

GLOBAL AND NATIONAL DEVELOPMENT TRENDS DIGITAL ECONOMY

Monograph

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1. POTENCJAŁ GOSPODARCZY UKRAINY NA TLE KRAJÓW KANDYDUJĄCYCH DO UNII EUROPEJSKIEJ¹

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Wstęp. Po rozpadzie Związku Socjalistycznych Republik Radzieckich (ZSRR) Ukraina była pierwszym z nowych niepodległych krajów, który podpisał Układ o Partnerstwie i Współpracy między Wspólnotami Europejskimi i ich państwami członkowskimi a Ukrainą i w ten sposób wyraził chęć pogłębienia relacji z UE (Stankiewicz, 2013). Od tej pory minęło już prawie 20 lat, a Ukraina nadal przekonuje Unię Europejską (UE) o swoim potencjale gospodarczym. Do czasu upadku ZSRR Ukraina była drugą po Federacji Rosyjskiej najsilniejszą pod względem gospodarczym republiką związkową. W 1991 r. udział przemysłu w strukturze PKB kraju wynosił ponad 42 %. W strukturze ukraińskiej gospodarki istotną rolę odgrywał przemysł elektromaszynowy, wydobywczy i chemiczny oraz kompleks militarno-wojskowy (Bazhenova, 2021). Mimo znacznego potencjału gospodarczego od czasu uzyskania niepodległości Ukraina nie wykazała wzrostu gospodarczego nawet zbliżonego do innych krajów Europy Środkowo-Wschodniej (Business Insider Polska, 2022).

W ciągu ostatnich dziesięciu lat na drodze integracji Ukrainy do UE zaszły wydarzenia, które miały decydujący wpływ na rozwój gospodarki ukraińskiej. Aneksja Krymu i zajęcie przez Rosję wschodnich regionów Ukrainy doprowadziły do zerwania współpracy między tymi krajami w wielu dziedzinach (Mroczek, 2022). Konflikt z Rosją przyczynił się do zamrożenia inwestycji zagranicznych oraz ogromnego wzrostu inflacji, co w znacznym stopniu osłabiło ukraińską gospodarkę (Business Insider Polska, 2022). W tym czasie został podpisany Układ o Stowarzyszeniu między Unią Europejską a Ukrainą, w ramach którego stosowana jest umowa o pogłębionej i kompleksowej strefie wolnego handlu (DFTCA).

Na tle wymienionych wyżej wydarzeń pozostają jednak pytania, jak zmieniał się potencjał gospodarczy Ukrainy w trakcie jej akcesji do UE oraz czy poprawiła się konkurencyjność Ukrainy na tle innych krajów kandydujących do UE. Podjęta analiza danych statystycznych w zakresie potencjału gospodarczego Ukrainy oraz innych wybranych krajów ma na celu próbę odpowiedzi na te pytania.

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Przegląd literatury. Aktywizacja aspiracji Ukrainy wobec UE zaowocowała wzrostem publikacji naukowych na temat europejskiej integracji kraju. Jednak przedmiotem badań w tych pracach są przeważnie poszczególne zagadnienia dotyczące integracji gospodarki Ukrainy z UE (Babenko, Biletska, & Pelyak, 2019; Grytsenko, Borzenko, & Burlay, 2021; Pidorycheva, 2021; Sologub, 2022; Soroka, 2022; Stankiewicz, 2013). Celem tej pracy jest kompleksowa analiza potencjału gospodarczego Ukrainy i jego zmian na tle wybranych krajów (w tym kandydujących do UE i Polski) w okresie przedwojennym, tj. w latach 2010-2020. Analiza porównawcza będzie obejmować kluczowe wskaźniki rozwoju gospodarczego kraju, takie jak tempo wzrostu PKB na mieszkańca, inflacja, bezrobocie, saldo pierwotne budżetu oraz saldo obrotów bieżących, które tworzą tzw. „magiczny pięciokąt” konkurencyjności kraju (Bieńkowski, 2000; Koberka, 2011; Matkowski, Rapacki, & Próchniak, 2014).

Rezultaty. Przystąpienie nowego państwa do UE stawia przed nim wyzwanie kształtowania gospodarki zdolnej do konkutowania zarówno na jednolitym rynku, jak i w skali międzynarodowej. Wynika to z kryteriów kopenhaskich, które zostały określone przez Radę Europejską na szczycie w Kopenhadze w 1993 r. Są to m.in. gospodarka rynkowa kraju starającego się o członkostwo oraz zdolność sprostania presji konkurencyjnej i siłom rynkowym UE. Pozostaje jednak pytanie, jaki stopień rozwoju gospodarczego jest wystarczającym dla spełnienia wymienionych kryteriów.

W dzisiejszych czasach szykuje się nowa duża fala krajów kandydujących do UE, które demonstrują stosunkowo niezbyt wysoki poziom rozwoju gospodarczego. Są to Albania, Czarnogóra, Gruzja, Mołdawia, Republika Macedonii Północnej, Serbia, Turcja oraz Ukraina¹. Analiza porównawcza podstawowych wskaźników makroekonomicznych wymienionych krajów wyznaczy, czy istnieje luka rozwojowa między tymi krajami. Z kolei włączenie Polski jako państwa członkowskiego UE do listy badanych krajów da możliwość pokazać, w jakim stopniu różnią się poziomy ich rozwoju gospodarczego.

Podstawowym miernikiem konkurencyjności kraju jest poziom PKB na mieszkańca. Pokazuje on dystans (lukę rozwojową), jaki dzieli kraj kandydujący od państw członkowskich UE. Przyjmuje się, że wysoki poziom tego wskaźnika świadczy o wyższej pozycji konkurencyjnej gospodarki konkretnego kraju w porównaniu z innymi krajami. Stanowi on jednak przybliżoną miarę potencjału gospodarczego kraju oraz wydajności pracy (Pilarska, 2017). Przeprowadzenie bardziej rozbudowanej analizy potencjału gospodarczego kraju może bazować się na wykorzystaniu metody „magicznego pięciokąta”, która obejmuje kluczowe wskaźniki rozwoju gospodarczego, takie jak tempo wzrostu PKB na mieszkańca, inflacja, bezrobocie,

¹ Podczas napisania pracy Bośnia i Hercegowina nie posiadała oficjalnego statusu kandydata do UE, a Gruzja wraz z Ukrainą i Mołdawią złożyła oficjalny wniosek o członkostwo w UE (dopiero później Gruzji odmówiono oficjalnego statusu kandydata do UE). Zatem na liście analizowanych krajów znalazła się Gruzja, a Bośnia i Hercegowina nie została włączona do tej listy.

saldo pierwotne budżetu oraz saldo obrotów bieżących (Bieńkowski, 2000; Koberska, 2011; Matkowski, Rapacki, & Próchniak, 2014).

Przed przejściem do porównawczej analizy wspomnianych wyżej wskaźników przedstawimy krótką ocenę ukraińskiej gospodarki na podstawie dynamiki poziomu dochodu narodowego na mieszkańca. Tabela 1, sporządzona na podstawie danych Banku Światowego, przedstawia poziom PKB na mieszkańca Ukrainy na tle wybranych krajów (w tym kandydujących do UE i Polski) w latach 2010-2020.

Tabela 1

Poziom PKB na mieszkańca wybranych krajów (w tym kandydujących do UE i Polski) w latach 2010-2020, w dolarach USA

Kraje	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ukraina	3078,4	3704,8	4004,8	4187,7	3104,6	2124,7	2187,7	2638,3	3096,6	3661,5	3724,9
Mołdawia	2437,5	2942,3	3045,7	3322	3328,8	2732,5	2880,4	3509,7	4230,4	4491,7	4547,1
Gruzja	3233,3	4021,7	4421,8	4623,7	4739,2	4014,2	4062,2	4357	4722,8	4698	4256,7
Serbia	5735,4	6809,2	6015,9	6755,1	6600,1	5589	5765,2	6292,5	7252,4	7417,2	7730,7
Albania	4094,3	4437,1	4247,6	4413,1	4578,6	3952,8	4124,1	4531	5287,7	5395,7	5246,1
Turcja	10742,8	11420,6	11795,6	12614,8	12158	11006,3	10894,6	10589,7	9454,3	9121,5	8536,4
Czarnogóra	6688,5	7328,9	6586,7	7186,4	7378,3	6514,3	7028,9	7784,1	8845,9	8910,7	7677,2
Macedonia Północna	4577,7	5098,1	4728,3	5241,1	5495,7	4861,6	5149,6	5450,5	6108,7	6070,4	5917,3
Polska	12613	13879,6	13097,3	13696,5	14271,3	12578,5	12447,4	13864,7	15468,5	15732,2	15742,5
UE	32970,7	35756,3	33158,9	34578,1	35286,1	30485	31186,6	33093,8	35752,2	35083,7	34173,5

Źródło: dane Banku Światowego

W 2010 r. wśród analizowanych krajów (tab. 1) Ukraina miała najniższy poziom dochodu narodowego na mieszkańca, z wyjątkiem Mołdawii, której wielkość PKB per capita była niższa o około 21 % niż Ukrainy. W latach 2010-2020 PKB na mieszkańca Ukrainy wzrósł zaledwie o 21 %, tj. znacząco mniej niż innych krajów kandydujących, przykładowo ten sam miernik dochodu Mołdawii zwiększył się o około 87 %. W efekcie w 2020 r. pod względem dochodu narodowego na mieszkańca Mołdawia wyprzedziła Ukrainę (w 2020 r. PKB per capita Mołdawii był wyższy o około 18 % niż Ukrainy). Po dziesięciu latach w 2020 r. przy wartości PKB na mieszkańca równej 3724,9 dol. Ukraina zajęła ostatnie miejsce wśród badanych krajów.

W analizowanym okresie zwiększyła się luka dochodowa nie tylko między Ukrainą i krajami kandydującymi (z wyjątkiem Turcji), lecz także względem Polski. W 2010 r. PKB per capita w Ukrainie był 4,1 razy mniejszy niż w Polsce, gdy po 10 latach - 4,22 razy. W latach 2010-2020 dość duża luka dochodowa dzieliła Ukrainę też od krajów UE. W badanym okresie PKB per capita Ukrainy był blisko 10 razy mniejszy niż średnia dla krajów UE. Podsumowując ocenę ukraińskiej gospodarki na podstawie dziesięcioletniej tendencji zmian dochodu narodowego należy stwierdzić, że inne badane kraje rozwijały się w tym czasie szybciej niż Ukraina.

Kontynuacją mierzenia potencjału gospodarczego kraju jest analiza tempa wzrostu PKB na mieszkańca. Odpowiednie dane dla wybranych krajów w latach 2010-2020 zawiera tabela 2. Należy zauważyć, że w analizie nie bierzemy pod uwagę rok 2020, ponieważ w tym roku prawie wszystkie badane kraje, z wyjątkiem Turcji, wykazały negatywne tempo wzrostu PKB na mieszkańca.

Tabela 2

Tempo wzrostu PKB na mieszkańca wybranych krajów (w tym kandydujących do UE i Polski) w latach 2010-2020, w %

Kraje	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ukraina	4,5	5,8	0,4	0,3	-4,9	-9,4	2,9	2,8	4	3,8	-3,4
Mołdawia	7,2	5,9	-0,6	9,1	5,1	0,5	5,6	6,5	6,1	5,4	-5,4
Gruzja	7	8,3	7,2	3,9	4,4	2,9	2,8	4,8	4,9	5,2	-6,8
Serbia	1,1	2,8	-0,2	3,4	-1,1	2,3	3,9	2,6	5,1	4,9	-0,3
Albania	4,2	2,8	1,6	1,2	2	2,5	3,5	3,9	4,3	2,5	-3,4
Turcja	6,9	9,5	3,1	6,7	3,2	4,3	1,6	5,8	1,4	-0,4	0,7
Czarnogóra	2,5	3,1	-2,8	3,4	1,7	3,3	2,9	4,7	5,1	4,1	-15,2
Macedonia Północna	3,1	2,2	-0,6	2,8	3,5	3,7	2,7	1	2,8	3,9	-5
Polska	4	4,7	1,3	1,2	3,5	4,3	3,2	4,8	5,4	4,8	-2,4
UE	2,1	2	-0,9	-0,3	1,3	2,1	1,8	2,7	1,9	1,8	-6

Źródło: dane Banku Światowego

Rosnąca luka w poziomie dochodu narodowego Ukrainy względem badanych krajów (tab. 1) była efektem jego wolniejszego tempa wzrostu, zwłaszcza w latach 2014-2015 (zob. tab. 2), gdy tempo wzrostu PKB per capita było ujemne (-4,9 % w 2014 r. i -9,4 % w 2015 r.). W latach 2016-2019 choć dynamika wzrostu PKB na mieszkańca Ukrainy była nieco wyższa niż Gruzji, Turcji oraz Macedonii Północnej, to pozostała niższa niż większości analizowanych krajów. Wszystko wyżej wymienione świadczy o wolniejszym wzroście gospodarczym Ukrainy w stosunku do innych krajów kandydujących do UE oraz Polski.

W literaturze (Misztal, 2010) za wskaźnik równowagi wewnętrznej kraju przyjmuje się poziom inflacji. Relatywnie wolnemu wzrostowi dochodu narodowego na mieszkańca Ukrainy względem badanych krajów towarzyszyła najwyższa inflacja (tab. 3).

Tabela 3

Stopa inflacji (PKB deflator) wybranych krajów (w tym kandydujących do UE i Polski) w latach 2010-2020, w %

Kraje	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ukraina	13,7	14,2	8	4,3	15,9	38,9	17,1	22,1	15,4	8,2	9,8
Mołdawia	33,3	8,2	7,4	3,9	6,4	9,6	5,7	6,3	3,2	5,4	5,4
Gruzja	14,2	8,7	0,5	1,3	4,2	5,8	2,6	8,5	4,4	5,2	7,3
Serbia	5,7	8,9	6,2	5,1	2,6	1,9	1,5	3	2	2,4	2,4
Albania	4,5	2,3	1	0,3	1,5	0,6	-0,6	1,5	1,5	1,2	-0,4
Turcja	7	8,2	7,4	6,3	7,4	7,8	8,1	11	16,5	13,9	14,8
Czarnogóra	1,6	1,2	0,2	2,1	1	2,2	5,1	3,8	3,2	2	-0,2
Macedonia Północna	2	3,7	1	4,5	1,4	2	3,5	2,8	3,9	0,9	1,1
Polska	1,7	3,3	2,4	0,3	0,5	1	0,3	1,9	1,2	3,2	4,1
UE	0,9	1,6	1,7	1,3	1	1	0,9	1,5	2	2,2	1,6

Źródło: dane Banku Światowego

Jeśli od 2011 r. w Mołdawii inflacja nie przekroczyła 10 %, to w Ukrainie w siedmiu na dziesięć lat była powyżej 13 %. W pozostałych krajach, z wyjątkiem Turcji, gdzie inflacja przekroczyła 13 % w latach 2018-2020, oraz Gruzji, gdzie inflacja w 2010 r. była powyżej 14 %, poziomy inflacji w analizowanym okresie były jednocyfrowe. Warto zauważyć, że w 2015 r. stopa inflacji w Ukrainie była ogromnie

wysoka, przekroczywszy 38 %. Dowodzi to szczególnie wysoką nierównowagę gospodarczą Ukrainy w analizowanym okresie. Większość przeprowadzonych dotychczas badań wskazuje na występowanie ujemnej zależności między inflacją i wzrostem gospodarczym kraju (Misztal, 2010). Potwierdzają to dane zaprezentowane w wyżej przedstawionych tabelach.

Kolejnym miernikiem potencjału gospodarczego kraju jest stopa bezrobocia (zob. tab. 4).

Tabela 4

Stopa bezrobocia (oznaczenie krajowe) wybranych krajów (w tym kandydujących do UE i Polski) w latach 2010-2020, w % całkowitej siły roboczej

Kraje	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ukraina	8,1	7,8	7,5	7,2	9,3	9,1	9,4	9,5	8,8	8,2	9,5
Mołdawia	7,4	6,7	5,6	5,1	3,7	4,7	4	3,9	2,9	5,1	3,8
Gruzja	20,2	19,6	19,6	19,4	17,4	16,5	16,6	13,9	12,7	11,6	18,5
Serbia	19,2	23	24	22,1	19,2	17,7	15,3	13,5	12,7	10,4	9
Albania	14,1	13,5	13,4	15,9	18	17,2	15,4	13,6	12,3	11,5	-
Turcja	10,7	8,8	8,1	8,7	9,9	10,2	10,8	10,8	10,9	13,7	13,1
Czarnogóra	19,6	19,8	19,8	19,6	18	17,5	17,7	16,1	15,2	15,1	17,9
Macedonia Północna	32	31,4	31	29	28	26,1	23,7	22,4	20,7	17,3	16,5
Polska	9,6	9,6	10,1	10,3	9	7,5	6,2	4,9	3,8	3,3	3,2
UE	9,8	9,8	10,8	11,3	10,9	10	9,1	8,1	7,3	6,7	7

Źródło: dane Banku Światowego

W latach 2010-2020 Ukraina utrzymywała stosunkowo stabilny poziom bezrobocia w przedziale od 7,2 % do 9,5 %. W analizowanym okresie odnotowano wzrost stopy bezrobocia w kraju o 17,28 %. Z kolei w tym samym czasie Polsce udało się obniżyć poziom bezrobocia trzykrotnie, a Mołdawii, Serbii oraz Macedonii Północnej dwukrotnie. W latach 2010-2015 poziom bezrobocia w Ukrainie był niższy niż ten sam średni wskaźnik dla państw członkowskich UE. Nadal ta sytuacja uległa zmianie i już od 2016 r. bezrobocie w Ukrainie było wyższe niż na obszarze UE. W 2020 r. stopa bezrobocia w Ukrainie była o 2,5 % wyższa niż przeciętny poziom bezrobocia w państwach członkowskich UE. Należy przy tym zaznaczyć, że w 2020 r. w badanej grupie krajów niskie bezrobocie odnotowano w Polsce (3,2 %) oraz w Mołdawii (3,8 %). W Serbii oraz w Ukrainie w tym samym roku bezrobocie utrzymywało się na poziomie 9 % - stosunkowo zbliżonym do przeciętnego poziomu na obszarze UE (7 %). W pozostałych krajach (Turcji, Macedonii Północnej, Czarnogórze) bezrobocie przekroczyło 10 %, a w Gruzji osiągnęło najwyższy poziom – 18,5 %.

Korelacja między wzrostem gospodarczym i bezrobociem charakteryzuje się złożonością i różni się w zależności od kraju (Kotłorz, & Sojka, 2017; Maleszyk, 2014; Pacho, & Garbicz, 2008). Warto też wspomnieć, że zgodnie z krzywą Phillipsa niskiemu bezrobociu często towarzyszy wysoka inflacja (Phillips, 1958). Na podstawie danych zawartych w tabelach 2-4 widzimy, że relatywnie wolnemu wzrostowi dochodu narodowego na mieszkańca Ukrainy oraz wysokiej inflacji w latach 2010-2020 towarzyszył stosunkowo niewysoki poziom bezrobocia.

Korelacja między wzrostem gospodarczym kraju i saldem pierwotnym budżetu państwa budzi wiele kontrowersji (Żabiński, 2022). Spróbujemy wstępnie pokazać

taką zależność na przykładzie Ukrainy i innych wybranych krajów. W tabeli 5 przedstawiono saldo pierwotne budżetu wybranych krajów (w tym kandydujących do UE i Polski) w latach 2010-2020. Wskaźnik ten ma na celu pokazać równowagę między dochodami i wydatkami w budżecie państwa bez uwzględnienia długu publicznego. Należy zauważyć, że w analizie nie bierzemy pod uwagę rok 2020, ponieważ w tym roku wszystkie badane kraje wykazały dość wysoki poziom deficytu budżetowego.

Tabela 5

Saldo pierwotne budżetu wybranych krajów (w tym kandydujących do UE i Polski)
w latach 2010-2020, w % PKB

Kraje	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ukraina	-4,14	-0,79	-2,38	-2,33	-1,15	3	1,87	1,45	1,36	1,11	-3,02
Mołdawia	-1,53	-1,37	-1,27	-1,12	-1,12	-1,19	-0,42	0,46	-0,05	-0,67	-4,46
Gruzja	-3,6	0,3	0,2	-0,44	-1,01	-0,21	-0,4	0,7	0,35	-0,6	-7,69
Serbia	-	-	-	-	-	-	-	-	-	-	-
Albania	-0,16	-0,35	-0,33	-2,01	-2,59	-1,62	0,96	0,65	0,91	0,13	-4,62
Turcja	0,85	2,42	1,34	1,36	1,09	1,08	-0,33	-0,27	-1,68	-2,27	-2,32
Czarnogóra	-	-	-	-	-	-	-	-	-	-	-
Macedonia Północna	-1,68	-1,73	-2,9	-2,92	-3,23	-2,32	-1,56	-1,37	-0,59	-0,8	-6,99
Polska	-4,91	-2,43	-1,11	-1,7	-1,68	-0,84	-0,68	0,08	1,2	0,63	-5,61

Źródło: dane Międzynarodowego Funduszu Walutowego

W latach 2015-2019 w Ukrainie odnotowano poprawę stanu finansów państwa, czego wyrazem jest osiągnięcie nadwyżki budżetu w kraju. W badanej grupie krajów w różnych okresach nadwyżkę miały również budżety Polski (w latach 2017-2019), Turcji (w latach 2010-2015), Albanii (w latach 2016-2019), Gruzji (w latach 2011-2012 oraz w latach 2017-2018) oraz Mołdawii (w 2017 r.). Porównując tempo wzrostu PKB na mieszkańca oraz saldo pierwotne budżetu badanych krajów w latach 2010-2020 widzimy, że uzyskane nadwyżki w budżecie Ukrainy nie odzwierciedlają jej należytego wzrostu gospodarczego. Pod tym względem możemy wstępnie przypuszczać o niedostatecznej skuteczności wykorzystywanych instrumentów polityki fiskalnej w procesie pobudzania wzrostu gospodarczego kraju (Żabiński, 2022).

W latach 2014-2020, z wyjątkiem 2019 r., relatywnie wolnemu wzrostu dochodu narodowego na mieszkańca Ukrainy towarzyszył wysoki poziom długu publicznego. Traktat z Maastricht nakłada na państwa członkowskie UE obowiązek unikania nadmiernego zadłużania – dług publiczny nie powinien przekraczać 60 % PKB (European Central Bank). W latach 2014-2020, z wyjątkiem 2019 r., Ukraina nie spełniała tego kryterium. Udział długu publicznego w PKB wynosił od 60 % do prawie 80 %. W grupie krajów kandydujących do UE w latach 2010-2019 wskaźnik ten nie przekroczył 50 % w Mołdawii, Gruzji, Turcji oraz Macedonii Północnej. Zapewne wysoki poziom długu publicznego był czynnikiem sprzyjającym zmniejszaniu się dynamiki wzrostu gospodarczego Ukrainy (Siudek, 2014).

Za miernik równowagi zewnętrznej kraju uznaje się saldo obrotów bieżących. Na jego wysokość wpływa wiele czynników, które odzwierciedlają eksport i import, terms of trade, międzynarodowe płatności bieżące, prywatne transfery dochodów i

przepływy krótkookresowych kapitałów. Korelacja między wzrostem gospodarczym kraju i saldem obrotów bieżących zależy od wielu czynników (Maciejewski, 2017; Matkowski, Rapacki, & Próchniak, 2014).

Tabela 6

Saldo obrotów bieżących wybranych krajów (w tym kandydujących do UE i Polski)
w latach 2010-2020, w % PKB

Kraje	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Ukraina	-2,1	-6	-7,9	-8,7	-3,4	5,5	-2	-3,1	-4,9	-2,7	3,4
Mołdawia	-6,9	-10,1	-7,4	-5,2	-6	-6	-3,6	-5,7	-10,6	-9,3	-7,5
Gruzja	-9,8	-12,2	-11,4	-5,6	-10,1	-11,8	-12,5	-8	-6,8	-5,5	-12,4
Serbia	-6,4	-10,3	-10,9	-5,8	-5,6	-3,5	-2,9	-5,3	-4,9	-6,9	-4,1
Albania	-11,4	-12,9	-10,2	-9,3	-10,8	-8,6	-7,6	-7,5	-6,7	-7,9	-8,8
Turcja	-5,7	-8,9	-5,4	-5,8	-4,1	-3,2	-3,1	-4,8	-2,8	0,7	-4,9
Czarnogóra	-20,6	-14,6	-15,6	-11,5	-12,4	-10,9	-16,2	-15,7	-17,1	-14,4	-25,9
Macedonia Północna	-2,1	-2,5	-3,3	-1,6	-0,6	-1,9	-2,9	-0,9	-0,1	-3,3	-3,4
Polska	-5,6	-5,4	-4,1	-1,8	-2,6	-0,9	-0,8	-0,4	-1,3	0,5	2,9

Źródło: dane Banku Światowego

W latach 2014-2020 Ukraina miała nadwyżkę lub stosunkowo niewielki deficyt salda obrotów bieżących w porównaniu do większości krajów kandydujących do UE, z wyjątkiem Macedonii Północnej (tab. 6). Porównując tempo wzrostu PKB na mieszkańca oraz saldo obrotów bieżących badanych krajów widzimy, że relatywnie wolnemu wzrostu dochodu narodowego na mieszkańca Ukrainy w latach 2014-2020 towarzyszyła pewna poprawa bilansu obrotów bieżących, co jest normalnym zjawiskiem w okresach stagnacji czy recesji kraju (Matkowski, Rapacki, & Próchniak, 2014). Ujemna zależność między stopą wzrostu PKB per capita a saldem obrotów bieżących głównie występuje w krajach o niższym poziomie rozwoju gospodarczego (Maciejewski, 2017).

Wnioski. W pracy podjęto próbę analizy zmian potencjału gospodarczego Ukrainy na tle wybranych krajów (w tym kandydujących do UE oraz Polski) w okresie poprzedzającym agresję Rosji na Ukrainę, tj. w latach 2010-2020. W okresie tym na ukraińską gospodarkę wpływały zarówno czynniki globalne (pandemia), jak i polityczne (konflikt z Rosją w wyniku aneksji Krymu i zajęcia wschodnich terytoriów Ukrainy). Niemniej jednak w tym okresie czasu Ukraina pogłębiła współpracę z UE poprzez podpisanie Układu stowarzyszeniowego i stosowanie umowy o wolnym handlu.

Przeprowadzona analiza porównawcza zmian gospodarki Ukrainy oparta na metodzie „magicznego pięciokąta” dowodzi, iż zmiany te były niezwykle anemiczne. Na rzecz takiej oceny świadczy najniższy poziom PKB per capita Ukrainy wśród analizowanych krajów w 2020 r., który był efektem jego wolniejszego tempa wzrostu w latach 2010-2020 w porównaniu do innych badanych krajów. Wysoka stopa inflacji w Ukrainie, która w większości lat badanego okresu była wyższa niż we wszystkich innych analizowanych krajach, świadczy o nierównowadze gospodarczej w tym kraju. W latach 2010-2020 Ukrainie udało się utrzymać stosunkowo niewysoki poziom bezrobocia. Lepsze wskaźniki bezrobocia miały tylko Polska (w latach 2014-2020)

oraz Mołdawia. W latach 2015-2019 choć Ukraina przywróciła równowagę budżetową oraz nieco poprawiła stan obrotów bieżących, to poziom zadłużenia publicznego systematycznie zwiększał się przyczyniając się do bardzo wysokiego poziomu zadłużenia. W sumie w badanym okresie wysoka luka rozwojowa Ukrainy względem innych krajów kandydujących do UE zwiększyła się.

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2. DIGITALIZATION DEVELOPMENT AND ITS IMPACT ON SERVICE INNOVATIONS

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Introduction. The modern world is living in the fourth industrial revolution era - a period in which digitization plays the most important role, giving virtual reality, the Internet of Things, artificial intelligence and robotics that has opportunity to change technology, work methods and lifestyle in general, as well as the humanity thinking design. This caused the emergence of new challenges for society. The information field format in today's conditions is rapidly changing and is actively implemented in all spheres of people's life and business, on the Internet, social networks, cloud technologies, devices, gadgets, etc. In many countries, digitalization is becoming an area of active implementation by the state itself: by stimulating business and society to digitize, building new national digital infrastructures, attracting private investors to create digital platforms in the service sector - from electronic payments to educational, medical, logistic, industrial, etc. [1].

The information and digital technologies use significantly accelerated the innovative development of many society areas: production, trade, logistics, marketing, taxation, the fight against corruption, medicine, education, sports, tourism, etc., which began to determine the economic development level and the country's population well-being as a whole. Digitization has become widely spread and used in the Ukraine economy as well. First, steps have already been taken to digitize the main socio-economic society spheres, and the prerequisites for developing a strategy for creating our own digital market have been formed. Despite the indicators that characterize the state of digitalization development and the implementation of digital technologies by business entities in Ukraine, it should be taken into account that digitalization is not a temporary trend today, but a mandatory requirement for the functioning of the modern

Ukraine economy, it is a complete rethinking of the business model, all processes transformation and the transition to the new innovative technologies and tools use [2].

Literature review. The prerequisites study and main trends of digitization analysis are given by the authors Varlamova M. and Demyanova Yu. in the work [3, p. 253-254]. Among the main trends, scientists singled out: the Internet of Things and production automation, digital design and modeling, virtual and mobile technologies. Favorable conditions for the penetration of digitalization into all spheres of human life are considered to be the global Internet traffic growth and the Internet penetration coefficient in the world regions.

The conceptual and definition analysis of "digitalization" was carried out by scientists Dubyna M. and Kozlyanchenko O. In most foreign sources, the "digitalization" concept refers to interaction technologies and methods, and Internet technologies are the existing prerequisites for the digitalization processes development [4, p. 23-25]. The state and features analysis of digitization and digital transformation in the EU countries was conducted by Y. Bocharova, O. Chernega, and T. Kozhukhov. In particular, the EU main strategic documents were analyzed and the priority directions of the EU countries digital transformation until 2030 were highlighted [5, p. 8]. Zhosan H. assessed the development state of digitization in Ukraine and analyzed the key aspects of digital transformation on the way to the business and society development in the "digital" direction [6, p. 46, 50].

The authors A. Todoshchuk and M. Shlaifer identified the main prospects of the economy digitization in Ukraine in the European integration conditions and highlighted the main areas of digitization active development and directions that need to be strengthened [7]. The role and necessity of digitalization in the business development was studied by many domestic and foreign scientists, in particular, they highlighted a number of advantages that business receives from the digital transformations implementation [8, p. 50]. The analysis of the digitalization impact on the enterprise business processes management was carried out by the author V. Yatsenko in the work [9].

Results. The era of digitization is only the beginning of profound changes and society and business rebooting. It significantly changes the way of life and state economy functioning. Currently, there are many definitions of the "digitalization" concept by domestic and foreign scientists. The most general definition of digitalization means the digital transformation of society and the economy. It describes the transition from the industrial era and analog technologies to the knowledge and creativity era, characterized by digital technologies and innovations in digital business (as defined by Innolytics) [10].

Digitalization can be characterized as a modern innovative stage of economic development, which is based on the integration of physical and digital resources in the sphere of production and consumption, in the economy and society [11].

The "digitalization" definition is interpreted by scientists as the process of using, applying, transferring and converting information into a digital format; it is a system

of data collection, storage, analysis, artificial intelligence application; transformation of the digital technologies penetration, regarding to the business processes optimization. Digitization is a transformational change aimed at the symbiosis of digitization and software [12, p. 15].

The reason for the rapid development and digitization penetration in all spheres of human activity is its ability to collect, use and analyze huge amounts of information (digital data) about almost everything. Such digital data is collected based on the analysis of "digital footprints" that remain on various digital platforms as a result of the individuals, social groups or enterprises activity. The global traffic volume based on the Internet Protocol (IP), which allows you to get a rough idea of the data flows scale, has grown from about 100 gigabytes (GB) per day in 1992 to 150,700 GB per second in 2022 (Fig. 1), which explained by the larger number appearance of new users on the Internet and the Internet of Things growth [3, p. 253].

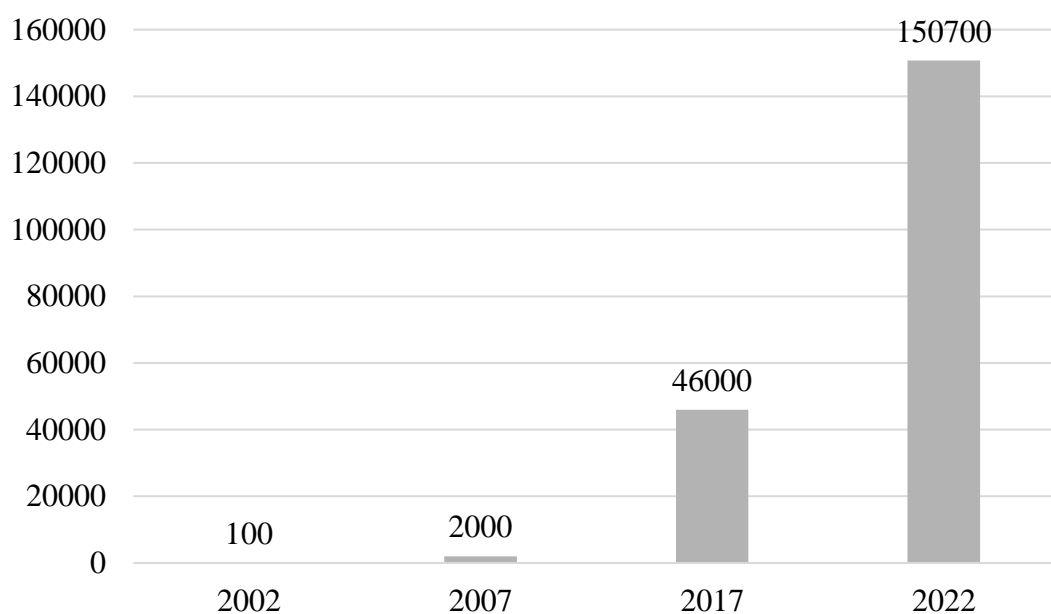


Figure 1. Global Internet traffic dynamics in gigabytes/second

Source: [3, p. 253]

Digital trends observed today cover almost all spheres of human life: from medicine and education to taxi calling, are characterized by the "Uberization" (a process characterized by the intermediaries rejection) of the economy and are carried out with the help of special digital technologies, applications and platforms [3, p. 253]. At the moment, there are four digitization directions, formed by the authors Kling Ya., Lamb R. (Fig. 2) [4, p. 27].

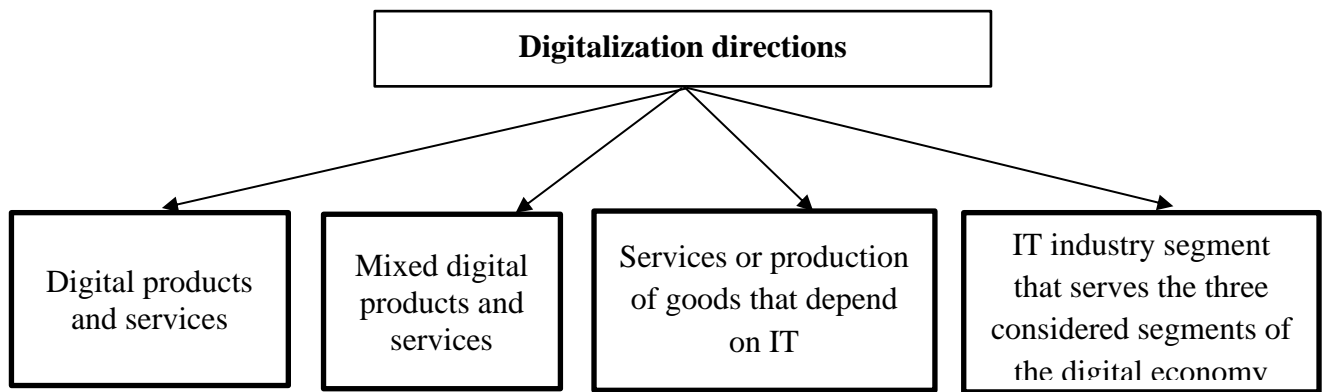


Figure 2. Digitalization directions

Source: developed by the authors based on [4, p. 27]

Digitalization contributes to the information space expansion, creating new information products and services, and helps to reduce information costs. This significantly speeds up and simplifies the search for information, its exchange, and helps strengthen cooperation between companies, as well as affects the interaction quality between the country's population and its government. Changes in economic processes, the production reorientation from the material goods creation to the services provision, the economy globalization are noted by scientists as the most important development signs of a new society type in the informatization and digitalization formation processes era. Despite numerous advantages, digitalization has certain disadvantages. The summarized analysis results of the digitalization advantages and disadvantages are presented in the table. 1.

Table 1

Digitalization process advantages and disadvantages for business and society

Digitalization advantages	Digitalization disadvantages
<ul style="list-style-type: none"> – increasing the level of business competitiveness, society and the state in general; – work simplification with information and data array; – communication improvement; – significant saving of financial and natural resources; – increase in the loyalty level of products and services consumers; – image growth of the enterprise and the state on the world market; – execution of processes speed and time saving; – speeding up the innovations implementation in business, society and at the state level. 	<ul style="list-style-type: none"> – growing need for highly qualified specialists; – the possibility to lose control and leakage of data to the outside (both enterprises and citizens); – the need for special software, technologies and equipment; – dependence on the Internet network stable operation and the equipment serviceability; – employees reduction due to robotization and processes automation; – the need to quickly respond to changing market conditions and challenges; – certain groups of society unreadiness to use digital technologies.

Source: developed by the authors based on [4, p. 27; 8, p. 50; 13]

The digital transformations processes are currently a key indicator of business and society development, as well as a guide for the future. Digitization is a requirement and condition for business competitiveness and economic development of society. Table 2 shows the digitization directions of the main activity spheres.

Table 2

Digitalization directions of the main activity spheres

№	Activity sphere	Digitization directions
1	2	3
1.	Banking sphere	Digital transformation of bank transfers Using Blockchain technologies Cloud technologies
2.	Financial market	Capital transfer to social networks IT specialists involvement to optimize business processes Use of cryptocurrency
3.	Consumer market	Using applications with built-in artificial intelligence The rise of cloud and edge computing Investment in product promotion in social networks
4.	Manufacture	Implementation of the digitization process of production technology Network production "Intelligent exploitation"
5.	Economy	Creation of "digital enterprises" Data digitization Use of cloud technologies
6.	Business	Development of a digital business strategy Online presence
7.	Education	Development and launch of educational platforms Use of cloud technologies
8.	Society	Merging the digital and physical worlds (artificial intelligence embedded in devices)

Source: developed by the authors based on [6, p. 48-50]

According to the Global Digital Overview report, at the beginning of 2023, more than 5 billion of the world's population are Internet users and spend 40% of their lives on it, but 2.9 billion people still do not use it. Although there was a 1.9% year-over-year increase in users, the overall trend in Internet popularity slowed as the average user reduced their daily time spent online by an average of 20 minutes. Below are the main indicators of world population digitization in 2023 [14]:

- 5.16 billion Internet users in the world, which is 64.4% of the world population;
- 6 hours 37 min. – average time spent on the Internet per day;
- 92.3% use the Internet from smartphones;
- 65.6% access the Internet from a computer.

The main share of Internet users falls on developed countries, namely the USA, EU countries, Japan - an average of 81% of the population, while the share of Internet use in developing countries is 40%, in countries with transition economies - 15%. Based on the results of Mastercard's research conducted among online users from 60 countries of the world, the index of Internet technologies users was calculated, which

was determined on the basis of four key factors and 170 indicators: access to the Internet and infrastructure development; consumer demand for digital technologies; state policy, laws and resources in this area; innovation in the country (including investments in technology and digital startups). Having analyzed the growth rates and the state of the digital economy, we can divide all countries into four categories [3, p. 255]:

I. The first category - leading countries: Singapore, Great Britain, New Zealand, UAE, Estonia, Hong Kong, Japan and Israel - demonstrate high rates of digital development and are leaders in the spread of innovations.

II. The second category – countries with slower growth rates: Western European countries, Scandinavian countries, as well as Australia and South Korea. For some time, these countries have shown constant growth, but at the moment they have significantly reduced the pace of development. Without the innovations implementation, they risk significantly falling behind the leaders of digitization.

III. The third category – promising countries: despite the fact that these countries show a relatively low overall digitalization level, they show a steady growth rate that attracts investors. These countries include: China, Kenya, India, Malaysia, Philippines, Indonesia, Brazil, Colombia, Chile, Mexico.

IV. The fourth category – problem countries: they include South Africa, Peru, Egypt, Greece, and Pakistan. These countries face challenges associated with a low level of digital development and slow growth rates. The leadership of these countries should study the adoption of which policy measures can increase the country's competitiveness.

Analyzing the research results conducted by Riverbed Technology in such developed countries as: USA, Brazil, Germany, France, China, Singapore, India, Great Britain, Australia (enterprises in the field of sales, transport, industry, healthcare were interviewed), 95% respondents noted the inability to implement digitization in their own business processes at the moment. First of all, they singled out the main problems on the digital transformation path: a limited budget, outdated network infrastructure, and as negative factors they noted the lack of end users work transparency, low personnel qualification and low management interest in the digital innovations implementation [8, p. 51].

One of the most important strategic documents in the EU countries, which defines digital transformations as the EU development basis until 2030, is Digital Compass: the European way for the Digital Decade. This strategic document determines that digital transformations in the EU by 2030 should implement the digitization of public services: all key public services should be available on the Internet; all citizens will have access to their electronic medical records; 80% of citizens should use digital identification solutions [15].

Digital transformations in EU countries are characterized by the following results [5, p. 12-13]:

1. 97% of households in EU countries have primary access to the Internet.

2. 58% of EU citizens have basic digital skills, 33% at a higher level, 61% have basic software skills. The level of digital literacy and competence varies depending on the age of citizens.

3. 85% of EU citizens countries constantly use the Internet, 9% have never used it.

4. The integration of digital technologies occurs mostly through the electronic information distribution (34% of enterprises), the social media development (25% of enterprises), the collection, storage and analysis of data - Big data (12% of enterprises), the use and administration of cloud technologies (18% of enterprises), the e-commerce development (18% of small and medium-sized enterprises in the EU trade online, 11% - the revenue share of small and medium-sized enterprises created due to the e-commerce development, 8% - the international sales share of small and medium-sized enterprises online).

5. 67% of Internet users in the EU use e-government opportunities, 66% of citizens use access to open databases.

New economic challenges and the process of Ukraine's integration into the European community dictate new requirements for the competitive business advantages formation and effective business management concepts. Digital transformation is a new development model for Ukraine based on digital computer technologies. New digital technologies make it possible to create huge amounts of information and distribute it among an almost infinite number of people - quickly, qualitatively and cheaply. As a result, the digitization process has covered all levels of modern society: public administration, economy management, business and everyday life of every citizen in Ukraine [11, p. 196].

As part of the digital transformation implementation in Ukraine, there is a problem of digital inequality, which is caused by two factors:

- lack of high-speed Internet (wired and mobile) in some settlements;
- digital literacy low level of population part.

88.8% of Ukrainian households have primary access to the Internet instead of the planned indicator of 95% by the end of 2023. The plans could not be implemented due to the full-scale invasion of the Russian Federation (Ukrainians left their homes, the infrastructure was damaged by shelling, part of the territories were under occupation). 47.8% of Ukraine population of aged 18 to 70 have digital skills below the "basic level" mark, and the number of those who do not have any digital skills is 11.2%. However, the level of electronic services use increased among the following age categories: by 52% among people aged 70 and over, by 30% among people aged 50-69, by 18% among people aged 30-49, by 11% among people aged 18-29 years old [14].

The International Institute for Management Development (IMD) compiles the annual World Digital Competitiveness Ranking, fig. 3 shows the dynamics of the assessment level of digitization in Ukraine. In the 2022 report, Ukraine ceases to be mentioned due to the military invasion of the Russian Federation and the access loss to data and their evaluation.

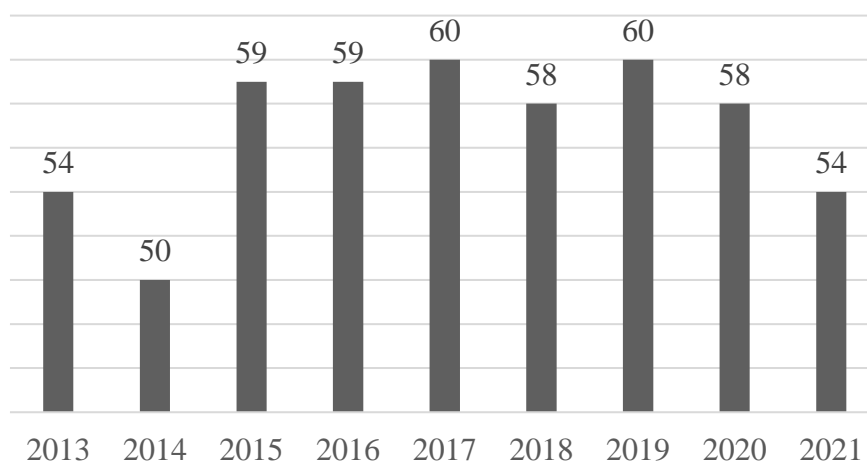


Figure. 3. Digitization level assessment dynamics in Ukraine for the period 2013-2022 (ranking)

Source: [16]

According to the Coursera Global Skill Report 2022 on the main trends in the development of specialist skills in the world, Ukraine entered the top ten of the best technical qualifications. Currently, there are about 90,000 such specialists. Almost 40% of all services that Ukraine exports to the foreign market are IT services. In 2022, Ukraine took 8th place in the ranking of IT skills and was recognized as an advanced country. Having assessed the level of skills in all spheres and directions, Ukraine was included among the progressive countries of the world and took 21st place in Europe. According to the results of 2021, the number of IT specialists increased from 244 thousand to 285 thousand. This branch of the economy is developing extremely fast. In 2021, the Ukrainian IT industry grew by 36%, over the past few years the industry has grown by more than 50% in terms of the number of specialists [11, p. 197].

Digital transformation in the areas of digital economy, digital innovation, digital skills development and digital rights of citizens has significant potential in Ukraine, which is confirmed by the following statistical data [17]:

1. Unlike traditional mass media (television, radio, press), the Internet is the only media that is growing in popularity among the population - 78% of Ukrainians use the Internet every day.

2. Ukrainians aged 18 to 40 spend an average of 16 more hours a month on the Internet than watching TV. Even while watching TV, half of Internet users use smartphones at the same time.

3. 9 of 10 Ukrainians aged 12 to 35 use the Internet. At the same time, the largest increase is shown by the audience over 45 years old. It has grown by 80% over the past 6 years.

4. The smartphone is the #1 device for Ukrainian Internet users of any age, and 31% of users use a smartphone for online shopping.

5. Messengers are replacing social networks. Telegram turned out to be the fastest growing, with a 600% increase in reach over the year.

6. Only 34% of the population from Ukrainian cities make online purchases.

7. Contactless payment using a smartphone grew 68 times, and in 2019 Ukraine entered the top 10 countries in terms of the contactless payments number.

8. The clothing category ranks first after electronics and household appliances among the most purchased items by Ukrainians on the Internet.

9. Since the beginning of the invasion of the Russian Federation and the blocking of Russian resources, their use by Ukrainians has significantly decreased, and foreign platforms (such as Facebook) have become new leaders among social networks for Ukraine.

In Ukraine, the first steps have already been taken to digitize the main socio-economic spheres of the population's life, and the prerequisites for developing a strategy for creating its own digital market have been formed. Ukraine Cabinet of Ministers Decree No. 67P of January 17, 2018 "On the development concept of the digital economy and society of Ukraine for 2018-2020." legal support for the digital economy development in Ukraine was launched. At that time, the main goal of digitization was to achieve the digital transformation of existing and the creation of new economy sectors, as well as the life spheres transformation into new, more efficient and modern ones [18, c. 27].

The key directions for achieving the aforementioned Concept goal are the development of digital infrastructure: broadband Internet coverage; educational processes digitization, which will give impetus to digital transformations in the education system, medicine, ecology, cashless economy, infrastructure, transport, etc. That is why the digitalization process has covered various spheres of modern society: state management, economy, business, and every citizen's daily life [17].

Digitization significantly facilitated the everyday life of Ukrainians and made it possible to speed up the processing of any information. At the moment, the digitization result is the service sector. There are more than 120 online services in Ukraine, which are located on the website guide.diia.gov.ua, on the portal of public services igov.org.ua, or in the electronic services office of the Justice Ministry. Online, you can apply for the status of an internally displaced person or apply for state assistance at the birth of a child, simply by submitting documents online; issue certificates and bank cards, change the name or surname in the passport, obtain a pension certificate, file for divorce, etc. By combining different data, you can get fundamentally innovative services. These services not only make life easier, but also reduce costs and increase labor productivity. Ukraine is the first country in the world where digital passports are used on a par with paper ones. Ukraine legalized digital passports in Diya, and from August 23, 2021, they are full analogues of paper 197 and plastic passports [17].

Conclusion. From the conducted literature review, it can be stated that the growth of digital transformation in the state contributes to the emergence of many new economic and social opportunities. Digital data can be used for economic development as well as for solving social problems. Thus, they can contribute to the economic and social indicators improvement, the innovations development and the country's position improvement in the international arena. More developed countries demonstrate better

indicators, which makes it necessary to take into account the patterns of their development in different countries. Digital platforms simplify transactions, networking and information sharing. From the point of enterprises view, the spheres and markets transformation under the influence of digitalization can contribute to the quality of goods and services improvement while reducing costs. Thus, digitalization can contribute to the economic and social indicators improvement, the innovations development and increased productivity.

In recent years, Ukraine has taken many steps forward towards the digitization of most life spheres, in particular, the state, commercial, medical and educational sectors. Although Ukraine still lags behind the most digitized states in terms of digital development, the personnel potential and trends among society give considerable confidence in the near future.

The main elements of the institutional influence on the digital transformation process of the national economy are: the state authorities' activities, the entrepreneurship institute functioning in the economy digitalization conditions, changes in the national mentality of society. The Ministry of Digital Transformation is the main body in the system of central executive bodies responsible for the national policy implementation in the digitization areas, digital development, digital economy, digital innovation, development of digital skills and citizens digital rights.

First of all, it is expedient to improve the legal framework for the regulation of e-commerce, to strengthen the investors rights protection in the digital industry, as well as to promote the attraction of foreign capital related to the digitization areas and e-commerce. The development direction, domestic legal regulation improvement of digitization is a promising direction for further research.

Summing up, we can say with confidence that the business spheres and social life digitalization in particular is a continuous process that will gain more and more momentum over the years and open new horizons for global development.

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3.NFTs AS THE NEXT STEP IN DIGITAL ECONOMY

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Introduction. Non-fungible tokens (NFTs) are a type of digital asset that represents ownership or authenticity proof of a unique item using blockchain technology. Each NFT has a distinct ID, and its ownership and transaction history are recorded using blockchain technology. In other words, NFT is a way for blockchain technology to certify ownership and tradeable rights to digital assets. Unlike cryptocurrency units, they cannot be exchanged like for like. They are unique for each item and, therefore, create a new way of authenticating [1]. Text, picture, video, audio, and game items can all be copied, but the token itself cannot be copied. Tokens are stored cryptographically on a blockchain, which is an immutable ledger that facilitates the process of recording transactions and tracking assets. An immutable ledger is permanent and immune to data corruption, as once the information is recorded, it cannot be altered.

These concepts are combined with the benefits of smart contracts. A smart contract is a precondition written into the code on a blockchain. If predetermined conditions are met and verified, computers execute actions like releasing funds to the appropriate parties, issuing tickets, sending notifications, etc. They are commonly used to automatically carry out an agreement, ensuring that all involved parties promptly know the result without the need for an intermediary or delays. The blockchain ledger is subsequently updated upon the culmination of the transaction [2]. NFTs enable the generation and exchange of distinctive digital assets and have the potential to create new economic opportunities and value streams. They have already shown significant potential for generating substantial returns for their holders, thus generating tangible value for both buyers and sellers.

Literature review. NFTs are a comparatively new phenomenon, so the literature on the topic is limited. Basic information can be found on cryptocurrency websites (e.g., Ethereum), websites of cryptocurrency exchanges (e.g., Binance), tech companies (e.g., IBM), NFT marketplaces, etc. Most scientific studies include an analysis of NFT creation, usage, popularity, and profitability. According to Popescu A. [3], NFTs empower artists and creators by providing tools for digital artwork control addressing issues like scarcity, counterfeiting, and piracy. Predominantly used in the digital content realm, NFTs have the potential to revolutionize ownership in various industries, including gaming and media. They offer artists global reach, direct sales without intermediaries, and the ability to implement royalty systems. NFTs may find broader applications in real-world utility, such as domain purchases and collateral for

crypto loans. While still in the early stage of development, the focus is on scalability, interoperability, and the emergence of new internet communities with decentralized micro-economies. The digital transformation, accelerated by the COVID-19 pandemic, creates vast opportunities for digital asset adoption and innovation.

A study on NFT traders and networks conducted by Nadini M. et al. [4] revealed that most traders specialize. The research also found that NFT collections often exhibit visual homogeneity. Additionally, the predictability of NFT prices was explored, indicating that past history is a significant predictor, while NFT-specific properties, like the visual features of associated digital objects, enhance predictability. Pinto-Gutiérrez C. et al. [5] analyzed the drivers of attention to nonfungible tokens. They found that Google search activity for the topic of NFTs in general and for specific NFTs is positively associated with major cryptocurrency returns. The pricing on NFT markets has been studied by Dowling M. [6, 7], who found it inefficient and often characterized by fraudulent behavior, which is characteristic of an early-stage market.

Brian E. and Lawrence J. T. [8] analyzed whether and when NFT can be considered a security, which is important in the context of legal regulations. Inter alia, they analyze the U.S. Securities and Exchange Commission guidance on Digital Assets. In the US, the Howey test investment contract analysis is the main vehicle for determining whether the sale of a cyber asset is a security.

Studies emphasize NFTs' potential to empower artists, revolutionize ownership across industries, and expand into real-world utility. Understanding the dynamics of NFT markets, including factors influencing pricing, liquidity, and market trends, requires ongoing research. This can help investors, creators, and platforms make informed decisions and adapt to the evolving NFT landscape.

Results. Non-fungible tokens hold worth as they serve as proof of authenticity for a non-interchangeable asset. This attribute renders these assets unique and one-of-a-kind. Therefore, NFTs are unique tokens created on a specific blockchain. However, if an NFT is listed or sold on one platform, that transaction is specific to that platform's marketplace. It doesn't automatically synchronize with other platforms. In other words, owning an NFT on one platform doesn't grant you ownership of the same NFT on a different platform. Some platforms might have partnerships or integrations that allow for cross-platform visibility or trading. For instance, certain marketplaces might use a shared standard (like ERC-721 or ERC-1155 on Ethereum) [9] that allows NFTs to be recognized and used across multiple platforms that support that standard. It's important to check the specific features and interoperability options of each platform to understand how they handle NFTs and whether they can interact with other marketplaces or applications.

The idea of NFT originated in 2012 with the introduction of the Colored Coins project on the Bitcoin blockchain. However, it became popular only in 2017 with the introduction of CryptoKitties, a game allowing users to breed and exchange digital cats [10].

The concept of NFTs is still evolving. NFTs can function autonomously for various operations or integrate as a component within the broader blockchain

ecosystem. For example, integration with FinTech, especially with decentralized finance, presents numerous opportunities for FinTech innovation. NFTs have the potential to create new economic opportunities and streams of value. They enable the generation and exchange of unique digital assets. For example, the most valuable NFT is worth more than \$91.8 million, and an estimated 250,000 people trade NFTs each month on OpenSea (the most popular NFT marketplace) [11].

The value of NFTs is largely determined by supply and demand. As demand increases due to factors such as rarity, utility, and speculation, the price of NFTs increases. NFT markets are generally considered less liquid than markets for fungible assets such as cryptocurrencies or financial securities because they are non-fungible and, therefore, have no equivalent. Some main factors determine the value of NFT. These are the underlying value of the asset, the value behind the creator, potential value in the future, the perception of the buyer, market value of similar assets. Determination of the value of an NFT depends on what the NFT represents. Pricing in crypto art and collectibles is very similar to pricing any other piece of art or collectible. It is necessary to understand the history of the work, its artistic value, and market demand. The value associated with each NFT can also be determined by basic metrics such as rarity, utility, tangibility, and ownership history. If an NFT is part of a limited edition or series, specific numbers are often more valuable than others [12].

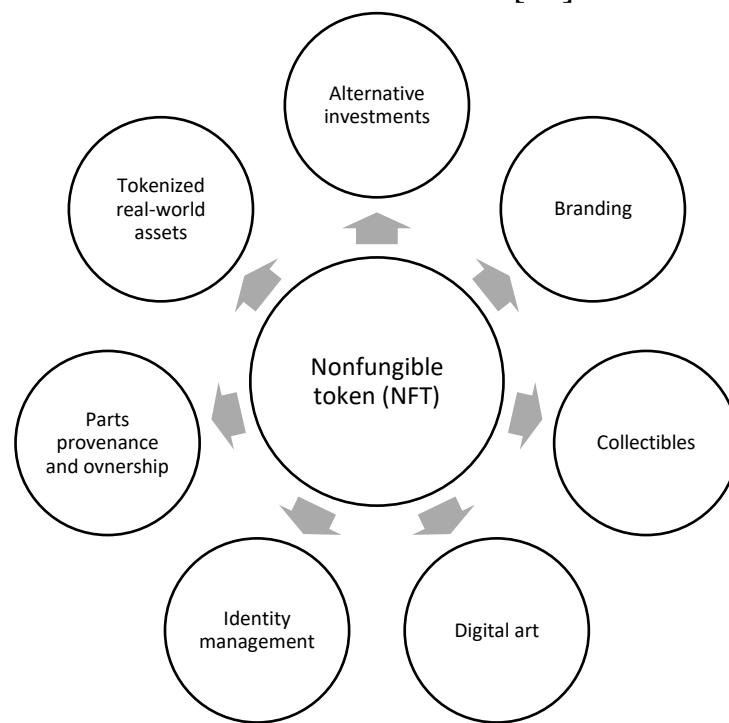


Exhibit 1. NFT use cases.

Source: Developed by the author based on [12]

NFTs also offer an innovative way to reward the creators rather than the ultimate owners. The smart contracts behind the NFTs can be programmed to pay out rewards to various predefined blockchain addresses. The original creator of an NFT can set up

creator earnings that will be credited to the original creator whenever the NFT is sold. Possible ways of application of NFTs are presented in Exhibit 1.

Therefore, the NFT is a type of digital asset created on the blockchain using a smart contract according to existing token standards, represents ownership of a commodity that exists online or is a virtual representation of something that exists in the physical world (an image, animation, video, etc.), which is exclusive and attests to its originality. In other words, NFTs serve as proof of ownership, providing a tamper-proof way to prove mathematically that a particular address on the blockchain is the owner of that object. Owning an NFT does not give an exclusive right to use its content. A person doesn't buy the content itself but the part of the code that links to the object behind the NFT (artwork, document, piece of music, ticket, digital file, etc). Ownership copyright of the digital artwork is not passed to the buyer of the NFT. The NFT can also be used as the Certificate of Authenticity, which ensures that any form of multimedia object can be traced back to its source and prove that the object has not been tampered with since NFT creation.

There are different marketplaces for NFT. The platforms usually earn by charging fees for each trade. Among the most popular NFT Marketplaces are OpenSea, CryptoPunks, Rarible, SuperRare, Binance, NBA Top Shot, Nifty Gateway, Blur, KnownOrigin, Foundation, etc. They trade in one, all, or some of the following categories: utility, collectibles, trading cards, art, domains, virtual worlds, sports, gaming assets, sports, and music. They use different blockchains like ETH, MATIC, KLAY, SOUL, NEO, BSC, AVAX, CRO, WAX, ERN, etc. Different payment methods are possible on the platforms. Most of them use cryptocurrencies; some accept credit cards, and some even PayPal [13, 14]. OpenSea is an obvious leader in the NFT market (See Figure 1). Blockchains used on this platform are ETH (most popular), MATIC, or KLAY, and all categories can be traded except music and sports.

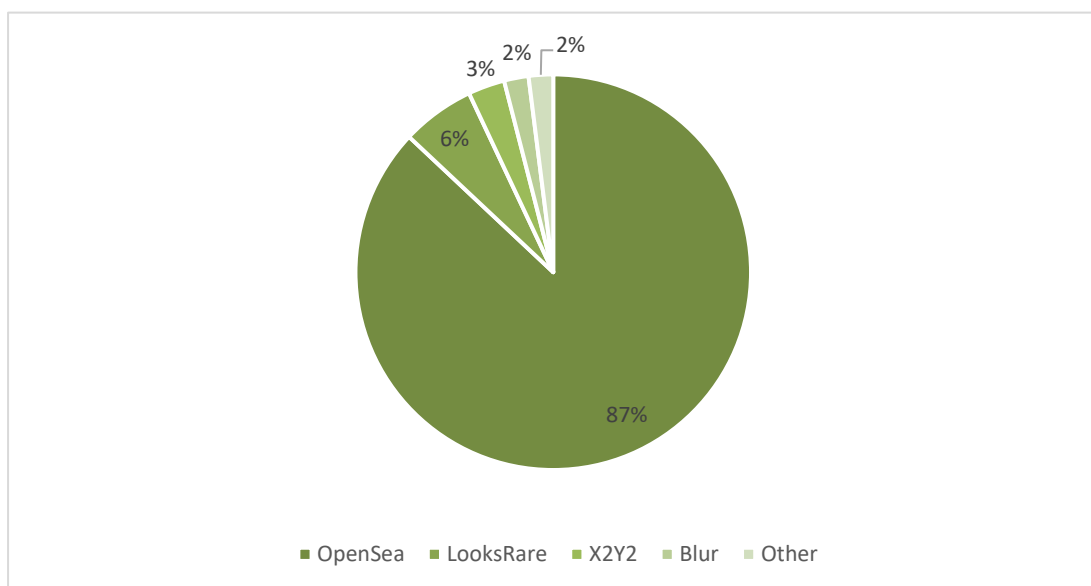


Figure 1. Key players in the NFT market brand shares

Source: Developed by the author based on [15]

There is a comparatively simple way to create NFT. First, a decision must be made about which blockchain to use for creating the NFT. Ethereum is the most popular choice, but other platforms like Binance Smart Chain, Flow, and others also support NFTs. Then, a compatible cryptocurrency wallet must be created to interact with the blockchain. It should support the chosen blockchain. The next step is to connect to a Marketplace or Minting Platform. Some platforms, like OpenSea or Rarible on Ethereum, allow you to mint NFTs directly on their websites. Alternatively, a service like Mintable or Mintbase that specializes in NFT creation can be used. If using a platform, there will be an option to create or mint an NFT. This process involves providing details like the title and description and uploading the digital file to tokenize. Some platforms may also allow to set royalties – a percentage each time the NFT is resold. If using Ethereum, be aware of gas fees. A gas fee refers to a transaction fee or the fee required to execute contracts on the Ethereum network. They can be high during periods of network congestion. After minting, metadata may need to be uploaded. This is information about the NFT, such as title, description, creator details, and a link to the digital file. Once minted, the NFT's ownership is recorded on the blockchain. This information is immutable and publicly accessible. After that, the creator can view his/her NFT on the platform and will receive a unique identifier (the token ID) for it. NFT can be listed for sale on the platform's marketplace, kept in a wallet, or displayed in virtual galleries. Each platform may have slight variations in the minting process, and some platforms might have additional features like unlockable content, auctions, or additional customization options [16, 17].

Most of the NFTs are built on the Ethereum blockchain. Therefore, it is interesting to compare the fluctuations of Ethereum and NFT prices in USD. As we can see from Figure 2, the fluctuations are similar in many ways. However, Dowling M. (2022) [7] found that the pricing dynamics of NFTs appear notably different from the volatility transmission observed in cryptocurrency pricing. To affirm the low-correlation status of NFTs in relation to other assets, additional exploration of NFT pricing is essential. According to the study of Ante L. in 2021 [18], the NFT markets are still immature or even inefficient.

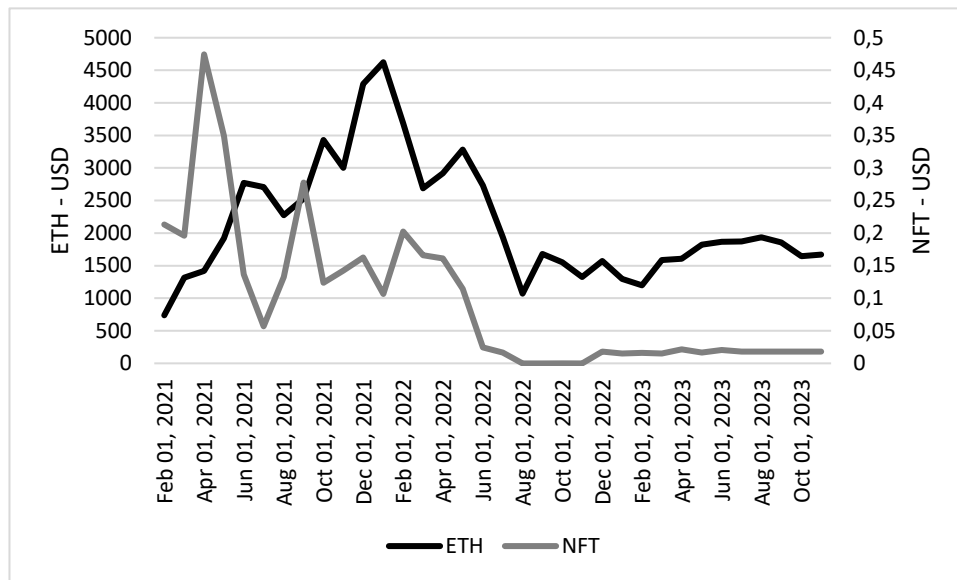


Figure 2. Ethereum and NFT average prices in USD

Source: Developed by the author based on [19]

The average price of NFTs is small because there are many NFTs with minimum prices. Nevertheless, according to Statista [15], the revenue in the NFT market is projected to reach 1,601.0 million USD in 2023, and the average revenue per user in the NFT market amounts to 114.8 USD. The penetration rate is projected to be 0.18% in 2023. The number of NFT users is constantly growing, as are general revenues (see Figure 3). However, the average revenue per user is not so stable. It was 2,5 in 2018; in 2019 fell almost to 0, then rose again to 2,5; in 2021, it was as high as 109,7 and a little lower again in 2022, constituting approximately 86,6 USD [15].

Dowling M. [6] has studied the pricing of virtual real estate (land parcels) in Decentraland, which is the largest blockchain virtual world. He found out that the land NFTs price is characterized by both inefficiency and a steady rise in value. He explains those pricing inefficiencies, coupled with a notable and swift increase in value by it being an early-stage market where the quest for suitable pricing models tends to be volatile, and market efficiency emerges gradually. Possible factors contributing to this could also include market manipulation in pricing or other fraudulent activities, given the historical impact of fraud in the realm of cryptocurrencies. Growth in popularity also contributed to the price growth of NFTs in 2021 [5].

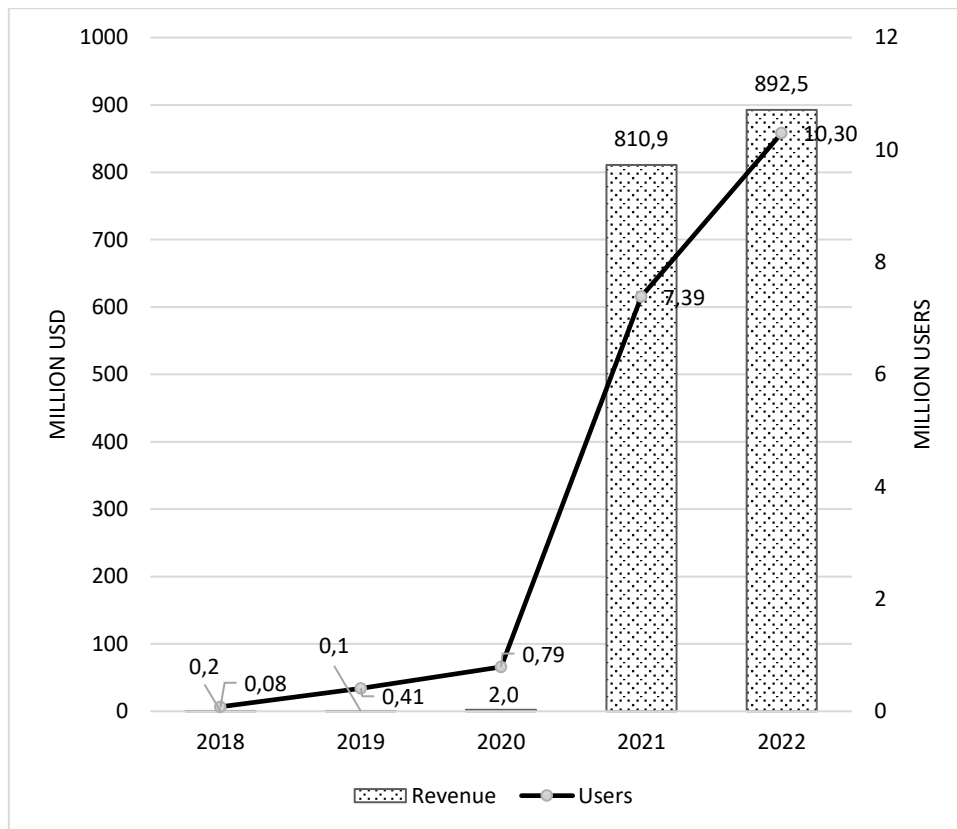


Figure 3. NFT revenue and number of users

Source: Developed by the author based on [15]

Many legal systems are still catching up with the rapid growth of NFTs and blockchain technology. Some jurisdictions have taken steps to address the legal status of NFTs, but others may not have specific regulations in place. NFT ownership is primarily recognized in the digital realm, proving ownership of a unique digital asset on a blockchain. However, translating this ownership into legal rights over a physical, real-world asset (like a piece of art, real estate, or a collectible) might require additional legal mechanisms. Smart contracts associated with NFTs may include terms that define the rights and responsibilities of the parties involved. These terms can be legally binding, but enforcing them can be complex and may require legal action. If an NFT represents a digital representation of copyrighted material, the ownership of the NFT does not grant copyright ownership. Copyright laws still apply, and rights holders maintain control over the reproduction, distribution, and display of the underlying content. Laws related to fraud and misrepresentation may apply if there are false claims about the nature, ownership, or value of an NFT. Some jurisdictions are exploring or have implemented legal frameworks for tokenizing real-world assets (like real estate or company shares). This involves creating digital tokens (sometimes NFTs) to represent ownership of these assets. These tokenization efforts often require compliance with securities laws. If an NFT just represents a single entity ownership of a unique digital asset and no other rights are entitled, issuing NFTs will usually not involve securities laws. But if we consider, for example, fractionalization and presales of NFTs for a not-yet-built game with certain revenue rights to the owners of NFTs,

securities law may be applicable. The three specific scenarios with NFTs are proposed by Gatto J. [20] when one should seek securities advice. Those are NFT fractionalization; NFTs representing a right to revenue stream (owner gets a share of future revenue); and pre-sale of NFTs that have no current use but are used to raise money (e.g., when the game is being built).

The U.S. Securities and Exchange Commission is exploring whether NFTs are being used to raise money like traditional securities and has already charged LA-Based Media and Entertainment Co. Impact Theory and Creator of Stoner Cats Web Series for the unregistered offering of NFTs [21, 22]. When it comes to the regulatory environment for NFTs in Germany, the Federal Financial Supervisory Authority proceeds in the same way as when examining fungible tokens. To date, German authorities are not aware of any NFTs that can be classified as securities in the regulatory sense. On one hand, tokens have so far lacked embodied security-like rights. On the other hand, NFTs usually have individual rights and content, so standardization and, thus, tradability in the sense of the regulatory definition of securities is not possible. However, it cannot be ruled out that NFTs will be classified as securities in the future [23]. As of now, there exists no unified EU framework governing crypto assets and services. Each member state adheres to its own national regulations, if any. However, since 2023, the Markets in Crypto Assets Regulation (MiCAR) is being developed. MiCA establishes standardized market regulations for crypto assets across the EU.

This regulation applies to crypto assets that currently fall outside the scope of existing financial services laws. It includes crucial provisions regarding the issuance and trading of crypto-assets, encompassing asset-reference tokens and e-money tokens. These provisions pertain to aspects such as transparency, disclosure, authorization, and transaction supervision. This development is viewed as a positive signal for the European Fintech market, promising a future of transparency and security in crypto-related business. The ongoing effort to establish practical regulations and solutions appears to have made substantial progress with the current draft. The draft reflects the EU's willingness to address practical solutions for crypto assets, considering prevailing technical standards while ensuring adequate security. MiCAR's entry into full application is planned for December 2024 [24]. In Ukraine, a draft law on the taxation of crypto operations has been submitted to Verkhovna Rada and is now for consideration by the head of the Verkhovna Rada. It was introduced in June by the National Commission for Securities and the Stock Market, and they implemented the EU Regulation on crypto-asset markets (MiCA) regulations into the law. It includes NFT-market regulations [25].

The sale of digital artwork "Everydays" created by the artist Beeple for \$69.3 million, conducted by Christie's, is noteworthy as it represents a purely digital NFT work sold by the prestigious auction house, adding further legitimacy to the emerging form of digital originals. Other notable NFT transactions, such as the sale of the Nyan Cat meme, have contributed to the market's expansion [26].

Concerning further developments of NFT, they can be used not only for digital art and collectibles but also for physical assets. They can provide a digital certificate

of authenticity that verifies the ownership and lineage of a physical asset. Thus, the authentication process for both buyers and sellers becomes easier, mitigating the risks associated with fraud and disputes. NFTs also introduce the concept of fractional ownership, allowing multiple investors to collectively own a share of high-value physical assets like real estate or luxury cars. Utilizing NFTs for physical assets enables the tracking of ownership. This establishes a transparent and immutable record, valuable for monitoring the asset's value, legal standing, and maintenance history. But this process is not without challenges. Legal recognition and regulatory compliance pose significant hurdles, as existing frameworks may not acknowledge or regulate NFTs, leading to potential uncertainties and legal complications. Additionally, the technical infrastructure and widespread adoption of blockchain technology and NFTs present barriers, requiring expertise for effective implementation and use. This technical complexity may impede the broader acceptance of NFTs for physical assets.

There is a growing opportunity to merge NFTs and DeFi. DeFi and NFTs stand out as the prominent trends in the current cryptocurrency market, representing the leading applications of blockchain technology. NFTs specialize in asset tokenization, whereas DeFi offers unrestricted entry to financial services while maintaining user identity confidentiality. NFTs can contribute to DeFi in numerous ways. The capability of NFTs to authenticate ownership provides assurance to DeFi projects regarding the value of digital assets. Concurrently, the participation of DeFi in NFT markets enhances interoperability and boosts liquidity. NFTs are reshaping the fintech landscape by offering a novel method for individuals to establish ownership of distinctive digital assets. This transformation introduces fresh revenue streams for creators and enhances liquidity for digital assets [27]. NFTs are making their mark in the DeFi ecosystem, with intersections between design patterns and NFT marketplaces becoming increasingly prevalent. Projects like Rarible in decentralized finance offer a creator-centric NFT marketplace featuring a governance token called RARI. Operating under a Decentralized Autonomous Organization (DAO), Rarible enables token holders, including creators and collectors, to actively engage in platform governance, voting on improvements and moderating the marketplace. RARI also introduces an NFT index, serving as a portfolio for collectors to assess and choose artworks for investment.

The combination of NFTs and DeFi presents innovative solutions to challenges in decentralized finance. NFTs facilitate collateralization in DeFi, allowing borrowers to secure loans by offering NFTs as collateral, thereby addressing liquidity concerns, especially in markets like art and collectibles. The concept of fractional ownership enables broader access to high-value NFTs. The curve model, a liquidity distribution strategy, encounters resolution through the integration of NFTs and DeFi, allowing liquidity providers to customize price sizes. NFT ownership in DeFi is transforming the music industry, providing creators with revenue shares and verifiable income through streaming and reselling. NFTs also serve as collateral, offering access to undercollateralized loans and addressing licensing, royalty sharing, and copyright ownership issues. To sum up, the specific use cases of NFTs in DeFi include loan collateralization, fractional ownership to enhance liquidity, insurance transformation

with NFT-based policies, efficient debt management, NFT staking benefits, and using NFTs for DeFi governance, where certain NFTs confer voting rights. Various platforms, such as Arcade, Genesis, NFTfi, and TrustNFT, facilitate loan requests, demonstrating the practical integration of NFTs into the decentralized financial landscape [28].

NFTs hold significance in the realm of Web 3.0, seen by numerous vendors and observers as the upcoming iteration of the internet. Web 3.0 is anticipated to be blockchain-centric, substantially relying on cryptocurrency and NFTs for various commercial activities. This trend extends to the metaverse, an evolving 3D virtual world gradually taking shape through the utilization of Web 3.0 technologies. The metaverse is a simulated digital realm that integrates various technological elements, such as blockchain, augmented reality, virtual reality, and mixed reality, along with social media concepts. The goal is to create immersive settings that simulate the real world, enhancing user engagement. The metaverse is a conceptual 3D digital environment that users can potentially access through VR headsets. Within this virtual space, users can customize their virtual avatar, explore numerous locations, and furnish their virtual homes with preferred items. Interactions with others, task completion, gaming, and the emulation of daily activities are common in metaverses. NFTs have become linked to various resources designed to address issues related to digital artifacts in the metaverse [29].

In the evolving landscape of Web3, the traditional approach of competing for consumer attention is transforming. Instead of companies flooding the marketplace for attention, the emphasis shifts toward rewarding and empowering consumers. Web3 technologies, particularly utility NFTs and blockchain, enable deeper connections between brands and communities. Beyond being a social flex, NFTs hold the power to deliver mission-critical access, imbued with smart contracts that unlock perks, products, events, and experiences. Web3 allows for deeper engagement and ownership in the brand's story. Brands can cultivate an incentivized and driven community, recognizing loyal brand ambassadors and repeat customers on the blockchain. Through utility NFTs, consumers hold a stake in the brand, receiving rewards and fostering a sense of belonging. The direct relationship fostered by Web3 can lead to increased profits, allowing companies and creators to tailor high-value NFTs with specialized incentives. The shift to Web3 infrastructure is seen as a paradigm that future-proofs and democratizes intellectual property, marking a fundamental change in the business landscape [30].

Despite the growing interest and advancements in the field of non-fungible tokens (NFTs), there are several key areas to address:

- the development of comprehensive regulatory frameworks that can address legal challenges, investor protection, and ensure the responsible growth of the NFT market;

- the development of standards for better interoperability between different blockchain networks. This would enhance the seamless transfer and recognition of NFTs across various platforms;
- the enhancement of the security of smart contracts to prevent vulnerabilities, fraud, and potential exploits that could impact the integrity of NFT ownership and transactions;
- the exploration and implementation of sustainable practices, such as eco-friendly blockchain technologies, to lower energy consumption and mitigate the environmental footprint of NFTs;
- the exploration of NFTs' integration with traditional assets, such as real estate or company shares;
- the promotion of responsible NFT practices to help users navigate the complexities of the NFT ecosystem.

Addressing these areas can contribute to the responsible development of the NFT ecosystem, ensuring its sustainability, security, and positive impact on various industries and stakeholders.

Conclusions

Non-fungible tokens represent a revolutionary way to authenticate and trade digital assets on the blockchain. Their uniqueness and blockchain's immutability create a tamper-proof system for ownership verification. NFTs, created through smart contracts on platforms like Ethereum, serve as proof of ownership for virtual or physical assets. However, their value is influenced by factors like rarity, utility, and creator reputation. There is a discussion about whether NFT markets, especially Ethereum, exhibit fluctuations similar to cryptocurrency markets. While average NFT values vary, the overall market revenue is projected to grow significantly, attracting a rising number of users.

Legal systems are adapting to NFTs, recognizing ownership in the digital realm. Challenges include translating digital ownership into legal rights for physical assets. High-profile sales, like Beeple's "Everydays" at Christie's, mark NFTs' legitimacy. NFTs are poised to extend beyond digital art, entering physical asset authentication and fractional ownership.

NFTs play a pivotal role in the emerging Web 3.0 era, shaping the metaverse and transforming brand-consumer relationships. Utility NFTs in Web3 incentivize consumer engagement, offering perks and fostering a sense of ownership.

NFTs can offer a groundbreaking approach to verifying ownership and facilitating transfers of physical assets, such as real estate and vehicles. The benefits include enhanced authenticity, traceability, and fractional ownership, opening new avenues for investors and asset owners. However, challenges like legal recognition and technical adoption are crucial for ensuring the sustained viability and growth of NFTs in the realm of physical assets.

In conclusion, NFTs continue to evolve, presenting opportunities and challenges across various domains. Their integration with DeFi, changes in the legal landscape, and role in the Web 3.0 paradigm indicate a dynamic future for NFTs. They offer

innovative solutions that may change how we perceive, own, and engage with digital and physical assets.

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4. METHODOLOGICAL APPROACH TO INFORMATION SUPPORT OF INNOVATION ACTIVITIES IN THE CONDITIONS OF ECONOMY DIGITALIZATION

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Introduction. Fast scientific and technical progress brings about the emergence and rapid spread of new information technologies in society – the so-called society digitalization. The economic systems of many countries are searching for effective ways of using the achievements of society digitalization for economic growth. One of the strategic goals of Ukraine is development of the digital economy, which is characterized by the growing efficiency of economic activities of subjects at the expense of using the achievements of society digitalization.

The basis for the development of the digital economy has been created for several decades. Until now, the widespread expansion and use of information technologies (hereinafter IT) and the Internet have triggered the formation of an information technology paradigm of a new quality society. Information resources and technologies have been combined into an aggregate, where a variety of IT forms single properties for subjects. For example, digital information and communication technologies connect thousands of online course providers and millions of online listeners around the world. Therefore, it can be affirmed that the process of radical transformation of business relations into digital ones, which are carried out in the electronic environment due to the constant processing of digital data in real time, has begun [1]. Increasingly, the client's search and selection of market offers takes place on a digital platform, which replaces e-mail, online stores and telephones in business

communications. A widespread example is the digital transformation of the passenger transport market, but in many other types of economic activity (banking, education) qualitative changes in the information technology paradigm are also an impetus for creating innovations [1, 2].

The achievements of society digitalization include the following: active use of IT by citizens in business and personal communications, which allows collecting data (digital footprints) about their activities, interactions with mobile applications, web services, place and time of events; growing popularity of a new channel for communication of business entities with customers and partners through messengers. Previously, these opportunities were not available for use in economic activities. As a result of the acceleration of information flows, the volume of scientific, technical and socio-economic information resources, which represent value for innovative activity, increases many times. The intensive development of the IT infrastructure leads to an increase in computing power available in the economy, which can be simultaneously used in the processing and transmission of a growing amount of information. The construction of regulatory and legal support in the field of IT and information use is important for the development of the country's digital economy.

The highlighted achievements of digitization should become a new source of innovative development of business entities in Ukraine, because these achievements result in the digital transformation of the basic elements of business models and processes. Namely, channels and methods of interaction with the client (supplier, partner) are replaced with digital ones, new sources of data collection and accumulation appear (Internet of Things, mobile computing devices, etc.), volumes of information and data grow exponentially [3]. Thus, the achievements of digitization can and should be used in all spheres of the economy. Ignoring the possibilities of digitalization will lead to the expansion of foreign developers and suppliers in Ukrainian markets.

Problem statement. It should be said that digitization as a stage in the development of the information society does not mean the automatic development of the digital economy. Digitization of society creates new opportunities for business entities, which can be realized through the creation and implementation of innovations in the business sector and public administration. Innovations in management, production or in the goods and services themselves are the main drivers of digital achievements in the activities of economic entities and the mechanism of their transition to it. In the conditions of digitalization, innovative activity, like other types of economic activity, is subject to significant transformations, consisting in the expansion of types of innovative resources and subjects.

Therefore, it can be affirmed that the innovative environment, where the interaction of subjects (commercial and non-commercial organizations, state administration bodies and individuals) and resources of innovative activity takes place, should include the achievement of society digitalization in order to ensure the development of the digital economy in Ukraine. However, when forming an innovative environment of the digital economy, it is necessary to take into account not only the positive effects of society digitalization, but also the growth of risks associated with information security,

imperfection of technologies, and the negative impact of digitalization on a personality. These important aspects must be considered in the context of the disciplines of legal, technical and psychological sciences.

Therefore, the problem of creating an innovative environment based on comprehensive information support, which will make it possible for economic entities to gain access to new types of resources of innovative activity in the conditions of society digitalization, is a big problem that can slow down the sustainable socio-economic development of Ukraine.

Results.

1. Studying methodological provisions of information support of innovation activity in conditions of digitalization

In current scientific studies of the economy, great attention is paid to the approaches and methods of providing information for innovation activities of business entities [4-6]. The change in the phase of socio-economic development from industrial to post-industrial (even informational) marked intangible intellectual assets as the main driver of economic growth [4]. Starting from the middle of the 20th century, the structure of GDP of developed countries has been dominated by informational types of economic activity [5]. Industrial production of consumer goods was transferred to regions with cheaper resources for it. At the same time, the creation of intellectual assets by business entities of developed countries was expanded manifold.

The trend of society informatization increases its influence on the growth of the economy, the result of this was identification of a new source of growth – information resources [6]. The relevance of the tasks of information provision for innovative activities is increasing, as they include the effective transfer of content (information) for use in the process of creating innovations. Information support includes technologies and methods of using available information resources from external and internal sources.

The resources of innovative activity are in the external environment, an access to them is organized independently by the business entity through information support. Thus, through technologies, methods and means of information provision, the subject uses the most important information resources of the innovation environment to create effective innovations that form the basis of the digital economy (Fig. 1).

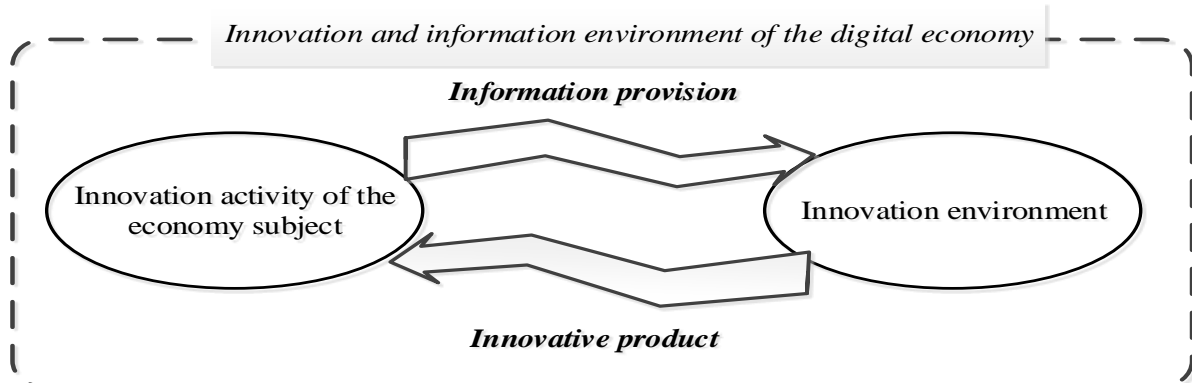


Figure 1. Innovation and information environment of the digital economy

Source: developed by the authors

The trends of economy globalization, the growing volume of digital data, the intellectualization of data processing expand the innovation environment, and for interaction with it an appropriate information support is necessary. Therefore, the methodological approach to information provision combines technologies and methods to meet its information needs. Hence, the activity of a modern business entity, regardless of its size and types of economic activity, is accompanied by numerous information flows, which include information from internal and external sources. Internal information mainly contains the information about the state of the entity itself, its resources and processes. External information is the information about scientific achievements, the state of the economy, consumers, competitors, legislation, news, i.e. the information about changes in the external environment [7].

Means of managing internal information flows based on modern computer and information-communication technologies are being actively developed by IT companies. Management systems for internal information resources are aimed at automating the document flow of the company and include a complex of software that allows collecting information, processing and analysing it, distributing and applying it in the activities of the entity. The purpose of automating document flow is, as a rule, increasing the efficiency of administrative business processes.

An important element of management of a modern business entity is the organization of its internal information processes. The creation of an effective system of information exchange significantly speeds up the process of decision-making and finding solutions to operational problems [8]. In practice, business entities receive external information from providers, operators or information agencies that collect and store information. The subjects gain access to the necessary data on the information market. The current state of the IT infrastructure is sufficient for the information support of the innovation process, capable of providing access to the most important resources of innovation activity. Information provision of a business entity innovation activity can be implemented according to a decentralized, centralized or mixed (combined) scheme.

I. ***The decentralized scheme*** assumes that each department or individual employees organize access to the data and information they need independently. The decentralized scheme of the organization of information support can be implemented according to the organizational form of management (linear, functional, project/product, mixed, etc.). This scheme is characterized by disparate storage of information resources, informal information processes and relations between employees and units. As a result of this, it is possible to highlight the main shortcomings of the decentralized scheme of the organization of innovative activities information support in the conditions of economy digitalization, namely:

- irrational use of funds to purchase access to information resources;
- lack of a systematized understanding of the information needs of the business entity divisions and the available information assets;
- duplication of functions related to information support [8].

Thus, it can be affirmed that the decentralized scheme, despite a number of shortcomings, can be effectively applied to small economic entities, where divisions or

individual specialists independently organize their information provision, the range of information needs is limited by a list of known parameters, and the costs of acquiring access to information resources are relatively small. In addition, the decentralized scheme allows specialists to quickly access information sources and perform operational tasks in a timely manner.

II. *The centralized scheme* of information provision involves the presence of an information centre in which the information needs are systematically processed, the necessary sources of information are selected, the most rational way to access them as well as provide the units and employees with the access to information resources is chosen and organized [10].

The centralized scheme of information provision makes possible to organize the effective use of information resources and reduce the costs of purchasing access to them. In Ukrainian practice, there are units that provide information services for internal users and organize access to external information sources in large companies, educational and scientific organizations [10].

It should be noted that the organization of work with external information sources and databases is of great importance for the information provision of innovative activities in conditions of digitalization. The volume of information from external sources in the economic activity of economic entities first grew gradually, and then exponentially.

The need for external information increased under the influence of the following factors, in particular: development of integration processes in the world economy; growing need for independent sources of reliable information, caused by the increase in the number of subjects of scientific and research activities, and sources of scientific information; increasing amount of accumulated information and data.

A business entity acquires access to external information on the information market. Achievements in the field of IT provided the conditions for the creation of a single information space. In the modern information space, various information resources and options for accessing them are represented (Table 1). A significant array of information is freely available, but its use also requires an appropriate approach to information provision.

The thematic division formed in the information provision of the digital economy is conditioned by the fact that each type of information activity required the appropriate competence, methodology and means. At the same time, the stage of preparing the information resource, related to the collection and formation of databases, was the most expensive and time-consuming. The tasks of adapting the information resource to the customer's requirements, creating services and tools for working with huge data sets, as well as their promotion to the market were carried out by specialized services.

Table 1 – External sources of information support of innovation activities in conditions of digitalization

Information market sector	Commercial sources	Sources with free access to information	Sources of digital data
<i>Business information</i>			
Socio-economic	Unofficial statistics	Official statistics	United Nations Statistics Division
Stock and financial	Financial information systems	Stock Exchanges and other financial institutions	Financial digital platforms
Commercial information	Registers of organizations, ratings, business climate	Reference commercial information, rating agencies	Commercial digital platforms
Business news	Bloomberg Thomson Reuter	Electronic mass media	News aggregators
<i>Scientific and technical information</i>			
Patent publications	Questel Orbit Scopus	Patent offices of Ukraine and other countries	WIPO
Referential databases	Web of Science e-Library	Google Scholar, Research Gate	Google Scholar
Full-text databases	LexisNexis, Elsaveir	Open Access	Open Access
Educational materials	Publishers of educational literature	Universities, research and international organizations (open educational resources)	Educational digital platforms
Mass consumer	Social media	Social media	Social media

Source: systematized by the authors based on [8, 10-12]

Thus, the development of informatization has resulted in the situation that the environment of economic activity has not only become digital. The costs of collecting information in the business environment have decreased, and the possibilities for collecting and processing digital data have become wider. New players have appeared on the information market that provide access to digital data – these are digital platforms such as Coursera, etc., as well as the operators of information and communication networks.

2. A methodical approach to the informatization of the innovation process in the conditions of the digital economy

In the course of innovative activity, many information needs arise, which will differ depending on the unit and the processes being performed. The main task of information provision is to satisfy information needs in an optimal and effective way.

Considering the fact that the driving force of the development of the digital economy is business entities that carry out their economic activities in the field of computer software development, consulting services and related services, as well as in

the field of IT, we believe it expedient to form a methodical approach to satisfying information needs in the innovation process based on their activity.

Giving access to external information resources is the primary task of information provision of innovation activities in the conditions of the digital economy (Table 1). However, the current innovation environment is so diverse that the issue of choosing the most optimal technologies and methods for meeting information needs inevitably arises.

The process of innovating, as the most creative process, requires development of a special method of meeting the information need. At each stage of the innovation process, there is a need for various knowledge, arrays of information and databases (Fig. 1). The effectiveness of meeting information needs has a direct impact on the creation of effective innovation. If incomplete, inaccurate or outdated information is used, the created innovation will not meet the criteria of novelty, market demand and profitability.

It is important that socio-economic information makes it possible to evaluate the ideas of the ongoing development of innovations to meet market demand and economic efficiency. Socio-economic information includes arrays of data generated by official and unofficial statistics services about the state of society as a whole and markets for certain goods and services, in particular. These information resources can be presented in the form of statistical series or texts. Socio-economic information is formed by state administration bodies, special services and consulting agencies, as well as research organizations in the form of analytical reports and references [13].

Access to scientific and technical information enables to explore the experience of creating innovations accumulated by experts. Studying the experience of leading innovative companies shows that a significant part of innovations was created on the basis of generalization of information and borrowings from related activities [14]. The sources of scientific and technical information are specialized information systems, patent offices, scientific research organizations, as well as actual innovative companies.

Information resources in the field of law were developed as early as at the initial stage of automation of economic activity [14]. Legislative and executive bodies of all levels, ministries, departments, committees, etc. serve as sources of legal information. According to the existing procedure, legal documents, including departmental ones, enter into force only after publication in the editions assigned to each body that the legal document generates, and on official websites and/or mass media.

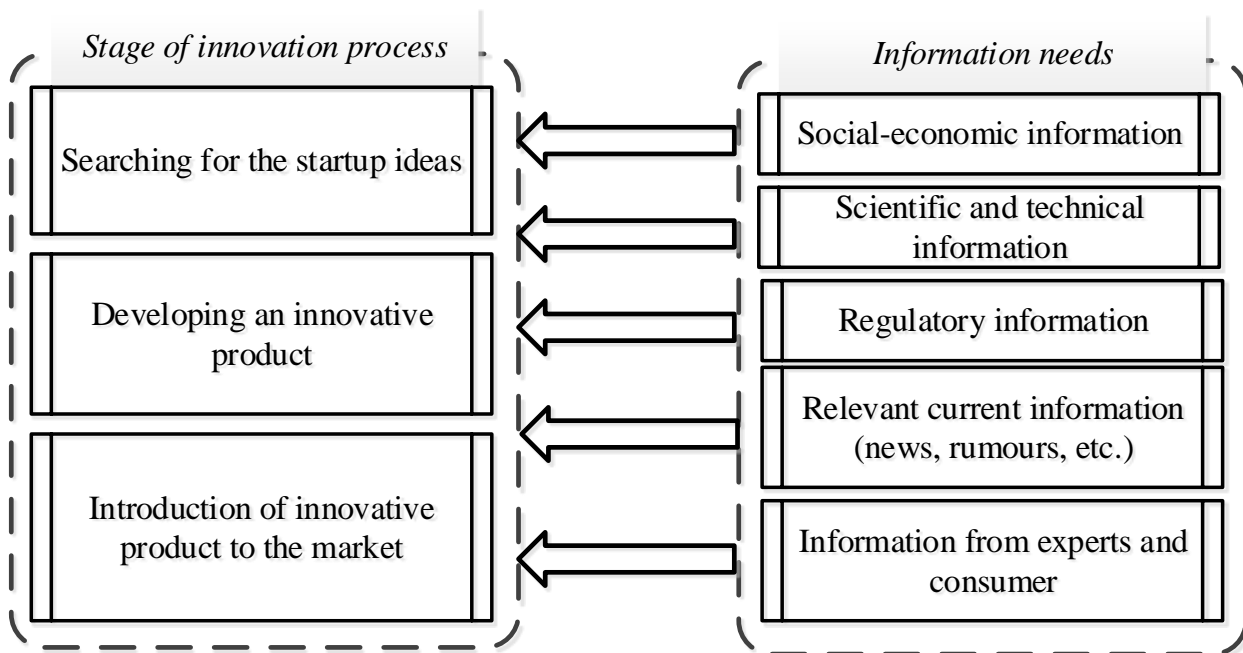


Figure 2. Basic information needs when creating an effective innovation

Source: developed by the author based on [13, 14]

It should also be noted that information valuable for the creation of innovations may be unpublished, that is, not included in the information resources of news agencies. If access to information is not limited, then it can be obtained from the expert community. Expert or professional communities in real time allow you to generalize the experience and knowledge of many specialists. As a rule, such communities are created in social networks, messengers, blogs or specialized web services [13].

In the process of creating an innovation in the conditions of the digital economy, the information needs must be met in several cycles that will correspond to the stages of the innovation process (search for a startup idea, development of an innovative product, introduction of an innovative product to the market (Fig. 2)). It is proposed to implement a methodical approach to meeting information needs in the innovation process in the conditions of the digital economy, which includes the cycles of sequential solution of six information tasks at each stage of innovation creation (Fig. 3).

Let's consider in more detail each information task from the perspective of creating an innovative product in the conditions of the digital economy.

I. Formulating information needs in accordance with the specifics of activity of a business entity and the market. The starting point of information and database management is the identification of information needs and their further processing. The effectiveness of the entire innovation process depends on the outcome of this task. Solving this task is hindered by the lack of formalized rules and instructions. The formulation of the information need should be carried out by specialists who know the terminology and possess sufficient competencies in order to describe the missing information resources. In the course of solving the task, a list of parameters of the external environment is determined, which have the greatest impact on the efficiency

of the innovation. The list of parameters for monitoring may include information about the activities of competitors or partners, changes in prices, stocks, etc.

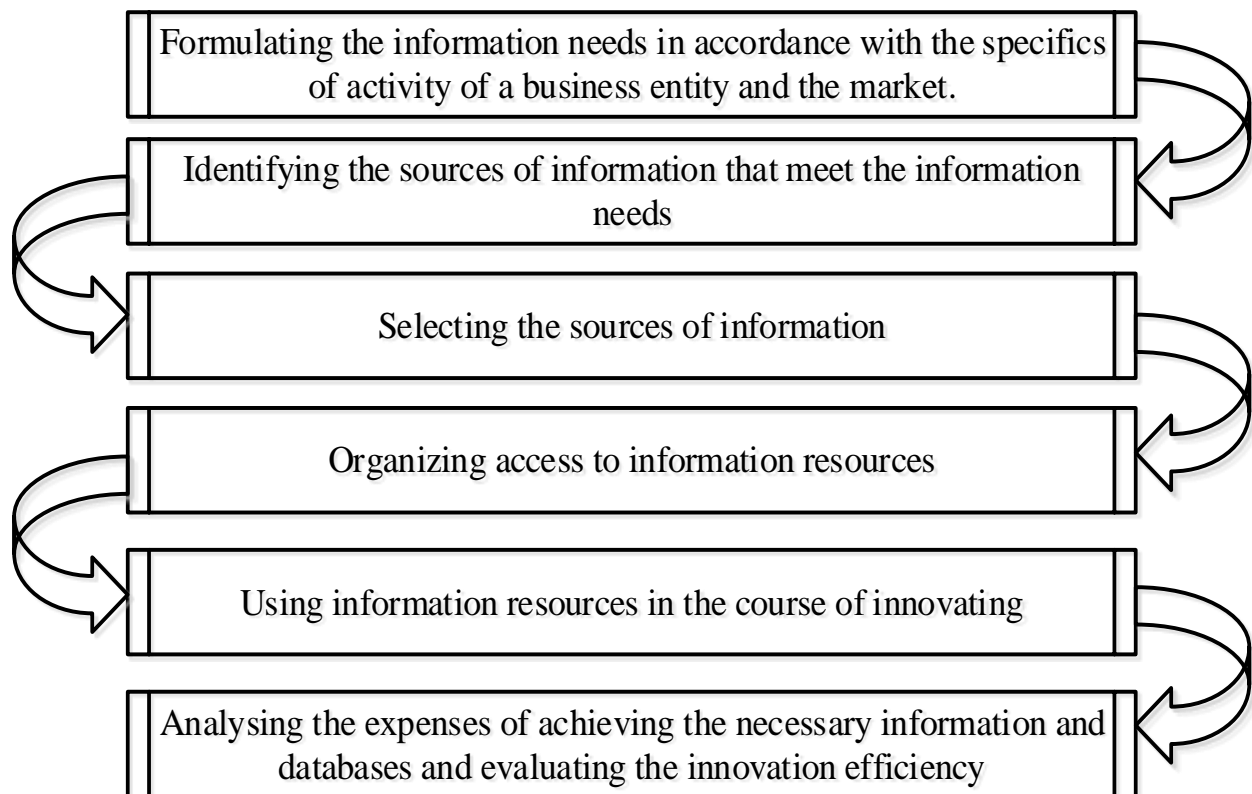


Fig. 3. Basic information tasks to meet the needs of innovative activity in the conditions of the digital economy

Source: developed by the authors

II. *Identifying sources of information that meet information needs.* Given the high saturation of today's information space, this is a quite difficult task. It is necessary to choose the most suitable sources for innovative activity from the variety of information resources presented. Based on the identified needs, the requirements for information sources containing the necessary information are determined. On the basis of meta-information, the relevant information resources are selected. Metainformation is information about information [15]. Metainformation sources contain a description of information resources according to accepted criteria (name, subject, subject heading, keywords, etc.), they enable to get an idea of information sources without directly referring to them. Access to information resources is a service whose quality is difficult to evaluate before its consumption, so most information agencies and providers give potential customers (subscribers) the possibility of trial access or demo versions of their databases. This allows specialists to assess the convenience of working with an information resource and the relevance of its content before purchasing the paid access.

III. *Selecting sources of information and data.* Working with meta-information enables to justify the choice of one or another information source in accordance with the requirements set by the user.

In particular, the following may be considered the main criteria for selecting information and data sources:

- sources of information from which the information resource is formed, their number, structure, geographical coverage;
- frequency of information updates (in real time, daily, weekly, etc.);
- possible subscription options and the cost of access to the information resource;
- user interface;
- search tools, ensuring complete access to information and data;
- details of the information resource, including the subject of the information presented in it, geographical coverage, time coverage, depth of the retrospective, etc.;
- the format of providing information and databases.

IV. *Organizing access to information resources.* After specialists evaluate the conditions of access to the information resource and its cost, a decision is made of entering into contracts with information agencies or providers. Types of rights to access databases can be different, as well as the ways of paying for access to information. Among the main subscription options, the following can be distinguished:

- one-time access to the information system, in which the access to the full text of the document is paid for;
- fixed payment for access to the information system for a certain time interval (week, month, etc.), during which restrictions can be set on the number of users and viewing of full texts of documents;
- mixed payment options – as a rule, information systems use a flexible pricing policy that allows combining different payment options.

When concluding contracts, specialists receive a package of documentation describing the content of information resources and the tools for working with them. For example, the LexisNexis information system contains more than 40 thousand sources of information, and effective work with this system depends on the level of user's training [16]. As a rule, information agencies organize seminars for specialists so that they can fully use the potential of the information system in their professional activities, and also provide consulting support to business entities.

V. *Using information resources in the process of innovating.* It should be noted that the acquisition of access to resources containing the necessary information cannot automatically lead to radical changes in the effectiveness of innovation activities. As a result, the users of these information resources are specialists who perform certain functions and operations. It is necessary to acquaint employees with the possibilities of available information resources and motivate them to work with these resources. The use of information and communication resources involves the organization of information search, monitoring of individual parameters of the external environment, evaluation of the obtained information.

The search tools of information systems can have both common features and significant differences. In some types of systems, the convenience of tools for working with arrays of documents is the main competitive advantage. The result of solving this

information task is a prepared justification for making a decision on the choice of a supplier, conducting an advertising campaign, etc., as well as an analytical report on market research, type of economic activity, etc..

VI. *Analysing the expenses of achieving the necessary information and databases and evaluating the innovation efficiency.* A control measure in managing the information and databases is the analysis of costs for obtaining access to information resources and evaluation of the effect achieved in innovative activities. However, this is not the final task, since information provision involves the possibility of making adjustments to each information task, in particular: identifying the need for information resources, selecting information resources, organizing a search, etc.

At each stage of innovation creation, information tasks are solved sequentially. The algorithm for meeting information needs in the innovation process involves returning to the previous task upon receiving an unsatisfactory answer to it.

As a result of applying a methodical approach to meeting information needs in the innovation process in the conditions of digital economy, the company gains access to information in order to:

- develop ideas for innovation (startup) and choose one or more;
- develop an innovation and conduct its testing;
- commercialize the innovation.

It should be noted that a business entity may not develop an innovation, but purchase a ready-made one from the developer. In this case, the content of innovation activity changes, its ultimate goal will be the acquisition of an effective innovation. However, the need for information support of innovation activity will be preserved and even strengthened. Therefore, it can be affirmed that the developed methodical approach to meeting information needs of the innovation process in the conditions of the digital economy can be also used in the organization of information support for the acquisition of an innovation ready for market launch. The sequence and algorithm for solving information tasks is also preserved, and the content of information needs and received solutions will correspond to the stages of the innovation process.

Conclusion. In the research, the main elements of the methodological approach to the information support of innovative activities in the conditions of digitalization of the economy were offered. The following conclusions and generalizations were made, namely:

1. It was determined that economic entities use the achievements of digitalization to improve the efficiency of their economic activities through the creation of various types of innovations. Accelerated pace of scientific and technical progress causes the emerging need for constant innovation. It was established that the main factors of innovation activity in the conditions of digitalization are information resources and technologies, as well as the methods of working with them.

2. It was proven that access to information resources of innovation activity affects the effectiveness of the created innovations, which must meet the market demand, be new and profitable.

3. The study showed that information provision is a connecting mechanism between the innovation environment and the business entity. The task of information provision is to transmit important information and data directly into the process of creating or acquiring innovations. Taking into account the fact that the innovation environment is constantly expanding due to the appearance of new technologies, content and competencies, the methodological approaches to the information support of innovative activities are being developed.

4. The paper established that information provision is mainly aimed at meeting information needs using technologies and methods of working with information from external and internal sources of information. At each stage of the process of creating an innovation, there is a need for socio-economic, scientific and technical, regulatory and legal information, news and information from communities of experts and consumers. Information provision is critical for creating effective innovations. In the conditions of the digital economy, innovation activity will be effective if the developers have at their disposal the information about the world achievements in their subject area.

5. The obtained results made it possible to determine the factors for choosing the optimal scheme of information provision. For representatives of small businesses, a decentralized scheme is preferable, in which each division or employee includes the solution of information tasks in the process they perform. The centralized scheme of information provision involves the systematic collection and analysis of information needs of a business entity in one unit in order to identify the most suitable sources of information and their suppliers, acquire access to them and provide interested employees with effective access opportunities.

6. A methodological approach was developed to meet information needs in the innovation process in the conditions of the digital economy. Its feature is the cyclical nature of solving information tasks, where the transition to each new stage of the innovation creation process is accompanied by the emergence of new information needs. Cyclicity is stipulated by the fact that the stages of the innovation process, the search for an idea, its implementation and then the transformation into an innovation every time generate new information needs, which require a consistent solution of information tasks.

7. An algorithm for meeting the information need when creating an innovation is offered, which includes solving the following tasks: formulating information needs in accordance with the type of economic activity of the entity and the market; identifying the sources of information that meet the needs of the innovation process based on meta-information; selecting the sources of information; organizing access to information resources; using information resources in the process of creating an innovation; analysing the costs of obtaining the necessary information and evaluating the effectiveness of the innovation. When receiving an unsatisfactory answer to any task, the return to the previous one takes place.

8. It has been proven that the methodical approach to meeting information needs in the innovation process in the conditions of the digital economy can also be applied to the acquisition and implementation of third-party innovative products.

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5. SWOT ANALYSIS OF THE USE OF SOCIAL NETWORKS IN DIGITAL MARKETING

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Introduction. Keeping a finger on the pulse of modern trends in the use of social networks in digital marketing is not merely an option; it's a necessity in today's dynamic digital landscape. The rapid evolution of social media platforms, user behaviors, technological advancements, and market dynamics necessitates continuous research and adaptation.

Understanding and leveraging these trends are essential for businesses aiming to remain competitive, engage their target audience effectively, optimize their content strategies, and maximize return on investment. It allows for the creation of more relevant and engaging content, the identification of emerging opportunities, the mitigation of risks associated with outdated strategies, and the establishment of a strong brand presence across evolving digital platforms.

Ultimately, staying informed about modern social media trends empowers businesses to stay ahead of the curve, innovate their marketing approaches, build stronger connections with their audience, and navigate the ever-changing landscape of digital marketing with agility and effectiveness.

Literature review. A literature review on the use of social media in digital marketing encompasses various aspects, including its impact, strategies, challenges, and opportunities [1; 2]. Numerous studies have highlighted the significant impact of social media on digital marketing strategies [3; 4]. Research often emphasizes its role in brand visibility, customer engagement, and relationship building [5]. Literature on social media marketing strategies focuses on diverse topics such as content creation, influencer collaborations, paid advertising, and data analytics. Scholars like Saeidi S., Baradari Z. [6] and Doshi R., Ramesh A., Rao S. [7] investigate aspects related to identifying fake pages using correlation metrics and modeling influencer marketing campaigns within social networks. This research area focus on metrics, identification of fake profiles, and strategies related to influencer marketing. Rakshit S., Islam N., Mondal S., Paul T. [8] discuss a metric model specifically designed for business-to-business (B2B) SMEs. Such studies explore tailored metrics and strategies for SMEs operating in B2B social network marketing scenarios.

The challenges of social media in digital marketing include algorithm changes, platform dependency, ad fatigue, misinformation, privacy concerns, and regulatory compliance [9; 10]. Scholars like Vo M.S., Huynh D.Q.V., Nguyen G.H. [11] discuss

the impact of marketing communication content distributed on social networks on electronic word-of-mouth.

Moreover, the evolving role of social media in societal contexts, such as its influence on social behavior, politics, and cultural trends, continues to be a subject of interest for researchers. Despite the extensive body of research investigating the role of social networks in digital marketing, ongoing and future studies are crucial to comprehensively understand and adapt to the evolving landscape of digital marketing strategies. It remains imperative to continue exploring the dynamics of strengths, weaknesses, opportunities, and threats (SWOT) associated with leveraging social networks for marketing purposes

Results. Social networks are online platforms or services that facilitate social interaction and communication among individuals or groups. These platforms allow users to create profiles, share information, connect with other users, and engage in various activities such as sharing content, messaging, commenting, and networking. Social networks come in various forms and serve different purposes, but they all revolve around connecting people and fostering relationships.

Some popular examples of social networks include Facebook, Twitter, Instagram, LinkedIn, TikTok, Snapchat, Reddit, and Pinterest. Each platform has its unique features, user demographics, and purposes, catering to different types of interactions and content sharing. Overall, social networks play a significant role in modern communication, connecting people across the globe, facilitating information sharing, fostering communities, and serving as platforms for entertainment, education, business, and various other purposes.

Here are some trends in the use of social networks in digital marketing [1-4; 9]:

1. **Video Content Dominance.** Video content has been reigning supreme across various social platforms. Short-form videos (e.g., TikTok, Instagram Reels) and live streaming have gained immense popularity for engaging audiences.

2. **Social Commerce Integration.** Social media platforms have increasingly integrated shopping features, allowing users to discover and purchase products directly from their feeds. Facebook Marketplace, Instagram Shops, and similar integrations have blurred the lines between social interaction and e-commerce.

3. **Influencer Marketing Evolution.** Collaborating with influencers continues to be a significant trend. However, there's a shift towards micro and nano-influencers due to their higher engagement rates and perceived authenticity compared to mega influencers.

4. **Personalization and Community Building.** Brands are focusing on creating personalized experiences and fostering communities. This includes responding to individuals, creating niche groups, and curating content tailored to specific audience segments.

5. **Augmented Reality (AR) and Virtual Reality (VR).** These technologies have been increasingly used in marketing campaigns to offer immersive experiences. Brands are leveraging AR filters, VR simulations, and experiences to engage and entertain users.

6. Social Media Stories. The popularity of ephemeral content (such as Instagram Stories, Facebook Stories, Snapchat) continues to rise. Brands leverage these features for more casual and authentic interactions with their audiences.

7. Privacy and Data Concerns. With increasing awareness around data privacy, there's a growing emphasis on transparency in data usage and compliance with regulations like GDPR and CCPA. Brands are more mindful of collecting and using consumer data.

8. User-Generated Content (UGC). Encouraging users to generate content and engage with the brand has been a successful strategy. Reposting user-generated content and running UGC campaigns help build trust and authenticity.

9. Social Listening and Customer Service. Brands are utilizing social media not just for broadcasting content but also for actively listening to customer feedback. Providing swift and personalized customer service through social platforms has become crucial.

10. Platform Diversification and Niche Networks. While major platforms like Facebook, Instagram, Twitter, and LinkedIn continue to dominate, there's a trend towards exploring niche networks catering to specific interests or demographics.

11. AI-Powered Tools and Chatbots. AI-driven tools are used for data analysis, content optimization, chatbots for customer service, and personalized interactions, enhancing overall user experiences.

SWOT analysis focusing on the use of social media in digital marketing is presented in Table 1.

Table 1

SWOT analysis of the use of social networks in digital marketing

Strengths	Wide Reach and Audience Engagement	Social media platforms have billions of active users worldwide, offering a vast audience base for marketing campaigns.
	Targeted Advertising and Analytics	Robust targeting options and detailed analytics allow for precise audience segmentation and measurement of campaign effectiveness in real-time.
	Interactivity and Engagement	Social media encourages two-way communication, enabling direct interaction between brands and consumers, fostering engagement, and building relationships.
	Content Variety and Creativity	Diverse content formats (videos, images, stories, live streams) allow for creative expression and compelling storytelling tailored to specific platforms.
	Influencer Collaboration	Influencer marketing leverages the trust and authority of individuals to endorse products or services, often leading to increased credibility and engagement
Weaknesses	Platform Dependence and Algorithm Changes	Dependence on third-party platforms exposes businesses to algorithm changes and platform policies that may affect reach and visibility.

	Overwhelming Competition	High competition on social media can make it challenging for brands to stand out and gain visibility amidst the noise.
	Time-Consuming and Resource-Intensive	Consistently creating high-quality content, engaging with the audience, and managing multiple platforms can be resource-intensive and time-consuming.
	Negative Feedback and Public Criticism	Social media can amplify negative feedback or criticism, requiring swift and tactful handling to manage brand reputation.
Opportunities	Evolving Technologies	Advancements in technology, like AR/VR, AI, and new platform features, provide opportunities for innovative marketing strategies and engaging experiences.
	Emerging Platforms and Trends	New social media platforms and emerging trends offer opportunities for early adopters to gain a competitive edge.
	Data-Driven Decision Making	Utilizing social media analytics enables data-driven decision-making, facilitating personalized and targeted marketing efforts.
	E-commerce Integration	Social media platforms increasingly integrate shopping features, providing opportunities for direct sales and enhanced customer experience.
Threats	Privacy Concerns and Regulations	Increasing privacy concerns and stringent regulations (e.g., GDPR, CCPA) can impact data collection, targeting, and personalized advertising.
	Algorithm Changes and Platform Instability	Frequent algorithm changes by social media platforms can disrupt organic reach and campaign performance.
	Fake News and Misinformation	The spread of fake news and misinformation on social media poses a threat to brand credibility and trust.
	Ad Fatigue and Consumer Skepticism	Over-exposure to ads can lead to ad fatigue among users, resulting in reduced engagement and skepticism toward marketing messages.

SWOT analysis illustrates the strengths, weaknesses, opportunities, and threats associated with leveraging social media for digital marketing strategies, emphasizing the need for strategic planning, adaptability, and a deep understanding of the dynamic social media landscape.

Based on the SWOT analysis, here are some recommendations for using social networks in digital marketing (Table 2-5).

Table 2

Recommendations for the use of social networks in digital marketing, taking into account the strengths

Strengths	Recommendations
Wide Reach and Audience Engagement	<ul style="list-style-type: none"> • Tailor content to suit diverse demographics by understanding regional preferences, cultural nuances, and language variations. Craft messaging that resonates with specific audience segments, ensuring relevance and engagement. • Foster a sense of community by organizing user-generated content campaigns, hosting Q&A sessions, or initiating discussions around shared interests or brand-related topics. Encourage user participation to build a strong community presence.
Targeted Advertising and Analytics	<ul style="list-style-type: none"> • Regularly analyze analytics data to refine audience targeting. Utilize A/B testing to optimize ad creatives, copy, and targeting parameters. Adapt strategies based on real-time insights to maximize engagement and conversion rates. • Focus on metrics that matter. Use analytics to assess which campaigns perform best and invest resources in the strategies that yield the highest ROI. Experiment with different ad formats to find the most effective ones for your audience.
Interactivity and Engagement	<ul style="list-style-type: none"> • Encourage two-way communication by actively responding to comments, messages, and mentions. Initiate interactive content such as polls, quizzes, or challenges to stimulate engagement and build stronger connections with the audience. • Encourage user-generated content by launching contests, challenges, or campaigns that inspire users to create and share content related to your brand. Showcase this content to boost authenticity and trust.
Content Variety and Creativity	<ul style="list-style-type: none"> • Develop diverse content strategies tailored to each platform's unique features and user behavior. Experiment with various formats (videos, images, stories) to identify what resonates best with your audience on each platform. • Utilize storytelling techniques coupled with visually appealing content to convey brand messages effectively. Create emotive visuals and compelling narratives that captivate and resonate with your audience.
Influencer Collaboration	<ul style="list-style-type: none"> • Collaborate with influencers whose values align closely with your brand. Focus on fostering genuine relationships and long-term partnerships that resonate authentically with the influencer's audience. • Consider partnerships with niche or micro-influencers who have dedicated, engaged followings within specific interest areas. These collaborations often lead to more authentic connections and higher conversion rates within targeted communities.

Table 3

Recommendations for the use of social networks in digital marketing, taking into account the weaknesses

Weaknesses	Recommendations
Platform Dependence and Algorithm Changes	<ul style="list-style-type: none"> • Spread efforts across multiple platforms to reduce dependence on any single one. Prioritize platforms based on your target audience's preferences but maintain an adaptable presence across various networks to mitigate risks associated with algorithm changes or policy updates. • Invest in building your owned platforms like email lists, website, or blog. While social media platforms are essential for reach, owned platforms provide a more stable base and direct audience engagement outside of third-party policies.
Overwhelming Competition	<ul style="list-style-type: none"> • Identify and target niche markets where competition might be less fierce. Tailor content to meet the specific needs and interests of these segments, allowing you to stand out and engage a dedicated audience. • Emphasize your unique brand proposition or USP. Highlight what makes your brand distinct, whether it's exceptional service, sustainability efforts, or innovative product features, to attract and retain your audience's attention.
Time-Consuming and Resource-Intensive	<ul style="list-style-type: none"> • Develop a content calendar to streamline content creation and posting schedules. Plan and batch-create content in advance to ensure consistent quality while saving time in the long run. • Consider outsourcing certain tasks or collaborating with content creators, agencies, or freelancers. Delegate responsibilities like content creation, community management, or analytics to specialized professionals to optimize efficiency.
Negative Feedback and Public Criticism	<ul style="list-style-type: none"> • Develop a clear protocol for handling negative feedback or crises on social media. Train social media teams on how to respond promptly, professionally, and empathetically to manage and mitigate negative situations. • Emphasize transparency in brand communications. Address negative feedback openly, admit mistakes (if any), and provide solutions or improvements publicly to build trust and authenticity among your audience.

Table 4

Recommendations for the use of social networks in digital marketing, taking into account the opportunities

Opportunities	Recommendations
Evolving Technologies	<ul style="list-style-type: none"> • Embrace emerging technologies like AR/VR, incorporating them into your content strategy to create interactive and immersive experiences for users. Experiment with AI-powered chatbots to enhance customer interactions and provide personalized experiences. • Stay updated with technological advancements and trends in the digital sphere. Allocate resources for research and development, ensuring your brand remains at the forefront of innovation in utilizing these technologies for marketing purposes.
Emerging Platforms and Trends	<ul style="list-style-type: none"> • Keep an eye on emerging social media platforms or trends gaining traction. Evaluate their alignment with your brand and target audience and consider early adoption to establish a presence and engage with audiences ahead of competitors. • Monitor and adapt quickly to emerging trends in content formats or user behaviors. Experiment with new trends and adapt your content strategy accordingly to capitalize on early adoption and stand out in a rapidly changing landscape.
Data-Driven Decision Making	<ul style="list-style-type: none"> • Leverage social media analytics to derive actionable insights. Utilize these insights to refine targeting, personalize content, and optimize campaigns for better engagement and conversion rates. • Invest in AI-powered tools for in-depth data analysis. Implement AI-driven solutions to uncover hidden patterns, predict consumer behavior, and optimize marketing strategies based on predictive analytics.
E-commerce Integration	<ul style="list-style-type: none"> • Utilize social media e-commerce features to streamline the shopping experience. Implement shoppable posts, user-friendly product catalogs, and seamless checkout options to encourage direct purchases from social media platforms. • Develop targeted sales strategies directly aimed at social media users. Offer exclusive promotions, limited-time offers, or unique discounts to incentivize direct purchases through social media channels.

Table 5

Recommendations for the use of social networks in digital marketing, taking into account the threats

Threats	Recommendations
Privacy Concerns and Regulations	<ul style="list-style-type: none"> • Ensure strict adherence to privacy regulations like GDPR, CCPA, etc. Obtain explicit consent for data collection, clearly communicate your privacy policy, and offer users control over their data. • Implement ethical data practices by anonymizing personal data whenever possible, securing user information, and using data solely for the intended purpose with transparent opt-in/opt-out options.
Algorithm Changes and Platform Instability	<ul style="list-style-type: none"> • Reduce reliance on organic reach by diversifying your marketing mix. Invest in a combination of paid advertising, influencer collaborations, email marketing, and SEO to spread efforts across various channels. • Stay agile and adapt swiftly to platform changes. Monitor updates, test different content formats, and adjust strategies promptly to maintain visibility and campaign performance despite algorithm fluctuations.
Fake News and Misinformation	<ul style="list-style-type: none"> • Prioritize fact-checking and accuracy in your content creation process. Verify information before sharing, and if misinformation arises, swiftly correct and clarify to maintain credibility. • Launch educational campaigns or initiatives addressing misinformation prevalent in your industry or niche. Provide accurate information to counter false claims and build trust with your audience.
Ad Fatigue and Consumer Skepticism	<ul style="list-style-type: none"> • Create content that adds value and resonates with your audience's interests and needs. Focus on providing information, entertainment, or solving problems rather than overtly selling. • Refine your targeting strategies to reach specific audience segments and avoid oversaturating users with ads. Implement frequency capping to limit the number of times an individual sees an ad within a given timeframe.

When combining the strengths, weaknesses, opportunities, and threats in utilizing social media for digital marketing, it's crucial to strategize in a way that maximizes strengths, leverages opportunities, mitigates weaknesses, and addresses threats effectively. Here's an overall conclusion on how to amalgamate these factors for effective use of social media in digital marketing:

Leveraging Strengths and Opportunities:

1. Targeted and Engaging Content. Leverage strengths like wide reach and precise targeting with opportunities in evolving technologies and emerging platforms.

Create interactive, personalized content using AR/VR, AI-driven tools, and adopt early trends on new platforms.

2. **Influencer Collaboration and E-commerce Integration.** Combine the strengths of influencer marketing with the opportunity in e-commerce integration. Collaborate with influencers authentically and utilize social media shopping features for direct sales and enhanced customer experiences.

Addressing Weaknesses and Mitigating Threats:

1. **Diversification and Adaptation.** Counter platform dependence by diversifying strategies and adapting to algorithm changes. Address weaknesses in time consumption by strategic planning, outsourcing, and adopting agile content strategies.

2. **Reputation Management and Privacy Assurance.** Mitigate negative feedback and privacy concerns by establishing a crisis management plan and ensuring compliance with regulations. Combat fake news through transparent communication and fact-checking measures.

Data-Driven Decision Making and Consumer-Centric Approach:

1. **Analytics and Audience Segmentation.** Utilize strengths in analytics and data-driven decisions to optimize strategies. Address ad fatigue and skepticism by adopting value-centric content strategies, limiting ad frequency, and personalizing content.

2. **Consumer-Centric Engagement.** Build a consumer-centric approach by fostering community engagement, responding actively to audience interactions, and focusing on authentic relationships to counteract overwhelming competition and skepticism.

In conclusion, an effective digital marketing strategy on social media necessitates leveraging strengths and opportunities, mitigating weaknesses and threats, all while centering efforts on audience engagement, personalized experiences, ethical practices, and adaptability. By integrating these elements cohesively, businesses can navigate the complexities of social media effectively, ensuring a sustainable and impactful presence in the digital landscape.

Conclusion. The strategic use of social networks in digital marketing requires a holistic approach that accounts for strengths, weaknesses, opportunities, and threats (SWOT). Understanding and addressing these factors is fundamental to devising effective strategies that capitalize on strengths and opportunities while mitigating weaknesses and threats. Social networks's strengths lie in its vast reach, targeted advertising, interactivity, content variety, and influencer collaboration. These strengths enable brands to engage with audiences, drive interactions, and build credibility through creative and targeted marketing campaigns.

However, challenges such as platform dependence, competition, time/resource intensiveness, and negative feedback require proactive measures. Diversification, adaptability, ethical data practices, and responsive reputation management are essential to mitigate these weaknesses and threats effectively.

Furthermore, opportunities presented by evolving technologies, emerging platforms, data-driven insights, and e-commerce integration offer avenues for innovation and growth. Leveraging these opportunities allows businesses to stay ahead

by adopting new trends, making informed decisions, and enhancing the shopping experience for consumers.

Combining strengths with opportunities while addressing weaknesses and threats is key. Strategies that involve personalized content, audience engagement, compliance with regulations, and agile adaptation to changes ensure a sustainable and impactful presence on social media platforms.

In essence, the effective use of social networks in digital marketing requires a balanced approach that optimizes strengths and opportunities while proactively managing weaknesses and threats. By integrating these elements strategically, businesses can navigate the dynamic landscape of social media, fostering brand growth, engagement, and long-term success.

Future research in social media marketing is expected to delve deeper into areas such as AI-driven personalization, the impact of immersive technologies (AR/VR), ethical considerations in data usage, and the evolving landscape of social commerce.

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6. DIGITALIZATION AS A DIRECTION OF POST-WAR RECOVERY AND DEVELOPMENT OF THE ECONOMY OF UKRAINE: PROSPECTS AND PROBLEMS

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Introduction. The war with Russia caused the loss of a significant part of Ukraine's economic potential, in particular its potential subsystems: labor, productive, natural, financial, etc. This initiates the search for effective ways of post-war recovery of the national economy and ensuring its growth. Moreover, taking into account the leading role of developments of the past technological systems (third and fourth) in the economy of Ukraine, the strategies of economic recovery and growth should be directed to the concept of innovative advancement. Innovative advancement involves choosing (certainly in line with global trends in STP) one's own path of development based on the search and realization of own competitive advantages in fields of activity and markets with necessary and sufficient conditions instead repeating the path that others have already taken and gained strong positions. The fourth industrial revolution (IR4.0), the completion of the fifth and the emergence of the sixth technological order set the general trends in the development of STP.

Global experience shows that in the context of the deployment of IR4.0 and the active implementation of digital informational and communicative technologies (ICT) in almost all spheres of human activity, digitization is a promising direction of innovative development of the national economy. For post-war Ukraine, digitization is becoming one of the main priorities. Digital transformations create opportunities for

the functioning and development of various spheres of human activity in the conditions of the loss of a part of the production base, objects of the market and social infrastructure, withdrawal of significant territories from economic activity, etc. In particular, by transferring business operations and providing services to the Internet, forming digital labor markets, etc. However, digitalization has a certain duality. On the one hand, it creates opportunities for innovative development. On the other hand, it creates problems that can exacerbate socio-economic contradictions and cause crisis phenomena. In this way, the problem of forecasting the consequences of the digitalization of the national economy of Ukraine and developing recommendations for using favorable opportunities and countering threats is actualized.

Literature review. The mentioned problems were investigated in numerous works of domestic and foreign scientists. In the work of Bashlay and Yaremko [1], the positive aspects of digitalization of the economy of Ukraine in the context of European integration processes were highlighted. Yaloha and others. [2] conducted an analysis of the directions of development of the creative industry as the main driver of the global economy, carried out an assessment of the risks of the post-war reconstruction of Ukraine, which may affect the functioning of the creative industry, and proposed ways to minimize them. Panchenko [3] investigated digital transformation as a priority direction of post-war recovery and realization of innovation and investment potential of Ukraine, proposed a system of state regulation measures of digitalization as a driver of post-war recovery of its economy. Kulakova, Zhytnyk [4] justified the importance of digitalization in ensuring the competitiveness of economic entities on national and international markets. They note the importance of e-commerce for the development of the state's economy in the conditions of COVID-19 restrictions and the war with Russia. Bolila [5] substantiated the crucial importance of digital ICT in ensuring stability and post-war reconstruction of Ukraine. She revealed the leading role of the domestic IT industry in the digital transformation of Ukraine's economy. Among its main priorities is the digitization of high-tech productions of the military-industrial complex.

Min J. and others. [6] revealed the impact of ICT IR 4.0 on changes in labor conditions, in particular, their promotion of individualized employment, which reduces the level of socialization of employees, makes it difficult to control their working and rest conditions. Rotatori and others. [7] showed that ICT IR4.0 affect all fields of economy, in particular the necessity to retrain the employees. They basically outlined the associated problems, and considered the ways of their solution. Eberhard B. and others. [8] investigated the transformation of the labor market under the influence of ICT IR4.0. They showed the growing demand for specialists with new professional skills in the conditions of digitalization. Made forecasts regarding the emergence of new professions that will be in demand in the future, as well as those that will disappear. The skills that will be necessary for employees of new professions have been determined. Ghislieri C. and others. [9] investigated the impact of ICT IR4.0 on employees, organizations and society as a whole. Changes in the interaction between

employees and technologies in conditions of digitalization, as well as changes in requirements for knowledge and skills of employees, were revealed.

Kudryavtsev [10] shows that the digital economy is an important driving force of economic development in line with the concept of sustainable development. Among the shortcomings, he draws attention to the growth of digital inequality. Seleznyova, Chumak [11] summarized the advantages and challenges of digitalization of the economy, determined its impact on competition and the competitive environment of domestic enterprises. Among the shortcomings, permanent changes in the relevance of professions, functional unemployment, an increasing skilled labor cost, a sharp increase of migration of employees of working professions, etc. are highlighted. Sydenko [12] singles out the negative effects of the digitalization of the economy: an increase in personal information insecurity, the intensification of information noise, the expansion of the possibilities of manipulating people's consciousness and behavior, and the strengthening of control over their behavior.

The results of the analysis of literary sources indicate that their authors investigated the positive effects of digitalization on the growth of various branches of national economies in the conditions of IR4.0. The prospects of post-war Ukraine recovery and development, European integration prospects, etc. are revealed. According to the research on the digital economy formation in different countries, the challenges of digitalization, as well as the problems they cause, are outlined. However, existing developments have a fragmentary nature, there is no systematic analysis of the problems and prospects of digitalization. And this complicates the development of strategies for the post-war recovery and development of Ukraine's economy on the basis of digitalization, taking into account the variety of its positive and negative effects.

Thus, the purpose of the study is to systematize the prospects and problems of digitalization, to form activities for implementation of favorable opportunities and to counter threats in the context of the formation of strategies for the post-war recovery and development of Ukraine's economy.

Research results. Structural and logical scheme of the study:

1. Determination and systematization of promising directions of post-war recovery and innovative development of Ukrainian economy based on digitalization.
2. Identification and systematization of problems and threats to the implementation of the selected directions.
3. Formulation of recommendations to apply favorable opportunities and countermeasures against threats in the strategies of innovative development, which lie in the direction of the chosen areas.

Digitalization of certain activities in Ukraine began to spread at the beginning of the 21st century: freelancing, internet banking, distance learning, etc. Quarantine restrictions of COVID-19 provided a powerful impetus to the acceleration of digitalization processes in various spheres of human activity in Ukraine. They forced business structures that suffered losses to search new ways of survival and development [13]. One of the most effective ways was the transfer of business to the Internet. This is facilitated by the spread of various gadgets and standardized and comparatively

inexpensive software among the population (mostly younger or middle-aged). Business is attracted by the ability of digital technologies to provide feedback to consumers and other market figures, the ability to provide services remotely 24/7. In the conditions of the COVID-19 pandemic, the consumer behavior of residents of large and small cities has been forced to change. They are already used to ordering various types of products (products and services) via the Internet.

The Russia's aggression forced, primarily for security reasons, to expand the scope of ICT IR4.0. Data from the Network Readiness Index 2022 show [14] that during the years of quarantine restrictions of COVID-19 and the war against Russia, Ukraine rose for 14 positions in the digital readiness rating (from 64th place in 2020 to 50th at the end of 2022). Thus, the high digital capacity of Ukraine was actually confirmed, that is, the readiness and possibility of digitalization of the branches of its economy.

The Table 1 outlines the spheres and methods of application of digital technologies in various spheres of human activity in Ukraine: actual or prospective. The vast majority of developments presented in the table 1 is used in practice or undergoes practical testing [13, 15, 16].

Table 1. Prospective areas of application of digital technologies in the economy of Ukraine (developed by authors)

Field of application	Way of application	Digital technology
1	2	3
Public services	Application "Diya" (electronic governance)	Cloud databases and knowledge, cloud computing; Big-Data; blockchain
Commercial services	Internet banking services; internet consulting: medical, insurance, financial, legal, etc.	Cloud databases and knowledge, cloud computing; Big-Data;
Digital marketing	Marketing research; marketing communications (direct and feedback); image formation and maintenance, etc.	Digital marketing tools; CRM technologies
Internet trade	Internet stores; Internet platforms for buying and selling products	Cloud databases and knowledge, cloud computing; Big-Data;
Production	Management of production processes in real time; automatic factories to which the products they produce and their consumers are	Industrial Internet of Things; predicative analytics; Big-Data; cloud databases and knowledge, cloud computing; digital

	connected via the Internet (in the future)	cloning of products; machine learning (self-learning of robots); augmented and virtual reality; Artificial Intelligence; additive manufacturing; CAD technologies
Logistics	Internet ordering and control of logistics services; delivery of products by drones; virtual warehouses of products digital copies and their 3-D printing; automated warehouses	
Immediate repair of products	Production of spare parts, small products (including scanning and duplicating samples) at the place of operation	
Science and education	The use of software and hardware complexes based on ICT IR4.0 in scientific research and the educational process for designing, creating, studying, testing objects, technologies, processes, etc. (computer simulation, virtual objects and processes, etc. n.). Increasing informational content of scientific research and the educational process: electronic libraries, knowledge bases, open courses of disciplines, etc. Formation of virtual teams of researchers, including international.	Industrial Internet of Things; predicative analytics; Big-Data; cloud databases and knowledge, cloud computing; digital cloning of products; machine learning (self-learning of robots); augmented and virtual reality; Artificial Intelligence; additive manufacturing; blockchain; distance learning software and tools
Education	New directions of specialist training in IR4.0 conditions. Expanding the forms and methods of training using the capabilities of ICT IR4.0: studying in classrooms, at future workplaces (real or virtual), distance online courses, an exam, on-line and off-line consultations, etc. Flexibility of time and place	Industrial Internet of Things; predicative analytics; Big-Data; cloud databases and knowledge, cloud computing; digital cloning of products; machine learning (self-learning of robots); augmented and virtual reality; Artificial Intelligence; additive

	of study: time zone, geographical region, location: at home, on vacation, in transport, etc. Orientation on the training specialists of creative professions that cannot be automated. Transformation of universities into self-managed systems (in future) that combine and ensure coordinated interaction of their human potential, resource potential, processes (management, scientific and educational, intra-organizational interaction, interaction with external partners, etc.) with the help of ICT IR4.0	manufacturing; blockchain; distance learning software and tools
Digital labor market	Digital freelance; digital outsourcing; remote work (synchronous and asynchronous mode); the latest forms of digital employment and labor relations (self-governing staff), etc.	Industrial Internet of Things; predicative analytics; Big-Data; cloud databases and knowledge, cloud computing; digital cloning of products; augmented and virtual reality; Artificial Intelligence
Culture, tourism, entertainment	Virtual museum tours, exhibitions; virtual tourism, both domestic and international; 3D movies, games, etc.	Cloud databases and knowledge; Big-Data; Augmented and virtual reality

However, digitalization of the economy also creates numerous problems (threats). Based on the results of the analysis of literary sources, as well as the domestic and foreign experience of digitalization, a generalization and systematization of existing and prospective problems was performed.

The entire set of identified problems is divided into three groups.

The first group includes problems related to the aggravation of the situation on the labor market:

- problems related to shifts in the relevance of professions, which become permanent as IR4.0 is deployed and its technologies spread: a decrease in the need for specialists in traditional professions and an increase in the demand for new ones;
- problems of functional unemployment (first of all, employees performing standard, monotonous jobs of both physical and intellectual nature), as well as technological unemployment;
- problems of significantly reducing the need for intellectual labor specialists of certain professions, since their work can be performed (or is already performed) by artificial intelligence.

Ways to solve these problems are indicated in the table. 1 in the column "Education" and partially in the column "Digital labor market".

The second group includes problems consisting in the aggravation of contradictions and polarization of society, in particular:

- talent - mediocrity, which differ significantly in terms of their demand, level of remuneration, etc.;
- specialists of creative professions or professions involving standard work that can be easily automated;
- technological inequality, which separates people by the ability to use certain technologies both in production and in everyday life, for example, gaining access to financial, state, etc. services;
- intellectual inequality, which divides people according to their ability to master popular intellectual professions, quickly change professions and areas of activity, etc.;
- geographical inequality caused by the lack of access to ICT, for example, due to the lack of access to the Internet in some areas of the country.

These challenges threaten a sharp decrease in the share of the middle class (as a stabilizing part of society) in the total population, which can lead to socio-economic crises and upheavals. Solving these problems requires: the formation of a state program for restructuring the economy and ensuring employment (self-employment) of the population; implementation of various forms of education and professional development with the purpose of formation and development of digital competencies of the population, especially older age groups. To ensure equal access of the population to digital services, the mobile Internet network should be developed, which is one of the conditions for the spread of IR4.0 digital technologies. In Ukraine, 61.5% of the population has access to the mobile Internet. This index is up to 90% or more in countries that are leaders in the development of the digital economy [17]. The development of the mobile Internet network will also make it possible to weaken the existing technological, intellectual, regional, etc. components of digital inequality of the population.

The third group includes expected problems that will be actualized in the nearest future as Ukraine's economy is digitized and they have already been realized for many countries:

- problems of mass unemployment, as automated production sharply reduces the need for labor force;

- problems related to changes in the usual traditional management organizational structures and forms of work organization and the introduction of innovative ones that correspond to the realities of the digital economy;

- problems related to the introduction of innovative forms of labor employment (in particular, informal employment) and new forms of labor relations, the formation of the digital labor market (digital freelancing, digital outsourcing, etc. are successfully developing in Ukraine [18]) cause such phenomena as part-time employment, lack of social guarantees and protection of labor rights, antisociality, etc.

To find ways to solve these problems, it is advisable to study the experience of countries that are leaders in the development of the digital economy [7, 8], with the aim of adapting it to the conditions of follower countries. However, it is also necessary to analyze the experience of countries that have just begun to implement ICT IR4.0, this will help to avoid their mistakes [19, 20].

It should be noted that in the conditions of IR4.0, that knowledge sector is the leading sector of the economy. Efficiency of production, distribution and use of knowledge, regarding the application of ICT, depends on the level of development of the human capital of society and individual organizations. Global experience shows that human capital plays one of the leading roles among prerequisites for digitalization of the economy, in particular, the readiness, ability and skills of effective use of ICT by the personnel of economic entities (in general, the population as a whole) in various spheres of activity. In the Network Readiness Index rating [14], which determines the readiness of the countries for the formation and development of the digital economy, one of the complex indexes is "people". In fact, it characterizes the level of development of human capital in the context of its readiness for digitalization. Other comprehensive indices are: "technologies", i.e. digital technologies; their use in management systems of different levels - "management"; the impact of digitalization on various aspects of human life - "impact". Human capital should be considered as a unifying link of the prerequisites for the development of business entities in the conditions of the digital economy (the specified indices are their characteristics). It combines personnel, ICT, digital management, the results of the digitalization impact. Accordingly, the issues of ensuring the proper level of human capital of enterprises and institutions as elements of the national economy, as well as its actualization regarding changes in external macro- and micro-environment, are being updated. Thus, the issue of human capital management of business entities of different levels (individual organization, industry, national economy as a whole) is one of the main prerequisites for their successful development in the conditions of the digital economy.

Among directions of digitalization of human activity spheres presented in the table 1, the priority is the introduction of digital technologies in the field of education (science and education), which will allow to apply innovative forms of education, in particular, regarding the formation, development and implementation of digital competences of persons studying: students, listeners, public. This will contribute to: updating the human capital of the state as a whole and individual business entities in conditions of the digital economy; solving a large part of the mentioned three groups

of problems; the success of digitalization as one of the priority areas of post-war recovery and innovative development of the economy of Ukraine.

Conclusion. Summarizing the above, it should be noted:

1. Prospective areas of digital technologies application in the economy of Ukraine have been identified. They have been systematized by spheres of activity and methods of application. The essence of each method is revealed, which allows to increase the accuracy of their selection.

2. The main problems of digitalization of the economy of Ukraine are identified. The existing problems are divided into three groups: those that aggravate the situation on the labor markets; those that exacerbate the contradictions between different parts of society and polarize it; expected problems that will appear in future. This made it possible to outline the consequences of selected problems, both current and expected.

3. Approaches to solving problems of each of the selected groups are proposed. The important role of human capital in solving digitalization problems, which requires priority development of the education system, is shown. In particular, in the context of the formation of digital competences of specialists, as well as the general population.

The obtained results develop and deepen the principles of information and analytical support of the organizational and economic mechanism of managing strategies for the post-war recovery and development of the economy of Ukraine on the basis of digitalization. Their practical application will allow to increase the level of validity of management decisions regarding the use of favorable opportunities of digitalization and overcoming threats in the context of choosing directions and strategies for the post-war recovery and development of Ukraine's economy. Further research should be aimed at developing a system of organizational support for the management of digitalization strategies in various spheres of human activity.

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7. ISSUES OF MANAGING THE DEVELOPMENT OF ECO-INNOVATION SYSTEMS IN THE DIGITAL ECONOMY

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Introduction. The environmental impact of human development is significant and irreversible. The rise in global population, outcomes of industrialization, and the consumer nature of society sometimes lead to unpredictable consequences caused by the ecosystem for humanity in the form of various environmental disasters. Given these trends, ensuring the balance between socio-economic development and the degree of negative impact on the ecosystem using digital economy technologies is the primary objective of these days. Economies should ensure economic development through the

introduction of digitally developed eco-innovations in various spheres of human activity. Such conditions require investment in the development of eco-friendly digital technologies at different levels of economic systems (nano-, micro-, meso-, macro-, meta-, and global levels) and shaping the appropriate investment and innovation policies of states. Moreover, in the third millennium, the civilized world experiences military aggression conducted with the use of new types of weapons. This will have an inevitable impact on the ecosystem and will require investments in the development of the latest technologies, mainly based on digital technologies, to mitigate the negative environmental consequences of the war and prevent a global food crisis. The issue of investment in the development of alternative energy remains relevant in light of reducing the dependence on imports of fuel and energy resources and decreasing their consumption.

Studies show that the cost of eliminating the environmental impact of using unfriendly technologies is 30-35 times higher than the cost of developing an eco-friendly technology [1].

Adopted in 2015, the 2030 Agenda for Sustainable Development laid the foundation for the promotion of green business in both economically advanced and developing countries. This program also drew the world leaders' attention to the need for environmental protection, rational use of natural resources, water and soil purification, introduction of energy-saving technologies, and active search for alternative energy sources. [2].

Literature review. Many domestic and foreign authors have researched and continue to study the pressing problems of eco-innovation development and its investment framework. The list includes Andersen M., Bondarenko S., Cherchyk L., Shershun M., Khumarova N., Mykytyn T., Cherchyk A., Geraldts T.H.J., Bocken N., Hall J., Kerr R., Lee J., Suh T., Roy D., Baucus M., Odrekivskyy M., Kohut U., Oltra V., Saint Jean M., Sarkar S., Poon J., Lepage E., Bilecki L., Girard B., etc. [3-11]. However, the extremely unsatisfactory global environmental situation requires further research in this field. The impact of global environmental problems on the emergence and change of investment trends, innovation and investment processes, and government policies on the creation, operation, and development of eco-innovation systems at various levels of organization through their computerization remains underresearched.

In particular, A. Sadekov notes that in the current conditions of the countries' socio-economic development, the eco-oriented management of innovation activities at all organizational levels of national innovation systems is among the most pressing issues. Today, the eco-oriented management system is becoming the central subsystem of the management system, while the functioning of all other subsystems (personnel, financial, etc.) is based on the principles of rational nature management and environmental protection [12].

Cai W. and Li G. investigate how eco-innovation impacts firm performance. To do so, they shed light on the keys, for example, (competitive pressures, environmental, organizational capabilities, and technological capabilities) contributing to eco-

innovation's evolution. These instruments give the firms incentives to embrace eco-innovation. Adopting eco-innovation significantly enhances a firm's environmental performance and, as a result, its economic performance [13].

Many corporations have adopted environmental policies, publishing environmental guidelines and codes of conduct to ensure product and production safety. That is why there are many examples of eco-friendly activities among international corporations. Ford, for instance, sees the main goal of its environmental policy in reducing carbon dioxide emissions by improving its car engine sustainability. In the United States, eco-friendly technologies stand alongside information and new technologies in terms of venture capital investment. In China, such venture capital investments have more than doubled in recent years, accounting for 19% of total investment. As the largest energy consumer and CO₂ emitter, China has developed various carbon emission reduction policies. According to the forecasts of the International Labor Organization (ILO), the German environmental technology industry will have grown 4 times from its current level by 2030 and will account for up to 16% of the total industrial output [14, 15].

In 2008, a grand project was launched to build an environmentally friendly Masdar City (UAE). It is the world's first city with zero carbon dioxide emissions and zero waste, free of industrial plants and unfriendly transportation means, and it is not without digital technologies. According to rough estimates, construction should be completed by 2025. The cost of the Masdar project will reach up to \$20 billion. Many of eco-innovations that have emerged here will be implemented not only in the UAE but also in other countries around the world [16].

Also, the Nordic Environment Finance Corporation (NEFCO), a multilateral financial institution, aims to enhance the environmental situation in the countries it operates in by investing in projects, including digital projects, that have a positive environmental effect [17]. Canada is also an active participant in the development of eco-innovation in the world. Canada is home to many startups in this field, has strong government support, and, aided by digital technologies, is actively creating and intensively developing eco-friendly innovative enterprises.

For example, Environment Canada's Corporate Environmental Innovation (CEI) initiative is a partnership-based governmental initiative designed to help accelerate innovation and to improve the environmental performance of companies. CEI brings together industry, the finance sector, academics, non-governmental organizations, and other government departments [18].

For the last five years, the Canadian tech ecosystem has cleaned up in the annual Global Cleantech 100, a prestigious list of startups and scale-ups best positioned to grow, advance their technologies, and tackle the climate crisis. In 2022, 13 Canadian firms (second in representation only to the United States) made the list, nine of them members of the MaRS portfolio [19].

When studying the efficiency of eco-innovation activities, countries use a number of indicators to measure the amount of investment in the development of eco-innovative technologies by both the state and individual business entities. These

indicators include Environmental Performance Index (EPI), Global Innovation Index (GII), and a very important indicator of the Eco-Innovation Index (EII).

Studying the situation with these indicators, it is worth noting that according to the Environmental Performance Index covering the analysis of ecological health and ecosystem viability, Denmark, the United Kingdom, Finland, Malta, and Sweden topped the ranking in 2022 (for comparison, Denmark, Luxembourg, Switzerland, the United Kingdom, and France were top performers in 2020). In 2020, Afghanistan, Myanmar, and Liberia occupied the lowest spots in the ranking (previously held in 2018 by the Democratic Republic of the Congo, Bangladesh, and Burundi). In 2022, Ukraine was ranked 52nd with an index of 49.60, which is significantly better than in 2020 – 60th place (index 49.50). [2, 20, 21].

According to the 2021 Global Innovation Index, Switzerland, Sweden, and the United States were the leaders of the ranking, retaining their positions from 2019, while Guinea, Yemen, and Angola were the outsiders [22].

In the 2021 Eco-Innovation Index, the top three positions were taken by Luxembourg, Finland, and Austria, a similar situation as in 2020. Malta, Poland, and Bulgaria showed the worst results in both years. Over the last decade, the Eco-Innovation Index mean rate has been growing driven by increased investment in research and development. The leaders of this ranking have shown a growing trend towards elevating the government's support for eco-innovations [23]. Unfortunately, the Eco-Innovation Index is not determined in Ukraine.

Results. Global environmental problems objectively increase innovation and investment activity in the development of green technologies. An important task here is to build ecological innovation systems (EIS) and shape appropriate eco-innovation policies to stimulate the development of eco-innovation activities. It is also important to identify investment and innovation priorities in this area.

The main characteristics that should be taken into account when shaping and implementing an appropriate innovation policy include [24-26] the country's investment in social and human capital, which merges knowledge and innovation systems; the research capacity of the country or region, its intertwining with the country's higher education system since the innovation and technological productivity of enterprises depends on the interaction between them and the ability to learn; and geographical proximity.

The systemic concept of eco-innovation policy as a structural policy aims to enhance the eco-innovation landscape and improve environmental and economic efficiency and international competitiveness of national industries. It contains elements of global, international, national, entrepreneurial, and interpersonal integration and competition, as well as self-sufficiency in ensuring economic growth and development. Therefore, it is worth considering interdependent and mutually consistent global (mega-level), international (meta-level), national (macro-level), regional (meso-level), corporate (micro-level), and anthropological (nano-level) eco-innovation policies (Figure 1).

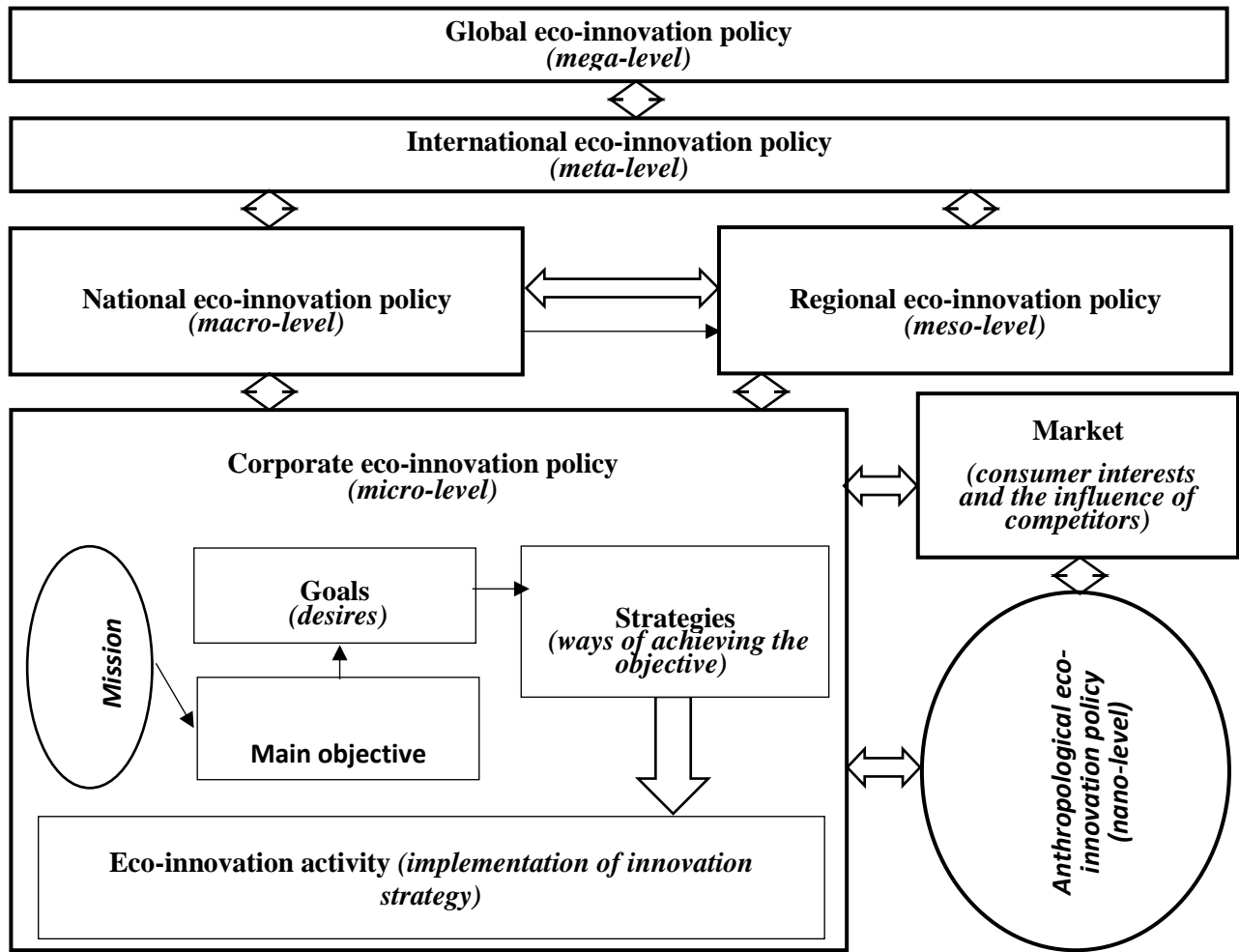


Figure 1. Components of eco-innovation policy at various levels of the global economic system (economy)

The development of a global eco-innovation policy (GEIP) (mega-level) is focused on building a global eco-innovation system that defines strategies for the development of the global ecological economy in general; organizing vertical and horizontal eco-innovation cycles, their parallelism and dynamism; the impact of green investments; technological, in particular digital, innovations and economic growth; rational and efficient use of energy, ensuring environmental sustainability [27].

International innovation policy today is developing according to the following scenarios [28]: “populism and protectionism”, in which populist and nationalist tendencies prevail in the international environment; “innovation as a global public good”, in which everyone wins and global cooperation is the dominant model; “bottom-up innovation”, which integrates the innovative forces of societies; international relations and innovation diplomacy. These scenarios are further combined into a single framework, the international dimensions of innovation policy, providing a foundation for aligning different stakeholders at the local, regional, national, and supranational levels. The following strategies of innovative development are suggested as the basis for the implementation of international innovation policy [29, 30]: support for the diffusion of innovations; support for “growth points”; support for foreign high-tech expansion and integration into transnational corporations; focus on leadership in

science; dissemination of innovations and creation of a favorable innovation climate; stimulation of innovations through the development of innovation infrastructure. These scenarios and strategies can form the core of the implementation and development of an international eco-innovation policy based on the sustainable innovation growth model, which provides for sufficient attention to the environment, energy, people, building human-cyber-physical systems, and other problems arising from climate change and natural resources depletion.

National eco-innovation policy (NEIP) (macro-level) is a set of principles and mutually supportive economic, legal, organizational, and social methods of planning, stimulating, regulating, and controlling eco-innovation activities in the scientific, technical, and industrial spheres. In order to ensure the systemic sustainability of the country's economy, the NEIP should be based not only on promoting eco-innovation but also on the development of basic business conditions, creation of a favorable competitive environment, and development of key factors of eco-innovative production [31, 32]. The main comprehensive types of NEIP include [33-35] a policy of technological and digital push; a policy of social orientation; a demand-based policy focused on market challenges [36]; a transformational policy [37] aimed at changing the structure of economic mechanisms and focused on addressing socio-economic problems; changing sectoral structures; interaction of economic entities and multi-level management; and living standards.

The emergence of new technologies, economic globalization, and limited national budgets have amplified the significance of regions in innovation. Increasingly, regional authorities are establishing contacts with interested circles abroad at the subregional level. Meanwhile, regional problems are addressed through close contacts between central governments and local authorities, as the latter are better aware of the technical, economic, and social needs of the regions. In recent years, the three levels of innovation policy development (policy implemented by the regions themselves and the regional components of national innovation policy and supranational policy) have become increasingly intertwined.

Regional eco-innovation policy (REIP) (meso-level) should be understood as a set of priorities and goals for the creation, implementation, and development of eco-innovation activities in the region. The main strategic objective of the REIP is to create favorable conditions in the region for development and comprehensive support of the internal scientific, technical, and innovation capacity; efficient use of own resource, technological, and product eco-innovations; intensification of innovation processes in the region; and improvement of competitiveness and economic development of the region. The main goal of the REIP is to constantly improve the level of the region's eco-innovation capacity, organize eco-innovation cycles, and create an efficient regional eco-innovation system and a system for managing regional innovation development in general. The REIP must align with the goals and objectives of the national eco-innovation policy. It should combine supranational and national interests in relation to the regions and intra-regional interests since supranational, national, and regional policies and policies of local governments and territorial entities should not be contradictory but should be integrated and complementary [38]. The REIP is a

component of the national eco-innovation policy, which provides guidelines for the development of the REIP based on the theoretical framework and international experience and creates the necessary conditions for the functioning of the REIP implementation mechanism. Taking into account the peculiarities of a particular region, the REIP determines the state's attitude to solving regional environmental problems through innovation and ensures the participation of the region's eco-innovation sector in solving national environmental and socio-economic problems.

The selection of the appropriate priorities that require preferential support is the basis for the efficient implementation of the REIP. These include technology ecologization, investment attraction in eco-innovation; capitalization of environmental intellectual property; balancing the eco-innovation supply and demand; development of regional eco-innovation infrastructure; introduction of material, energy, and resource-saving technologies; creation of high-tech and highly efficient environmental industries to ensure the production of competitive goods [39, 40].

Based on the REIP priorities, a system of REIP goals is developed, namely ensuring a high level of eco-innovation capacity and culture in the region; improving the environmental friendliness, competitiveness and efficiency of regional industries through their eco-innovation upgrade; creating a favorable eco-innovation climate in the region; searching for and mobilizing domestic eco-innovation reserves to ensure environmental friendliness, economic growth, and optimal use of available natural resources and financial and infrastructural capacity of the region for eco-innovation development; support for research and development in the priority areas of eco-innovative development of the region; creation and development of a system of personnel training and retraining; creation of a portfolio of eco-innovations, a bank of ideas, and an information base for the implementation of eco-innovative projects in the region; organization and development of interregional eco-innovative cooperation; maintaining an optimal balance between regional, national, and supranational eco-innovative policies [41, 42].

Corporate eco-innovation policy (CEIP) (micro-level) is a form of strategic management that defines the goals and conditions for the implementation of eco-innovation activities of an enterprise and is focused on ensuring its competitiveness [43]. Figure 2 shows the sequence of development of innovative goods, which suggests that market competition and demand are one of the driving factors in the development of CEIP. And the development of an enterprise's eco-innovation policy constitutes the process of searching for and combining the main elements of innovation policy into a single system, in particular marketing policy; research and development policy; policy of structural changes; technical policy and investment policy, which are in constant interaction and reflect the approach to managing eco-innovation processes at the enterprise in the context of eco-innovation activities in general. Therefore, the CEIP development involves defining the mission, goals, and strategies for the environmental development of an enterprise based on digital technologies, considering its potential capabilities and the availability of necessary resources.

The main CEIP components include the enterprise's mission, its main goal, and strategic and operational eco-innovative development goals. Strategic eco-innovation

goals are set in the form of declarations of eco-innovation intentions, which provide the basis for the entrepreneurial concept of environmental entrepreneurship and the definition of its basic and functional strategies that enable its implementation. A formal system is developed to support operational plans. Setting and formulating strategic eco-innovation goals is the starting point for selecting and developing strategies to ensure their implementation.

The study of the problems in the development and implementation of eco-friendly innovation strategies is relevant and in line with current demands. The processes of forming and implementing innovative strategies of eco-oriented enterprises (EOEs) and assessing the level of environmental friendliness of EOE programs and projects should generally be carried out according to specifically defined stages. A review of the literature reveals these stages and leads to the conclusion about the use of situational methodology and systemic and homeostatic approaches to making managerial decisions on the environmental status of EOE and the success of implementing eco-oriented innovation strategies that ensure the sustainability of their development.

The development and implementation of eco-oriented innovation strategies is a systemic process that includes the following main stages: analysis of the content of the conditions in which the EOE operates, definition of its mission and system of strategic environmental and innovation goals and objectives; assessment of eco-oriented innovation capacity and the state of the environment; determination of priority areas for the development of EOE; selection of eco-oriented innovation strategies; implementation of eco-oriented innovation strategies; evaluation of the efficiency of the implemented eco-innovation strategies.

Today, eco-oriented innovation strategies are divided into four groups [44, 45]: cooperative and circular flows; eco-efficiency and sufficiency; clean production; and ecological modernization. These strategies combine the ideas of environmental innovations, which are mainly digitally based and are a determining factor in ensuring eco-oriented innovative development of enterprises and optimal interaction between economic development and the environment.

The process of forming eco-oriented innovation EOE strategies should be based on an eco-oriented methodology and relevant provisions. The EOE's business strategy is aimed at profit earning with a focus on environmental conservation and sustainable development [46]. The basic assumption is that innovation strategies form a system with hierarchically interconnected elements. This system should be in line with global trends in eco-oriented development and, accordingly, domestic economy development, combining macro-, meso-, micro-, and nano-levels in cooperation with foreign countries (Figure 2).

The methods for developing the eco-oriented innovation strategies for each level and component of the system will be specific. In the process of developing eco-oriented innovation strategies, the goals and objectives peculiar to each level of this system should be taken into account, and strategies reflect the focus on solving the tasks.

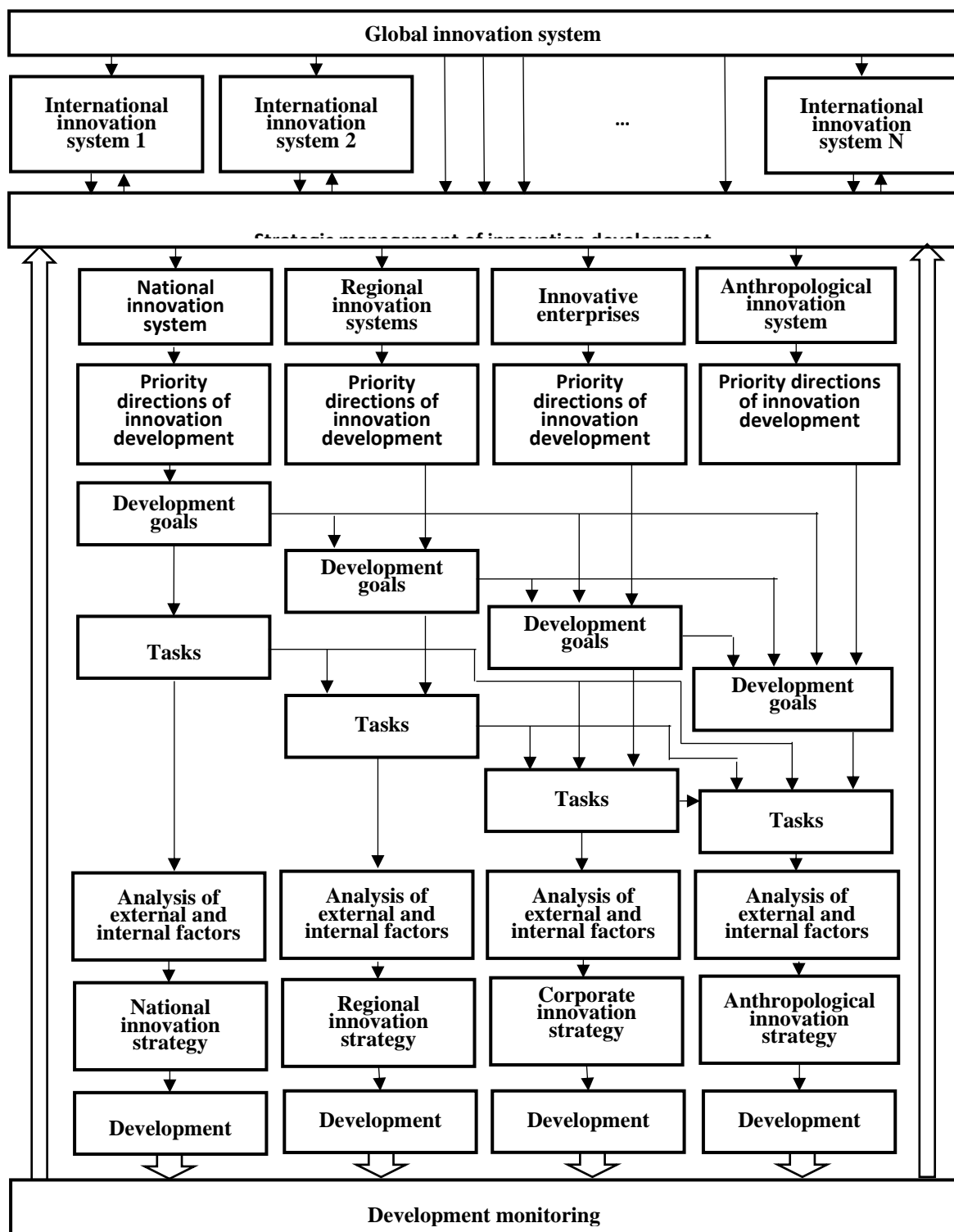


Figure 2. Model for building the eco-oriented innovation strategies in the system of strategic development management

The implementation of national eco-oriented innovation strategies includes selecting priorities based on a number of targets for eco-oriented innovation and scientific and technological development and intensification of the country's innovation process. When setting priorities, it is possible to create and choose many options, but they must be in line with global benchmarks for economic development

and innovation, advanced achievements in science and technology, and the goals and objectives of national socio-economic progress. The development of regional eco-oriented innovation strategies involves shaping priorities, regional innovation policy, and strategic and operational goals for eco-oriented regional growth.

In order to develop eco-oriented innovation strategies for an EOE, it is necessary to set priorities and goals for eco-oriented innovation development of the EOE; determine a plan of specific actions to manage eco-oriented innovation activities; take into account global, international, national, and regional innovation strategies for eco-oriented development; coordinate actions with the development strategies of industries, actors in the region's innovation system, participants in economic relations, and other business entities.

Particular programs that include a set of eco-oriented innovation projects and are prioritized according to various criteria like environmental friendliness, net present value, profitability index, return on investment, internal rate of return, payback period, optimal risk, etc. are created for the successful implementation of eco-oriented innovation strategies for enterprise development. In other words, the efficiency of an innovation program is assessed in terms of environmental friendliness, profitability, liquidity, and risk.

Assessing the level of environmental friendliness of projects, programs, and enterprises in general should be carried out in the following stages [47]: collection and analytical processing of preliminary data used to evaluate absolute actual indicators and characterize specific areas of eco-oriented activities of the enterprise; calculation of actual indicators; calculation of the ratio of actual indicators to strategic (reference) values; identification of generalized indicators and an integral indicator of environmental sustainability of the enterprise. Assessment of the environmental friendliness of EOE's will allow creating and accumulating an information base and identifying weaknesses in the organization and management of EOE's, the level of environmental safety of EOE's, their competitiveness, and investment and innovation attractiveness in terms of the environmental component.

With a view to making decisions on the status of environmental friendliness of the EOE and, accordingly, on the success of implementation of eco-oriented innovation strategies, under the influence of internal and external factors, computer technology, situational methodology, and a systemic approach to managerial decision-making based on comparative analysis of actual indicators of the EOE's eco-oriented activities and indicators of strategic plans are suggested to be used. Managerial decisions are made based on the results of comparing the value of the i ($i = 1, 2, \dots, N$) actual indicator with its strategic value. Assuming (Figure 3) Y^0_0 is the eco-oriented innovation strategy (main goal) of the EOE; Y^0_i is the strategically targeted planned value of the i studied indicator of the EOE's activity, and Y_i is the actual value, then the EOE management body makes decisions based on the deviation of Y_i from Y^0_i , i.e. based on the absolute value of the difference $|Y^0_i - Y_i|$. If the values of external factors go beyond the range of acceptable values and disturb the EOE's business processes, decisions are made

based on disturbances. Disturbances at the EOE today can be caused by environmental pollution, Covid-19, the energy crisis, etc.

Environmental pollution can be assessed on the basis of the Comprehensive Atmospheric Pollution Index (*CAP*), a quantitative measure of the level of atmospheric pollution generated by n substances present in the atmosphere of a settlement or individual EOE. *CAP* is calculated by the formula (1) [48].

$$I_n = \sum_{i=1}^n I_i = \sum_{i=1}^n \left(\left(\frac{\bar{q}}{MAC_{ad}} \right)^{C_{i_i}} \right)_n, \quad (1)$$

where \bar{q} is the time-averaged (month or year) concentration of the i impurity calculated for the station of a separate EOE or group of EOE's, a single settlement or a group of settlements; i – impurity.

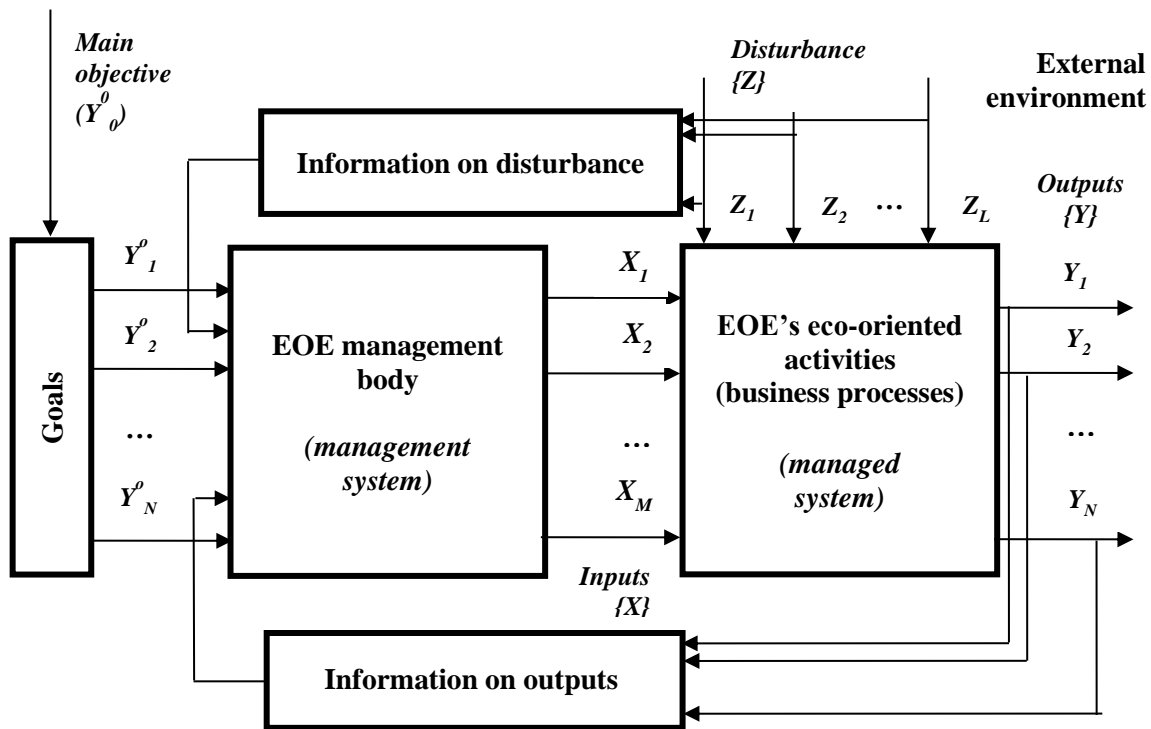


Figure 3. Management model for eco-oriented enterprises

Y^0_0 is main objective; Y^0_i ($i = 1, 2, \dots, N$) are strategic values of the studied indicators; Y_i ($i = 1, 2, \dots, N$) are actual values of the studied indicators; X_j ($j = 1, 2, \dots, M$) are management impacts; Z_l ($l = 1, 2, \dots, L$) are disturbances

CAP is calculated for the period under study for one or K city stations as the total of all Atmospheric Pollution Indices (*API*s). *CAP* takes into account n substances present in the atmosphere. For an integral assessment of the level of atmospheric pollution using *CAP*, the values of the *API* indices for the five pollutants for which these values are the highest can be used. In this case, formula (1) will look like (2).

$$I_5 = \sum_{i=1}^5 I_i. \quad (2)$$

Thus, the criteria for assessing the levels of environmental pollution by EOE's can be determined on the basis of the Atmospheric Pollution Index. An Atmospheric Pollution Index value of less than 2.5 indicates a clean atmosphere; from 2.5 to 7.5 – a slightly polluted atmosphere; from 7.6 to 12.5 – a polluted atmosphere; from 12.6 to 22.5 – a highly polluted atmosphere; from 22.6 to 52.5 – a severely polluted atmosphere; and more than 52.5 – an extremely polluted atmosphere. Therefore, the graph of levels of environmental pollution by eco-oriented enterprises is proposed to be presented in the form shown in Figure 4. The vertices of this graph represent the levels [48]:

R_1 (clean environment) – the level of pollution at which the value of the Atmospheric Pollution Index is less than 2.5;

R_2 (slightly polluted environment) – the value of the Atmospheric Pollution Index is between 2.5 to 7.5;

R_3 (polluted environment) – the value of the Atmospheric Pollution Index ranges from 7.6 to 12.5;

R_4 (highly polluted environment) – the value of the Atmospheric Pollution Index ranges from 12.6 to 22.5;

R_5 (severely polluted environment) – the value of the Atmospheric Pollution Index ranges from 22.6 to 52.5;

R_6 (extremely polluted environment) – the value of the Atmospheric Pollution Index is more than 52.5.

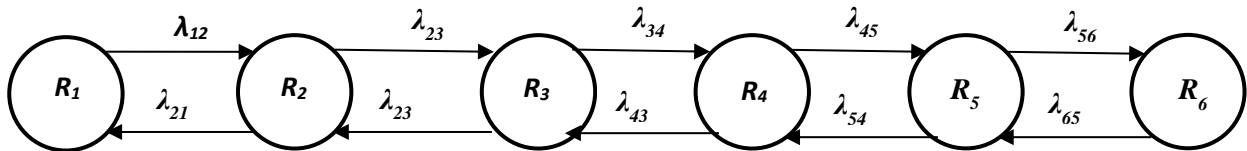


Figure 4. Graph of the levels of environmental pollution by EOE's

λ_{ij} are the intensities of transitions from level i to level j ; $i, j=1, 2, \dots, 6$; $i \neq j$.

The assessment of the level of environmental friendliness of EOE's business processes should be carried out in the following stages: collection and analytical processing of preliminary data used to assess absolute actual indicators and characterize certain areas of eco-oriented activities of the enterprise; calculation of actual indicators; determination of the ratio of actual indicators to strategic (reference) values; calculation of generalized indicators and an integral indicator of environmental friendliness of the enterprise. This will provide an opportunity to create and accumulate an information base and determine the level of environmental safety of EOE's, weaknesses in the organization and management of EOE's, their competitiveness and investment and innovation attractiveness in terms of environmental component.

Therefore, the results of the implementation of eco-oriented innovation strategies are evaluated, decisions are made on the status of EOE's business processes and the choice of management impacts on EOE's business processes, and appropriate adjustments are made to the strategy as a whole. Implementation of eco-oriented innovation strategies will ensure the sustainability of the EOE in the long term. Decision-making on the states of environmental friendliness of the EOE and the success of the implementation of eco-oriented innovation strategies, under the influence of internal and external factors, the selection and implementation of management impacts on the EOE, and the adjustment of eco-oriented innovation strategies are suggested to be carried out through the use of computer technology, situational methodology, and systemic and homeostatic approaches.

The current problems of functioning and development of eco-oriented enterprises require new approaches to organizing their management as they have been accumulating and not resolving various environmental contradictions for years. Therefore, the article suggests putting these contradictions in the basis of organizing the management of EOE's using a homeostatic approach.

In the daily management of enterprises in the presence of various kinds of contradictions, a situational methodology and systemic approach to making managerial decisions are most commonly used [49, p. 100]. The homeostatic approach is based on the systemic approach, complements it, and allows for efficient management of the development of modern enterprises. It is more reasonable in terms of maintaining the stability of the existence and development of enterprises in the long term and uses homeostatic management [50]. That is, the management of many processes of modern EOE's based on the concept of homeostasis [50] peculiar exclusively to living systems can be shown in the form of bipolar management, the model of which is shown in Figure 5 in the form of management through goals and contradictions between them.

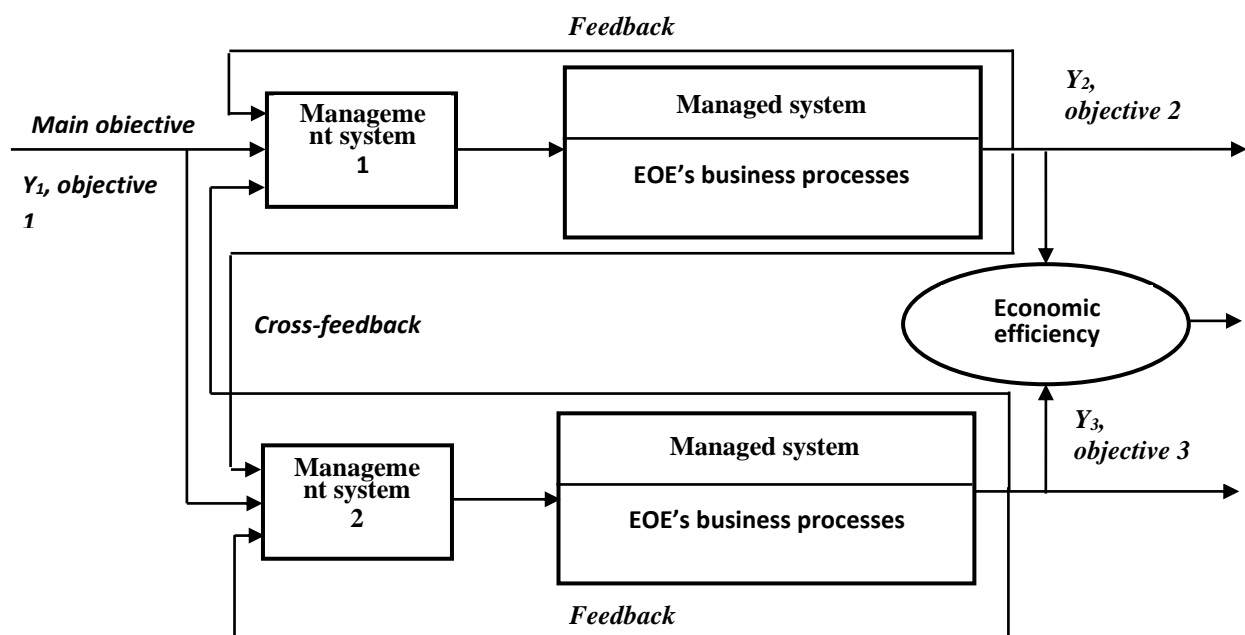


Figure 5. Homeostatic management model for EOE

The homeostatic approach to organizing the management of EOE is appropriate and enables the development of a strategy for managing the sustainable development of EOE based on the contradictions arising between the requirements for their environmental friendliness and operational and economic effects. The environmental friendliness of technologies requires high knowledge intensity and non-waste technologies in the production sector and promotes the high-tech and digital development of EOE, but this requires the investment of significant resources and, accordingly, a decrease in the economic efficiency of business processes at the initial stages of activity, which causes contradictions. In other words, the environmental friendliness of EOE's technologies requires an appropriate innovation capacity to ensure their sustainable development. Therefore, when building a model of homeostatic management of the EOE, an eco-oriented innovation strategy can play the role of the main objective (*objective 1*) or the target function in the homeostatic approach to managing the development of the EOE.

To ensure the sustainable development of the EOE, it is advisable to elaborate an improved structure for managing the system of relations, introduce scientifically-grounded restrictions on anthropogenic impacts, and ensure the advancement of eco-technologies, which could, in turn, become the target function of homeostatic management of the production sphere (*objective 2*). Increasing the level of the operational effect of the EOE (*objective 3*) and, accordingly, the economic effect as an integral one can be the target function of the homeostatic management of the EOE. The homeostatic management of marketing in the organizational activities of the EOE is relevant here. The nature of management in the functioning of the EOE can be presented as human management to support their professional activities. This view reflects the central idea of management – the management of people engaged in a particular activity [47]. A feedback loop chart may be used to illustrate this concept, with those carrying out production activities being the focus of management. The objective of management (*objective 2*) – to encourage people working at the EOE to perform their activities correctly – can be the target function here. These activities may result in eco-friendly products or products that will be used as goods or services. The managers' duties end when the products are ready for use. The conversion of products into goods or services is conducted by other people engaged in marketing-related activities.

The essence of marketing can be expressed as customer relationship management. This view of marketing reflects its idea as an activity of converting the products created by EOE into goods and services that satisfy the needs of their customers. This idea can also be expressed by a feedback management loop, in which the relationship with consumers constitutes the object of management. The objective of marketing (*objective 3*) – satisfying consumer needs – can be the target function. This type of management is deployed across the key marketing areas: modifications in goods and services, changes in prices and sales channels for goods and services, and promotion of EOE's products to the market.

Conclusions. It is worth mentioning that the collection, storage, and processing of information received from all feedbacks in order to support managerial decision-making and decision implementation are carried out by means of computer equipment using digital technologies.

Therefore, the approaches to building eco-innovation systems, shaping eco-innovation policy, developing and implementing eco-innovation strategies for the growth of economic systems at all organizational levels, and evaluating the results of the eco-innovation strategy implementation, as well as the homeostatic approach to managing EOE, proposed in the context of the digital economy allow solving modern problems of managing the eco-innovation systems at different organizational levels.

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8. ADAPTATION OF MARKETING ACTIVITIES OF DOMESTIC BANKS TO THE CONDITIONS OF MARTIAL LAW BASED ON INTERNET TECHNOLOGIES

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Introduction. In the current conditions of globalization and integration of financial markets, the banking sector is a very dynamic and high-tech sector of the economy. In order to gain competitive advantages, banking institutions are constantly expanding the range of banking products offered, improving banking technologies, introducing innovations, increasing the level of service, which provides them with opportunities for further growth.

Literature review. In [1], the authors analyze that in order to intensify their marketing activities in the market, commercial banks actively implement innovations using the Internet, artificial intelligence systems and software, are engaged in activities in the field of public relations and sponsorship. The features and possibilities of using artificial intelligence in the financial sector of Ukraine are presented in [2]. In [3], based on the analysis, it is recommended that commercial banks of Ukraine use FinTech and neobanking. Trends in changes in the marketing sales and communication policy of a banking institution and ways to improve their efficiency, leading banks in servicing legal entities and individuals in a bank branch, the most effective brands in the banking market products are presented in [4]. In [5] the importance of marketing analysis in the activities of commercial banks of Ukraine, its main tasks are defined and the main directions are analyzed. However, there are no publications in scientific sources that

highlight the specific possibilities of using Internet banking by large domestic banks of Ukraine, their cooperation with other business entities.

Results. Despite significant geopolitical, demographic, and macroeconomic losses, the market of banking products in Ukraine in 2022-2023 survived. This was due to a decrease in its internal vulnerability to stressful situations in previous years as a result of reforms and timely developed anti-crisis measures in quarantine and war [6]. During 2022-2023 commercial banks of Ukraine managed to ensure the inflow of funds of individuals to current and deposit accounts, adapt their operational processes to the appearance of blackouts in winter.

During the war, a small number of commercial banks were withdrawn from the banking products market of Ukraine, which continued the trend towards a reduction in the number of commercial banks in Ukraine, which had existed since 2014. However, it's worth noting that in times of war, the National Bank of Ukraine currently tolerates violations of banking regulations. Table 1 shows the dynamics of the number of commercial banks in Ukraine for 2011-2023.

Table 1

Number of commercial banks in Ukraine for 2011-2023

Years	Number of operating banks	Of these, with foreign capital	Among them with 100% foreign capital
01.01.2011	176	55	20
01.01.2012	176	53	22
01.01.2013	176	53	22
01.01.2014	180	49	19
01.01.2015	163	51	19
01.01.2016	117	41	17
01.01.2017	96	38	17
01.01.2018	82	38	18
01.01.2019	77	37	23
01.01.2020	75	35	23
01.01.2021	74	33	23
01.01.2022	71	33	23
01.03.2022	69	31	22
01.10.2022	67	30	22
01.01.2023	67	30	22
01.03.2023	65	29	21
01.10.2023	63	28	20

Source: Number of banks in Ukraine (2023)

Commercial banks of Ukraine in 2022-2023 both systematically and spontaneously, they continued to reduce their territorial network. During 2022, the number of divisions of banking institutions decreased by 20% from 6685 units. up to 5336 units Due to the occupation of the southeastern territories of Ukraine, as many as 1349 branches were closed, which was significantly more than in 2021, when only 449 bank divisions were closed [6].

Under martial law, there was a significant increase in the assets of commercial banks of Ukraine by 17,9% to UAH 2,7 trillion UAH. This was due to the forced

emission of the national currency by the National Bank of Ukraine, especially at the beginning of the war in order to cover additional budget needs for growing military and social expenditures. The dynamics of assets of commercial banks of Ukraine for 2010-2023 is shown in Fig. 1.

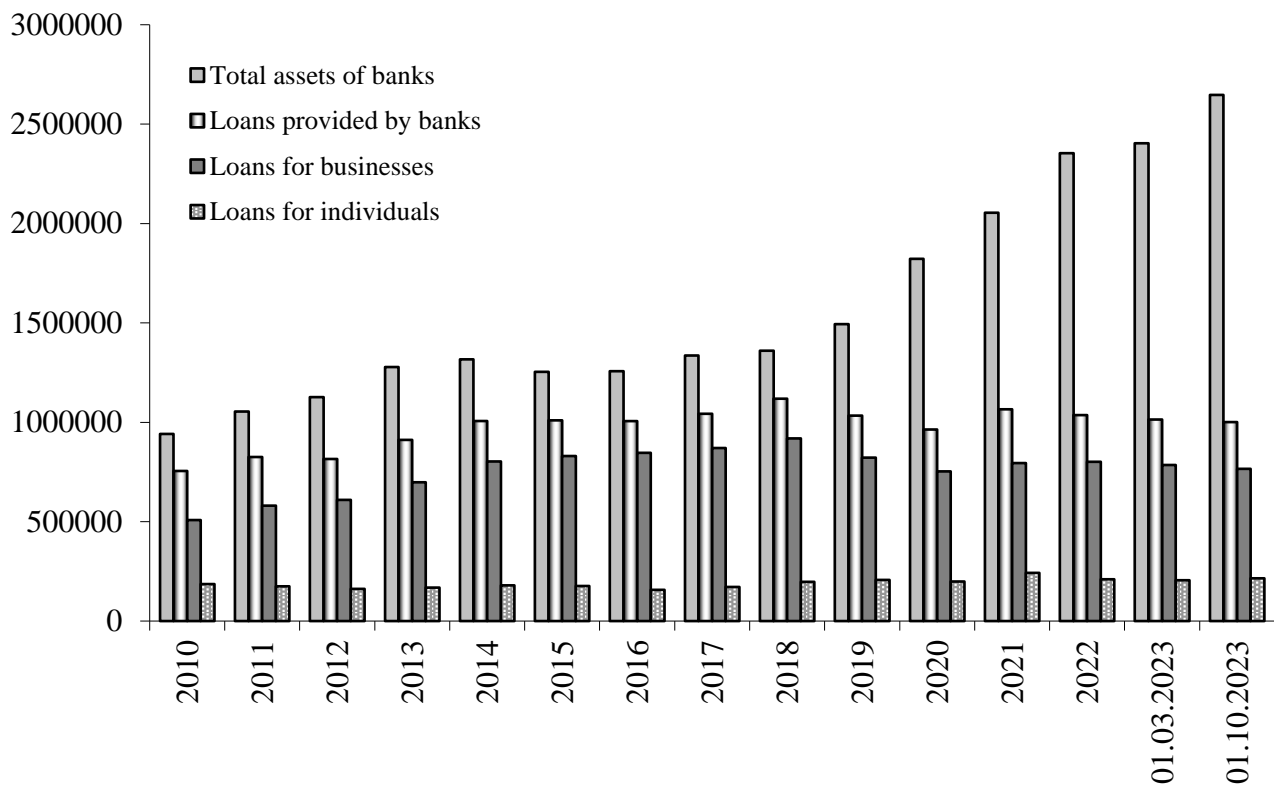


Figure 1. Dynamics of assets of Ukrainian banks and loans granted by them, mln. UAH

Source: Assets of Ukrainian banks (2008-2023) (2023)

During the war, the volume of loans issued by commercial banks decreased. Corporate clients, small and medium-sized businesses, and individuals today are not ready to pay high interest rates on loans and assume certain additional financial obligations. The volume of loans under martial law increased only for the agricultural sector by state-owned banks, in particular due to the use of the mechanism of the budget support program called "Affordable Loans at 5-7-9%". At the same time, the volume of soft loans provided by the state today already amounts to almost 30% of all available balances on corporate loans of commercial banks of Ukraine in the national currency.

During the war, the liabilities of commercial banks in Ukraine increased significantly, primarily due to an increase in customer funds – Fig. 2.

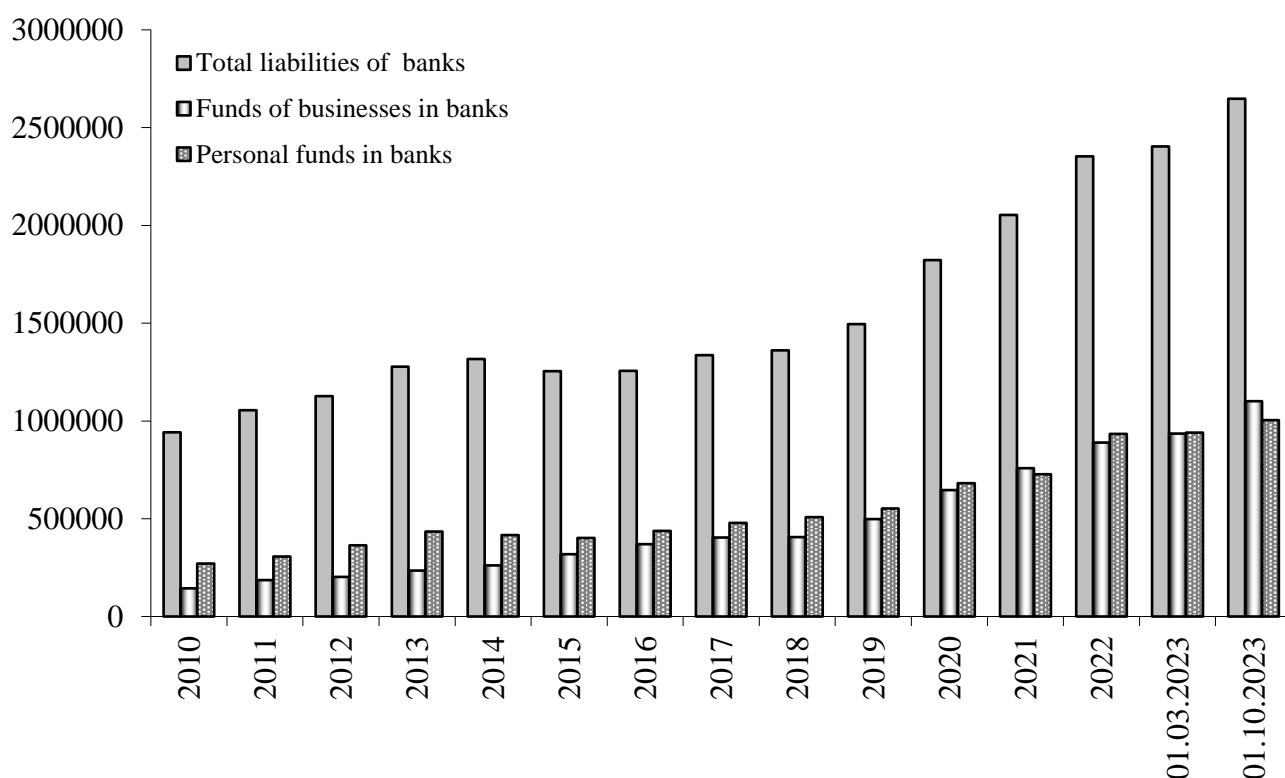


Figure 2. Dynamics of liabilities of commercial banks of Ukraine and customer funds during 2010-2023, mln. UAH

Source: Liabilities of Ukrainian banks (2008-2023) (2023)

At the same time, clients mainly accumulate funds on current accounts, in particular, there are primarily temporarily unused payments from military personnel, state employees and temporarily displaced persons in systemic state-owned banks. In the second half of 2022, commercial banks of Ukraine were able to resume the increase in foreign currency deposits due to their offer of 3-month "conversion deposits". They allowed customers to purchase non-cash currency at a "preferential" rate, which was initially a few hryvnias lower. for the current exchange rate that was in the exchangers.

The overall system return on banking capital of Ukraine under martial law is at the level of 10,9%, which is a positive phenomenon. However, the main source of the banking system's profits was the interest income of state-owned commercial banks of Ukraine from their investments in both domestic government bonds and NBU certificates of deposit.

In the market of banking products of Ukraine, there is a fierce struggle for customers who prefer reliable banks today. In the table 2 figure shows the ranking of financial reliability of commercial banks of Ukraine based on the results of their activities in the 4th quarter of 2022.

Table 2

Ranking of financial reliability of commercial banks of Ukraine based on the results of their activities in the 4th quarter of 2022

Name of the bank	FinScore	Net assets, mln. UAH	Profit, mln. UAH	Deposits, mln. UAH	Loans, mln. UAH
JSC "SEB Corporate Bank"	A / 3,47	5303	149	4387	398
JSC "ING Bank Ukraine"	A / 3,39	15339	415	10799	7173
JSC "UkrSibbank"	A / 3,27	108766	3533	92982	16315
JSC CB "PrivatBank"	A / 3,2	549738	30252	464871	71416
JSC "CITIBANK"	A / 3,05	51421	2818	44768	6904
JSC "OTP Bank"	A / 3	91005	597	77619	29892
JSC "Deutsche Bank DBU"	A / 3	5314	185	4734	698
JSC "Kredobank"	A / 2,99	38970	142	32820	12505
JSC "Raiffeisen Bank"	A / 2,98	176523	1547	143520	61821
JSC "Idea Bank"	A / 2,88	4567	-649,88	3535	2959
JSC "Oschadbank"	B / 2,83	272238	689	231297	83215
JSC "A-Bank"	B / 2,66	17786	222	14579	6220
JSC "Credit Agricole Bank"	B / 2,61	72569	31	63492	27458
JSC "ProCredit Bank"	B / 2,61	33022	-1649,34	24024	19292
JSC "Piraeus Bank ICB"	B / 2,58	6113	-108	4615	2100
JSC "Universal Bank" / Monobank	B / 2,55	86145	2402	69316	20797
JSB "UkrGasbank"	B / 2,53	132048	-2756,74	112755	65312
JSC "Ibox Bank"	B / 2,47	4355	598	1799	559
JSC "Ukreximbank"	B / 2,41	236241	-6886,18	175616	83013
JSC "Pravex Bank"	B / 2,41	10216	-415,21	8210	3694

Source: Ranking of financial reliability of Ukrainian banks for the 4th quarter of 2022 (2023)

Scoring indices of financial reliability of commercial banks, which are presented in table 2, calculated by the analytical department of YouControl.

The highest values of this FinScore index "A" mean the minimum probability of adverse financial consequences for these banks. According to the results of the 4th quarter of 2022, they are typical for nine banks with foreign capital and the state-owned JSC CB "PrivatBank". However, in order to conduct a correct assessment of the reliability of commercial banks, in addition to analyzing their customer rankings and microdata, it is necessary to monitor the situation on the market of banking products in general, especially in times of war.

Banks, competing with each other, encourage potential customers with new products and services, differentiate their distribution channels, and ensure accessibility to maximize the number of transactions. This leads to an increase in the role of the

sales policy of banking products and services, which determines the need for effective management of sales channels on the basis of their comprehensive assessment.

Recently, remote sales channels for banking products and services that require the use of the latest information technologies have become very popular. The most popular in Ukraine are ATMs, electronic communication systems and electronic payments at the point of sale of goods and services (table 3).

Table 3

Remote sales channels for banking products and services

Remote Channel Type	Channel Features
ATMs	It is based on the use of payment cards by private and corporate clients. It makes it possible to manage an account in a multi-currency mode, conduct cash and non-cash transactions, receive information about the movement of funds and certain benefits that are provided to cardholders
Electronic payment systems at the point of sale of goods and services	Expands the possibilities of using payment cards and allows you to reduce customers' needs for cash
Electronic Systems Communication	They enable individuals and legal entities to carry out banking transactions online using a PC and the Internet

Source: Prushkivskyi V.H., Kozytska H.V. (2010)

Remote sales channels of domestic banks are shown in table 4.

Table 4

Remote sales channels of domestic banks in the first half of 2023

Banking institutions	Number of ATMs, pcs.	Number of payment terminals, pcs.	Internet Banking
JSC CB "PrivatBank"	Over 7000	Over 11000	Privat24, the number of users is more than 15 million persons
JSC "Oschadbank"	2569	2513	Os Chad 24/7, the number of users is 5.8 million persons
JSC "Universal Bank"	13	8	Monobank, number of users – 6,75 million people
JSC "Kredobank"	258	79	KredoBank
JSC JSCB "Lviv"	224	-	Bank Lviv Online
JSC "Idea Bank"	24	116	O.Bank 2.0, the number of users is about 9 thousand people

Source: Official website of JSC CB "PrivatBank", JSC "Oschadbank", JSC "Universal Bank", JSC "Kredobank", JSC JSCB "Lviv", JSC "Idea Bank" (2023)

Internet banking of domestic banking institutions differs in capabilities and functions, which allows them to compete in the market of banking services (table 5).

Table 5
Features of Internet Banking of Domestic Banking Institutions

Functions	Privat24	Monobank	KredoBank	ABank24	O.Bank 2.0
Registration of new customers without visiting branches	Virtual Card	Pick-up point, virtual card	Virtual card, mail	Pick-up point, virtual card, courier	Virtual Card
Availability of BankID	Web, Android/iOS	Android/iOS	Web, Android/iOS	Web, Android/iOS	-
Features of opening a deposit online	Online refusal of prolongation, foreign currency deposit	Online refusal of prolongation, foreign currency deposit	Online refusal of prolongation, opening bonus	Online refusal of prolongation, foreign currency deposit	-
Online Lending	Cash Credit, Credit Card, Limit Increase, Repayment Online	Credit Card, Limit Increase, Repayment Online	Credit Card, Limit Increase, Repayment Online	Cash Credit, Credit Card, Limit Increase, Repayment Online	Cash Credit, Credit Card, Limit Increase, Repayment Online
Card-to-card transfers	Own cards – 0% or 0,5%, cards of one bank – 0% or 0,5%, cards of other banks – 0,5% (min UAH 5)	Own cards – 0%, cards of one bank – 0%, cards of other banks – 0%	Own cards – 0%, cards of one bank – 0%, cards of other banks – from 10000 UAH – 0,2%	Own cards – 0%, cards of one bank – 0%, cards of other banks – up to 100000 UAH – 0%	Own cards – 0%, cards of one bank – 0%, cards of other banks – 0,5%
Transfers by phone number	Commission on card tariffs, there is a connection with the phone book	0% commission, there is a connection to the phone book	-	Commission 0% on own funds, 4% on credit funds	-
Payment of utilities	Templates, regular payment, under contract – 1 UAH, under revisits – 3 UAH	Templates, regular payment, under contract – 0%, under revisits – up to 20000 UAH per month. – 0%	Templates, regular payment, for revisits – up to 10000 UAH per month. – 0%	Templates, regular payment, under contract – 0%, under revisits – up to 20000 UAH per month. – 0%	By requisites 0,5 %
Mobile account replenishment	Up to 100 UAH – commission 2 UAH, over 100 UAH – commission 4 UAH	Up to 10000 UAH - 0% commission, over 10000 UAH - commission 3 UAH	0% commission	Commission 0%, limit – one replenishment up to 5000 UAH, per month. – up to 10000 UAH	0% commission
Online currency exchange	Yes	Yes	Yes	Yes	Yes
SWIFT payments	Abroad – 0.5% + \$12, in Ukraine 1% + \$12, for credit funds + 3%	Receiving an incoming transfer – 0% commission	-	0% fee for deposits, 0,9% for cash withdrawals	-

Additional Features	Change of limits, free notification, card details, mobile wallet, payment of fines, charitable transfers	Change of limits, free notification, cashback section, card details, mobile wallet, payment of fines, charitable transfers	Change of limits, free notification, card details, mobile wallet, payment of fines, charitable transfers	Change of limits, free notification, cashback section, card details, mobile wallet, payment of fines, charitable transfers	Change of limits, free notification, card details, mobile wallet, payment of fines, charitable transfers
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Source: Online Banks (2023)

Multifunctional Internet-banking increases the profitability of a banking institution and increases the competitiveness of the bank, which necessitates its development in modern conditions.

An important channel for communicating with customers is the website of a banking institution. Table 6 shows the main characteristics of the websites of domestic banks.

Table 6

Characteristics of the sites of domestic banks

Banking institutions	Number of visits in October 2023, thousand Persons	Average number of pages per visit	User demographics		Average duration of visit, min.
			By age	By gender	
JSC CB "PrivatBank"	15500	5,09	18-24 – 11,61%, 25-34 – 25,09%, 35-44 – 20,16%, 45-54 – 18,73%, 55-64 – 14,73%, 65+ – 9,69%	Women – 51,09%, men – 48,91%	8:02
JSC "Oschadbank"	3500	6,55	18-24 – 10,03%, 25-34 – 19,05%, 35-44 – 18,88%, 45-54 – 19,84%, 55-64 – 18,05%, 65+ – 13,88%	Women – 45,52 %, men – 54,48%	6:51
JSC "Universal Bank"	162,8	1,99	18-24 – 11,25%, 25-34 – 28,24%, 35-44 – 24,02%, 45-54 – 21,13%, 55-64 – 10,27%, 65+ – 5,08%	Women – 60,75 %, men – 39,25%	2:39
JSC "Kredobank"	224,9	4,49	18-24 – 12,96%, 25-34 – 35,83%, 35-44 – 20,28%, 45-54 – 13,95%, 55-64 – 11,62%, 65+ – 5,36%	Women – 54,02 %, men – 45,98%	4:12

JSC "Lviv"	JSCB	185,4	3,57	18-24 – 10,25%, 25-34 – 18,45%, 35-44 – 19,49%, 45-54 – 24,85%, 55-64 – 18,02%, 65+ – 8,95%	Women – 49,12 %, men – 50,88%	5:03
JSC Bank"	"Idea	271,4	1,97	18-24 – 17,92%, 25-34 – 30,21%, 35-44 – 22,95%, 45-54 – 13,63%, 55-64 – 9,31%, 65+ – 5,99%	Women – 45,35 %, men – 54,65%	2:42

Source: compiled from Service Similarweb (2023)

Among the leaders in terms of visits to the websites of state-owned banks JSC CB "PrivatBank" and JSC "Oschadbank", however, users aged 25-44 prevail among visitors to the websites of commercial banks JSC "Universal Bank", JSC "Kredobank" and JSC "Idea Bank", which indicates the active communication activities of these banking institutions.

In the context of the information economy, there are significant changes in the marketing activities of enterprises in different countries, industries and scales of activity. These changes consist in particular in the transition from the company's individual efforts to develop brands to co-branding. For cooperation, you can use its various forms:

- dual branding;
- cross-marketing;
- coalition loyalty program;
- co-branding.

In recent years, the number of joint projects of banks and online stores has increased significantly. Table 7 shows loan offers from Rozetka and partner banks in paperless form for bank customers when buying online.

Table 7

Loan offers from Rozetka and partner banks (without paper form)

Bank	Lending terms		
	Number of payments, pcs.	Monthly commission, % of the loan amount	Advance payment
JSC CB "PrivatBank"	Up to 25	0,01% p.a.	In the amount of the monthly payment
JSC "Universal Bank" (monobank)	Up to 24	0,000001% p.a.	In the amount of the monthly payment
JSC "A-Bank"	Up to 24	0,00001% p.a.	In the amount of the monthly payment
JSC "Sense Bank"	Up to 24	0,01% p.a.	N/a
JSC "FUIB"	From 3 to 24	0,00001% p.a.	N/a

Source: Rozetka online store (2023)

Table 8 shows loan offers from Rozetka and partner banks when concluding a paper loan agreement while buying in a store.

Table 8

Loan offers from Rozetka and partner banks (paper form)

Bank	Lending terms			
	Loan amount, UAH	Loan term, months	Borrower's age, years	Additional terms
JSC "OTP Bank"	300 – 200000	Up to 24	18-69	Credit for goods of the seller Rozetka and other sellers
JSC "Sense Bank"	500 – 150000	Up to 36	18-70	Credit for goods of the seller Rozetka
JSC "FUIB"	500 – 100000	Up to 24	18-70	Credit for goods of the seller Rozetka
JSC "Ukrsibbank"	500 – 100000	Up to 24	21-65	Credit for goods of the seller Rozetka
JSC "CB "Globus"	1000 – 50000	Up to 24	21-70	Credit for other sellers' goods

Source: Rozetka online store (2023)

Also, when concluding loan agreements in paper form, at the discretion of the partner bank, an online signing service may be available. At the same time, loans issued can be insured at a minimum rate of 0,5% per month. More detailed lending conditions are discussed when filling out a credit questionnaire in one of Rozetka stores or over the phone.

Table 9 shows the possibility of lending to customers in the considered online stores or marketplaces.

Table 9

Ability to lend to customers in domestic online stores or marketplaces

Online stores or marketplaces	Partner banks	
	In paperless form	Paper loan agreement
1	2	3
Rozetka	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank), JSC "A-Bank", JSC "FUIB", JSC "Sense Bank"	JSC "OTP Bank", JSC "FUIB", JSC "Ukrsibbank", JSC "CB "Globus", JSC "Sense Bank"
"Epicenter K"	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank), JSC "Sense Bank", JSC "A-Bank"	JSC "Sense Bank", JSC "OTP Bank", JSC "FUIB"
MAKEUP	-	-
"Allo"	-	JSC "Ukrsibbank", JSC "OTP Bank", JSC "FUIB", JSC "CB "Globus"
Comfy	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank), JSC "A-Bank", JSC "Sense Bank", JSC "OTP Bank", JSC "FUIB"	-

MOYO	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank), JSC "A-Bank", JSC "OTP Bank"	-
"Pharmacy 9-1-1"	-	-
"Foxtrot"	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank)	-
"Citrus"	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank), JSC "A-Bank", JSC "FUIB", JSC "Sense Bank"	JSC "Ukrsibbank", JSC "OTP Bank"
Kasta	JSC CB "PrivatBank", JSC "Universal Bank" (Monobank)	-
"Eldorado"	JSC "FUIB", JSC "OTP Bank"	JSC "FUIB", JSC "OTP Bank", JSC "Ukrsibbank", JSC CB "PrivatBank", JSC "A-Bank"

Source: Authors' research

Joint projects of banks and online stores allow them to increase the number of customers, improve the image of partners, and reduce promotion costs through joint promotions. It is expedient for domestic banks to expand partnership programs with enterprises in various industries.

Conclusion. During wartime concurrency between commercial banks encourages development of new products and services, banks differentiate their sales channels and ensure accessibility to maximize the number of transactions. Recently, remote sales channels for banking products and services that require the use of the latest information technologies have become very popular.

The main directions of development of remote sales channels of Ukrainian commercial banks can be:

- increasing the number of ATMs and payment terminals that provide round-the-clock access to them for customers;
- expanding the range of banking products that can be obtained remotely;
- increasing the security of online payments by customers;
- formation of chats for the purpose of prompt online customer support;
- use of video communication services for the purpose of providing customer support.

Multifunctional Internet banking increases the profitability of a banking institution and increases the competitiveness of the bank, which necessitates its development in modern conditions.

An important channel for communicating with customers is the website of a banking institution. Among the leaders in terms of visits to the websites of state-owned banks are JSC CB "PrivatBank" and JSC "Oschadbank", however, users aged 25-44 prevail among visitors to the websites of commercial banks JSC "Universal Bank", JSC "Kredobank" and JSC "Idea Bank", which indicates the active communication activities of these banking institutions.

In the context of the information economy, there are significant changes in the marketing activities of enterprises, often there is a transition from individual efforts of the company to develop brands to co-branding. For cooperation between banking institutions, its various forms can be used: double branding, cross-marketing, coalition loyalty program, co-branding. In recent years, the number of joint projects of banks and online stores has increased significantly. These projects allow them to increase the number of customers, improve the image of partners, and reduce the cost of promotion through joint promotions. It is expedient for domestic banks to expand partnership programs with enterprises of different Branches.

Further development of the banking sector of Ukraine depends on the development of the economy, the growth of the purchasing power of the population, ensuring political stability in the country, and ending the war.

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9. IMPLEMENTATION TRENDS OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE UKRAINIAN EDUCATIONAL PROCESS

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Introduction. The war changed the conditions for the introduction of information and communication technologies in the Ukrainian educational process. Thus, the relocation of a significant part of the population, the unwillingness of the administration of educational institutions to take responsibility in the event of harm to the health of students or, even, their loss of life, in the event of missile and bomb attacks on educational institutions, and other factors led to a significant spread of remote teaching. This is a consequence of the introduction of interactive teaching methods, the use of digital educational materials, the use of a wider range of psychological and emotional tools for gaining students' attention to the educational process, visual and sound effects, etc.

Literature review. Let's consider distance learning as a concrete example of massive application of digital technology in higher education.

The use of digital technology in distance education has led to an increase in the level of digital competence of both students and teachers; allowed to use non-linear and hypertext provision of educational materials; increased the level of information and communication interaction between teachers and students; increased the level of students' independence in learning educational materials, which stimulated the process of self-education; the responsibility of teachers and students for the level of educational results has increased. According to the conclusions of a number of researchers, higher educational institutions in conditions of significant risks managed to form a specific educational environment, which even received a terminological identification «mobile information and educational environment of a higher educational institution» [1, p.55].

Results. The use of information and communication tools in distance education made it possible to form a compensatory mechanism of social adaptation - when instead of classroom social connections, interactive mechanisms for establishing and maintaining social contacts begin to play a leading role.

The combination of these factors stimulated the creation of a unified educational environment, which multiplicatively increases the effectiveness of education.

The named factor of increasing the level of digital competence of both students and teachers has a complex, integral nature.

Firstly, it is not only the skills of finding the necessary information using information and communication technologies and the use of appropriate computer security tools, but also acquiring the ability to critically assess the adequacy and relevance of data.

Secondly, the use of digital technologies is important for social and professional development. In particular, it fosters: readiness to widely apply digital skills for professional improvement, understand IT trends; willingness to work with the latest technologies.

In this way, it is possible to stratify digital competence into such components as: information competence, in which the ability to search for information leads to an increase in the level of its evaluation and understanding; communication competence, in which the ability to use digital tools for communication and communication in the digital space leads to the acquisition of skills in building social and professional relationships; functional competence, which leads to the efficiency of solving professional tasks; consumer competence, which leads to the efficiency of satisfying everyday consumer needs.

The structure of the benefits of using remote digital technologies in higher education according to the results of surveys in higher educational institutions is presented in Figure 1. As can be seen, the most significant advantage is considered to be "reduction of time spent on training". But what is more revealing, such an advantage as "the possibility of effective use of other digital technologies in education" is 25% greater than the pragmatic advantage of "reducing the costs of the educational process". Although the indicators of the effectiveness of the use of digital technologies in a higher educational institution, presented in Figure 2, called the main advantage "rationalization of the educational process". However, a careful analysis of the effectiveness indicators of the digital technologies use indicates that the above-mentioned indicator gave students more expected results than the other two, for which there is a significant difference between expectations ("before the implementation of IT") and the acquired effect ("after the implementation of IT"). It should be noted that the indicated difference is greater for the indicator "Evaluation of self-development through the use of IT"

Thus, distance learning with the use of information and communication technologies became an impetus for the digital transformation of higher education, stimulated a number of new directions. In particular, the formation of an individual educational profile that is maximally adapted to the level of education of the student,

the abilities of the future specialist, the level and structure of his incentives to acquire knowledge. In fact, new professions are being formed instead of the traditional profession of a teacher of a higher educational institution: a tutor or mentor, a tutor to eliminate gaps in education and acquire the appropriate pace of the educational process that corresponds to the pace of fellow students of the future specialist.

This opens up opportunities for wide implementation of all the latest information and communication technologies in the educational process - from the simplest to the most complex - artificial intelligence, genetic algorithms, cloud digital resources, etc., including those that have not yet left the startup stage.

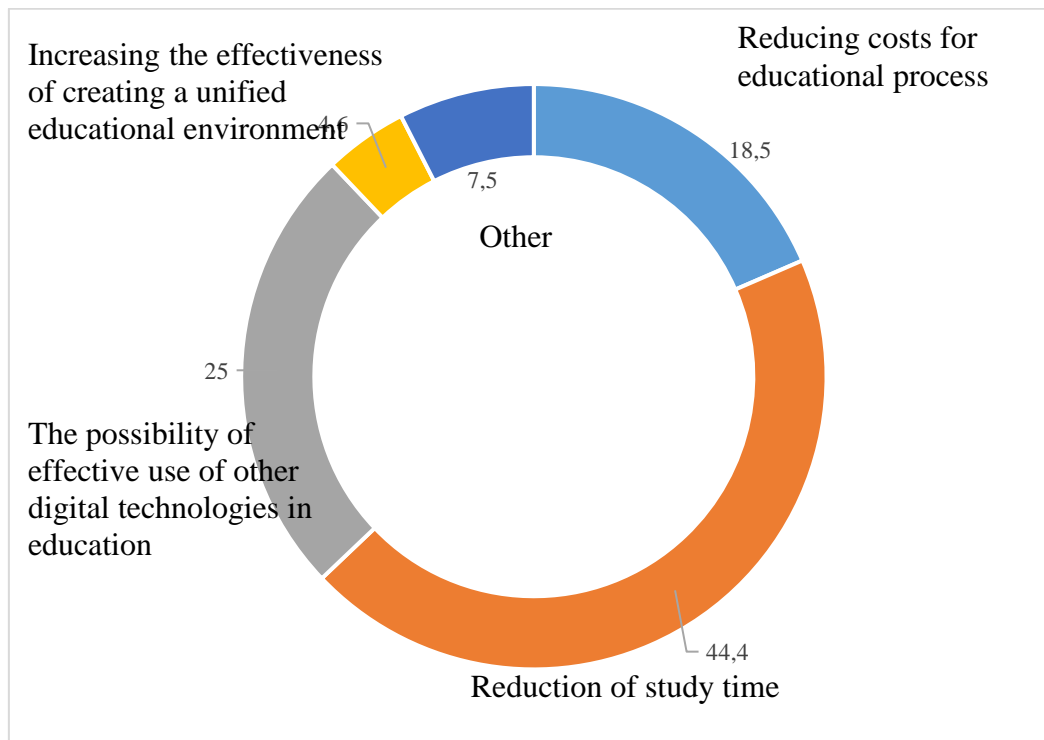


Figure 1. Structure of advantages of using distance digital technologies in higher education

Source: https://essuir.sumdu.edu.ua/bitstream-download/123456789/89990/1/Vasylieva_education.pdf, jsessionid=4BFA8C9B5933491321CA8E2D86BF185F

This shows that the introduction of information and communication technologies in the Ukrainian educational process was a forced reaction to an external challenge of a significant level. That is, the specified implementation had a diffusion nature. This definition is proposed by analogy with the process of diffusion - the formation of a concentration gradient in the environment due to external influences.

This, as well as the lack of teachers of the appropriate qualification level, who found the opportunity to work in foreign institutions of higher education, led to a significant loss of the quality of education.

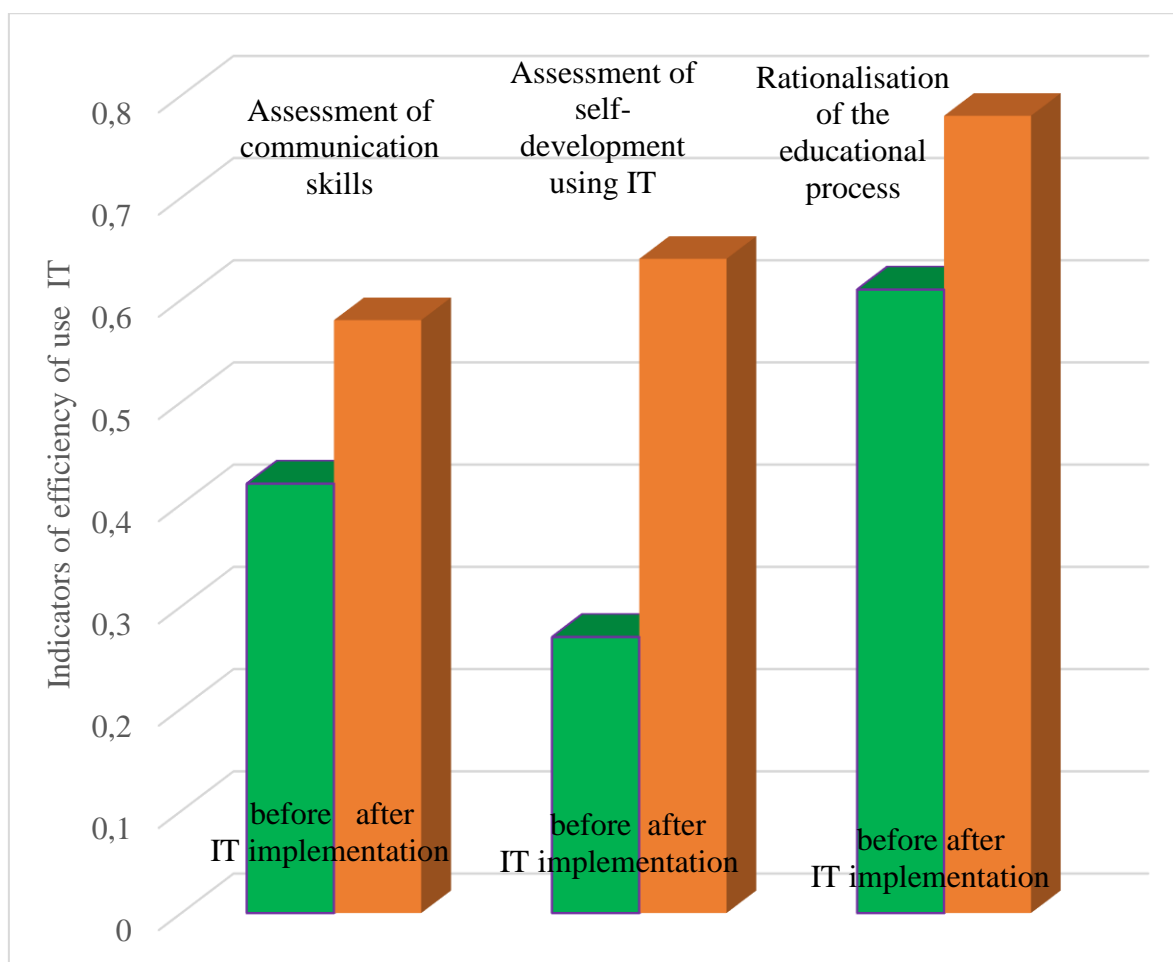


Figure 2. Indicator of the effectiveness of the use of digital technologies in a higher educational institution

Source: <http://eprints.zu.edu.ua/29851/1/216-1140-1-PB%20%281%29.pdf>

The rate of implementation of information and communication technologies is largely determined by the possibility of acquiring a synergistic effect of complex application both in a separate educational institution and in the field of higher education and the country as a whole. Here, the principle of emergency for large systems, which, in fact, are industries and countries, begins to play its role.

At the same time, the country's lag behind the Network Readiness Index (NRI), whose sub-indices indicate insufficient support of the external environment for the introduction of IT, which records not only society's readiness to use IT, but also the insufficient development of digital infrastructure, are constraining factors.

The differentiation of the network readiness index for different countries of the world indicates unequal access to information services of the population of these countries and, in particular, of teachers and students of higher education institutions of these countries. It is indicative, for example, that only ~11% of the Earth's population has access to Internet services [Network Readiness Index 2021]. At the same time, ~90% of this volume of humanity lives in developed countries [Network Readiness Index 2021]. This illustrates the "digital" and "price" gaps in educational opportunities. This is also characteristic of individual countries. Thus, in Ukraine there is a significant

differentiation in access to Internet services for the rural and urban population. There are also significant regional differences in the development of digital infrastructure in Ukraine. This determines regional differences in the formation of trends in the implementation of information and communication technologies in the Ukrainian educational process and a set of promising directions for this implementation in the near future.

In particular, the index of readiness to use the information network in Ukraine, the indicators of which are presented in Table 1, shows a downward trend (decrease in rank compared to the previous year of assessment by 12.4%) and a low level of population income (LM).

A significant problem of the introduction of modern technologies in the Ukrainian educational process is their cost. Attempts by the administrations of educational institutions to transfer costs to students encountered market restrictions - the increase in the integral cost of education in a specific educational institution led to a decrease in competition in it, which characterized the inefficiency of the administration of this institution in the institutional structure.

This determines the classical economic formulation of the problem - the need for proportionality of costs and achieved goals.

The goals of introducing information and communication technologies into the Ukrainian educational process have both a tactical and a strategic component.

The effectiveness of the achievement of tactical goals can be evaluated by the usual markers of the educational process, for example, the growth of student success.

The effectiveness of achieving strategic goals can be assessed by the growth trend of the competition in a specific educational institution, the average statistical level of career growth of graduates, the percentage of graduates working in prestigious companies and rating enterprises, etc.

Table 1

Indices of the introduction of the latest technologies in Ukraine

Index of the introduction of the latest technologies	Readiness sub-index and the state of the legal framework	Rank	Size indicator	Infrastructure		Доступність		Навички	
				Rank	Size indicator	Rank	Size indicator	Rank	Size indicator
		28	5.6	46	4.7	10	6.6	36	5.6
	Sub-index of application and state of the legal framework	94	3.4	Individual application		Corporate application		Application by institutional structures	
Rank				Size indicator	Rank	Size indicator	Rank	Size indicator	
78				3.7	78	3.5	124	2.9	
Index of readiness to use the information network		71	4.0	-	-	-	-	-	=

Source: Built using data [https://opendatabarometer.org/?_year=2017&indicator=ODB, Network Readiness Index \(2021\)](https://opendatabarometer.org/?_year=2017&indicator=ODB, Network Readiness Index (2021))

In this case, an indicator of the efficiency of investments in the latest technologies can be proposed to evaluate the effectiveness of educators' expenditures on information and communication technologies:

$$\eta \in \frac{A_1 - S_1}{S_1} \cap \frac{A_2 - S_2}{S_2} \cap \dots \frac{A_n - S_n}{S_n} \quad (1)$$

where A_i - the result of the implementation of the i -th technology; S_1 - costs of implementing the i -th technology; $i = 1, 2, 3 \dots n$ – technology index from a set of used digital tools; n – total number of digital tools used.

The use of the proposed approach to calculating the efficiency index of investments in the latest technologies is due to the emergence of a synergy effect due to the use of various digital technologies. Therefore, the result is in the area of the intersection of the effectiveness of investments in individual technologies, and the synergistic effect needs to be clarified based on the dynamics of the implementation of technologies in a specific educational institution. Calculation of the investment efficiency indicator requires the use of the procedure of normalization of the variables in the formula (1).

To increase the relevance of the integral indicator calculation of the investments effectiveness in the latest technologies, the level of digital infrastructure development (μ_1) must be taken into account), and also level of perception of digital technologies by the team (μ_2) and level of administration assistance (μ_3).

Then

$$\max \Theta \ni \begin{cases} \mu_1 \rightarrow opt \\ \mu_2 \rightarrow opt \\ \dots \\ \mu_m \rightarrow opt \\ \eta \rightarrow max \end{cases}$$

where Θ – an integral indicator of the investments efficiency in the latest technologies; μ_j - indicators of readiness by directions for the introduction of digital technologies; $j = 1, 2, 3 \dots m$ – index of the assessment direction of readiness for the implementation of digital technologies; m – total number of directions.

But the specified indicator makes it possible to calculate only a point value, which does not make it possible to assess trends in the implementation of information and communication technologies. To assess trends, a model of the gradients of the efficiency index of investments in the latest technologies is proposed. As is known, the specified gradients are the first derivatives of the objective function in the parameter space.

The time gradient provides an opportunity to assess the dynamics of changes in the efficiency index of investments in the latest technologies:

$$grad \Theta = \frac{\partial \Theta}{\partial t}$$

where t – time.

The following formula should be used to estimate the impact of investments in a specific technology when simultaneously investing in several of them:

$$\text{grad } \Theta = \frac{\partial}{\partial \eta_i} \frac{\partial}{\partial t} \Theta$$

Conclusion. Thus, the rates and trends of the introduction of information and communication technologies in the Ukrainian educational process will largely depend on:

- pace and size of investments in the development of digital infrastructure;
- pace and size of investments in the educational process;
- analysis and research of trends in the introduction development of information and communication technologies in the Ukrainian educational process by Ukrainian scientists, and the implementation of scientists' proposals in the strategy of the development of higher education in the country;
- research on the implementation of promising ICT technologies in the educational process, for example, adaptive learning , AI/Machine Learning, IOP;
- permanent monitoring by instructional and public structures of the provision state of higher educational institutions with software and technical means of ICT and the pace of its renewal;
- formation of cooperation conditions of software developers, methodical workers and collectives of higher educational institutions for the development of tactics and strategies for the latest information technologies use.

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10.CYBER PROTECTION OF THE DIGITAL ECONOMY AND SECURITY OF THE BANKING SECTOR

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Introduction. Cyber protection of the economic system is becoming more relevant and problematic every year, because cyber-attacks are becoming more frequent and sophisticated, affecting both individuals and the entire international community. At the same time, the quality of attacks decreases. The government and local authorities, the defense, financial, energy sectors, and media resources are the most attacked. The proliferation of the crypto-universe has further increased the likelihood of financial sector-wide breaches. Information technology has long been at the core of the financial system and cyber security and related threats are under close, daily, non-stop surveillance by central banks. The growing trend in cybercrime has made cybersecurity a key public policy issue for regulators and supervisors. Financial institutions, namely banks, are becoming an increasingly attractive target for cybercriminals because the financial sector attracts large IT investors, allocating significant financial resources.

The digital transformation of the banking sector ensures expansion of banking opportunities, preservation of the client base, improvement of positions on the international financial market, reduction of business costs, increase of competitiveness, etc. All this should be implemented under the close control of identifying possible internal and external threats, subjective and objective, against the background of which cyber incidents become the most dangerous. Therefore, the study of cyber protection

tools of the digital economy, which works with the help of banking, needs a balanced and detailed study in order to develop an effective mechanism of cyber protection of the banking system.

Literature review. The transformation of banking activity under the influence of digital technologies, the creation of new banking business models are revealed in their writings by foreign authors such as Forcadell F. J. [8], Eisenbach T. M., Kovner A., Lee M. J. [12]. O. G. Trofimenko [7] and a number of scientists are investigating a wide range of issues, the solution of which based on public-private partnership will create a comprehensive countermeasure against cyber threats. Modern scientists, such as A. S. Abramova [5], Kondratska N. M., Liubovska M. M. [10], in their works investigate the risks that accompany banking activities with the introduction of new digital technologies. Improving the cyber security mechanism of the economic space increases its priority among all the tasks and functions of the authorized institutions for its provision. Therefore, the study of the digital transformation of the economy and the banking sector, in particular, and the identification of ways to improve cyber protection, requires further research.

Results. Against the background of a full-scale invasion of Ukraine, digital attacks have become an integral part of the war, on state websites and the websites of large systemically important companies. At the same time, cybercriminals are mastering new methods of cyber-attacks. Therefore, the task of the regulators is to maintain systematicity in countering cyberattacks, and the banking sector to invest in cyber security.

Since the beginning of 2023, cyber specialists of the Security Service of Ukraine have neutralized almost four thousand cyber-attacks carried out by Russian hackers on the electronic systems of central authorities and critical infrastructure. The number of cyber incidents in the first half of 2023 increased by 123% compared to 342 incidents in the same period last year [1].

Reorganizing to strengthen cyber capabilities and better protect against cyber threats has been a top priority for many countries over the past few years. Although two-thirds of all countries have already implemented policies to protect against threats in cyberspace, given the situation with the Ukrainian-Russian war, which affects the whole world, measures that are more extensive are needed. The sheer number of countries capable of conducting offensive cyber operations and the effectiveness of Ukraine's defenses underscore the need for the right tools and connections for a comprehensive and successful fight against cyber defense.

For example, in January 2023, the directive of the European Commission NIS2 [2], aimed at increasing the general level of cyber security in the EU, entered into force. In particular, it sets a clear minimum list of technical and organizational measures for cyber protection, among others, for entities such as Internet service providers, data centers, cloud service providers and online venues. The directive obliges cybersecurity actors to pay due attention to the risks of attacks on supply chains and, accordingly, to conduct due diligence on the cybersecurity of their suppliers.

The approval of the National Cyber Security Strategy of Ukraine for 2016, which recognizes the importance of all players in strengthening Ukraine's cyber defense, both within and outside the government, became an important milestone in the consolidation of the country's national cyber capabilities. Implementation of laws and regulations on cybercrime and cyber security, implementation of technical measures to ensure the availability of expertise to improve cyber resilience, establishment of organizational measures to ensure coordination between government agencies and relevant actors, as well as capacity building through the growth of domestic cyber security industries, investment in research programs and developing and securing funding for research and development are just a few ways that national governments can improve their cyber resilience. In order to strengthen Ukraine's comprehensive cyber security, the Ukrainian government has worked to strengthen cooperation between all state organizations, local governments, military units, law enforcement agencies, research organizations, and civil society [3].

Cyber-attacks on the state, energy, media, financial, commercial and charity sectors of Ukraine have occurred frequently over the past ten years. Despite these obstacles, Ukraine has been able to coordinate its resources and connections to block and recover from failure after failure in cyberspace. Investing in both financial and human resources to ensure the recruitment and retention of qualified cybersecurity professionals is a critical part of cyber defense. Increasing the potential of cyber defense in Ukraine causes potential cybercriminals to become aggressive and want to retaliate against the banking and financial services, IT services, including managed service providers, Internet providers, delivery and logistics, and utilities.

Unfortunately, the work of the banking system, strengthened by the conditions of war, to ensure cyber protection is aimed at investing funds in the search for means of protecting the data and accounts of its customers and overcoming the consequences of cyber-attacks.

According to the National Bank of Ukraine (NBU), in 2022, almost all cyber-attacks on the banking sector were carried out by hacker groups backed by the government of the aggressor country (hacker groups Armageddon, Fancy Bears, and others). The cyber forces of the aggressor countries used various tools and means, which indicates long-term preparations for war, including on the cyber front. Currently, all cyber-attacks of the aggressor country have been reduced to two directions: DDoS attacks of various nature, which affect the entire banking system, but not the NBU, and phishing attacks of various types (various types of fraud). For massive DDoS attacks on Ukrainian banks, the enemy used surveillance webcams published on the Internet, which were “hacked” in advance by the enemy and infected with malicious code. Almost all phishing attacks that are aimed at the banking system are extortion of funds from bank clients under various assistance schemes. Fraudsters use the simplest social engineering, the simplest methods of creating fake mobile applications and fake bank pages that use the identity of real banks [4].

In fact, there are far more cyber-attacks on the banking system than official statistics show. This is explained by the fact that many of the cyber-attacks are

unsuccessful, and the identified gaps in the electronic banking system are quickly restored.

The key trends of banking digitization in Ukraine today are [5, p. 187; 6]:

- optimization of remote work of bank employees;
- growth of online operations;
- simplification of access to bank services;
- development of remote sales channels;
- fight against fraudsters and hackers;
- wide application of artificial intelligence technologies;
- transition to data-based management;
- programs total personalization;
- import substitution;
- development of ecosystems;
- development of own software;
- growing need for IT specialists.

It is the rapid development of information technologies that gives particular importance to cyber security, particularly in the banking sector. The demarcation of concepts is formed based on the strengthening of their content in the globalization space. The security of the banking sector can be of different nature. It is possible to single out the information security of the banking sector, the security of the bank's information technologies, and directly the cyber security of the banking institution.

Information security in the banking sector is the security of any information, including paper documents, voice information, bank secrecy, censorship, physical security, business continuity, social engineering, etc. The biggest threat to cyber security is human error. It is people who ultimately put data and systems at risk by being tricked into providing sensitive information, failing to properly protect their passwords, using weak credentials, clicking on malicious links, or opening suspicious email attachments (85% of cybersecurity breaches are the result of human error, 94% of all infected files and programs are transmitted via e-mail) [7].

The security of the bank's information technologies consists in protection against hackers, viruses, spam, phishing and other threats arising mainly from the Internet. Establishing requirements for computing and communication equipment and the information it stores, processes and transmits ensures the integrity, availability and confidentiality of banking information. If the information security of the banking sector relies to a large extent on the regulations and requirements of state security, then the organization of the bank's information technology security relies on the management bodies and technical support of the banking system, and thus the implementation of protection is carried out through the organizational and technical elements of the bank's work. The security of the bank's information technologies consists in the effective management of ensuring the security of banking processes, in particular, the use of cyber insurance, compliance with regulatory requirements for bank security, provision of security guarantees, ensuring the continuity of the bank's work with the detection of potential cyber threats. All this puts forward requirements for the competence of bank managers, financiers, economists, analysts, marketers, and lawyers using economic

and mathematical methods. In the bank's information technology security, everything comes down to risk management processes.

Banks are obliged to monitor potential threats and risks in detail. At the same time, it is necessary to clearly distinguish the objects of such cyber-attacks. If we group the most typical cyberattacks on the banking sector, the following elements of the attack can be distinguished: confidential or banking secrets; banking infrastructure; client and bank funds; websites of banks and regulators [8].

The study of the Basel Committee on Banking Supervision on the analysis of the impact of Fintech on banking activities (including the transformation of banking risks) by the key risks associated with the development of digital technologies, defines strategic risk, operational risk, cyber risk, compliance risk [9].

Strategic risks have a large-scale nature of predicting possible threats with the consequences of financial losses for the entire banking system. Strategic risks arise with the processes of rapid development of technologies of new banking products with access to the international level, which increases the risk of loss of banks' profitability due to a long adaptation period. The processes of adaptation to new products of the cyberspace of the banking sector will be protracted for some banks compared to market participants who provide similar banking services with an increased client base. A decline in the profitability of the entire banking sector due to the lack of flexibility in interaction with customers can weaken the ability of existing banking institutions to withstand cycles of business activity. This will lead to a weakening of the role of the social system, destabilization of the processes of realization of state interests.

Operational risks arise in the process of using electronic systems of the payment infrastructure of the banking sector, interconnected with the entire electronic network, both within a separate banking institution and the entire network of banks. A failure on the used electronic platform and server leads to the failure of the entire banking IT infrastructure, reinforcing the limited risk management experience of individual banking institutions, which makes it more difficult and expensive to overcome the consequences of cyber incidents. In addition, outdated banking IT systems are more difficult to "cure" and adapt to improved ones. The difficulty of avoiding and overcoming the operational risks of the banking system is borne by the relationships that banks have involving specialized companies, making the preservation of confidentiality and purity of information vulnerable, violations of financial monitoring norms [10]. However, with limited own capabilities of ensuring cyber security of a banking institution, the involvement of legal specialized IT companies (IT-outsourcing) on an ongoing basis is a necessary condition for ensuring cyber protection [11]. At the same time, according to the standards of the Basel Committee on Banking Supervision, although a part of the bank's functionality may be outsourced, the risks and liabilities related to this remain with the banks.

Cyber risks as a result of digital attacks, risks of the functional model of banking services, and risks of infection and damage to personal data of customers and reporting data of banks' activities are becoming more widespread, therefore the regulators of the banking sector refer to systemic cyber risks - the risk of disrupting the stability of the banking system as a result of the implementation of cyber threats against an individual

bank through appropriate deficiencies in its cyber resilience [12]. The cyber security of the banking institution itself is entirely dependent on the bank's management bodies and specialists. Losses of data integrity and unauthorized access to client data, risks of malfunctioning of the technical system in the information space reduce the trust of clients, society and the state as a whole if the bank is unable to ensure the appropriate level of cyber security.

Compliance risks lead to the occurrence of damages/sanctions, additional losses or failure to achieve planned revenues or loss of reputation due to a bank's failure to comply with legal requirements, when banks cooperate with a large number of involved companies, each of which seeks to access personal data of customers, which leads to violations of regulations fair competition, rules of corporate ethics, the occurrence of conflicts of interest and maintaining the purity of information.

The banking system under the influence of digitalization risks primarily depends on cyber risks, which have a direct impact on the entire information system of the state and thus on its security (Figure 1).

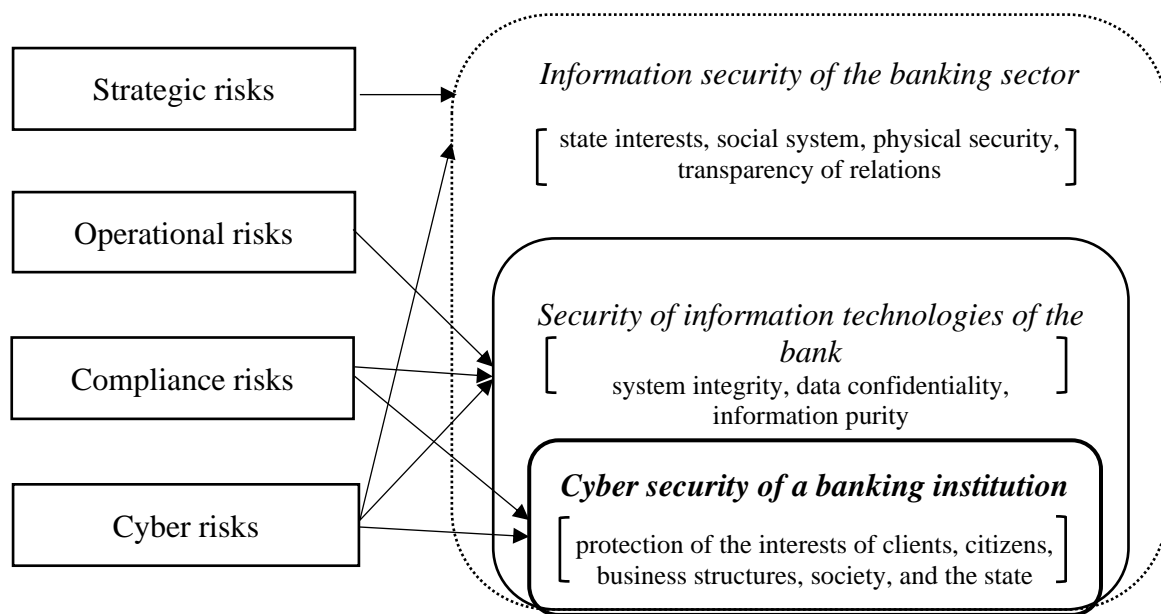


Figure 1. Cyber security in the information security system of the banking sector [13]

Ensuring the cyber security of the banking sector is a rather difficult task for the legislative authorities and directly for the management bodies of the institution or organization. There are many standards, regulations and legal provisions related to information security and cyber security of the financial sector, in particular, the banking sector, which change from time to time, and new regulations appear regularly. The most popular and recognized standard is ISO/IEC 27001 (ISO/IEC 27001 standard) "Information technologies. Protection methods. Information security management systems. Requirements". The ISO/IEC 27001 standard is subject to certification. In addition, there are standards from the ISO 27000 platform that help with the implementation of 27001 by providing various tips and best practices [14].

The Cyber Security Management System (CSMS), proposed by the IEC 62443 standard (ISA/IEC 62443 standard) [15], consists of six main elements: implement a CSMS program (to provide information needed to obtain management support); assess high-level risks (detection and prioritization of threats); detailed risk assessment (detailed assessment of technical vulnerability); establish safety, organization and awareness rules; select and implement countermeasures (to reduce the risk to the organization); maintain the CSMS (to ensure that the CSMS remains effective and supports the organization's goals).

The ISA/IEC 62443 standard contains requirements for design, secure implementation (programming), verification and authentication, defect management, patch management, and end-of-life with safety in mind. This standard defines the requirements for the secure product development process, based on 6 main principles [12, 14]:

- network perimeter security (provides for the establishment of network perimeter security to control those points where foreign software can penetrate the production automation system);
- protection of workstations (provides protection of workstations of the management system to prevent them from being infected with malicious software);
- account management (involves account management);
- security updates (ensures the relevance of all security updates for the operating system and management system);
- backup and recovery (implies the development and implementation of a backup and recovery plan);
- security monitoring and risk assessment (includes system monitoring for suspicious activity and risk assessment).

Central banks are usually responsible for managing and overseeing critical infrastructure (such as payment systems) in the financial sector. Therefore, a cyber-attack on a central bank or critical infrastructure can not only cause significant monetary and reputational damage to the institution itself, but also lead to large-scale disruptions in the financial system and, ultimately, significant public costs. In addition, central banks protect sensitive information that is often sought after by criminals. For example, sensitive material about future policies can become a target for criminals and government agencies involved in cyber espionage.

The National Bank of Ukraine has a dual status in the cybercrime countermeasures system. On the one hand, as a body of state supervision and management not only of the banking system, but also of the entire financial system, it must ensure the functioning of an established cyber protection mechanism. On the other hand, being a bank, the National Bank of Ukraine itself is subject to protection.

New challenges to the banking system of Ukraine, caused by the war, have formed stable business models for banks, taking into account a balanced approach to risks, especially cyber risks. The joint efforts of commercial banks and the regulator of the financial sector hardened to the biggest shocks and ensured smooth operation. Thus, the analysis of the banking sector of Ukraine in 2022 did not change significantly, the

number of banks in 2022 decreased by four units compared to 2021 (2 of them with Russian capital - Sberbank and Prominvestbank).

A significant step in the cyber protection of the banking system by the national regulator was the development of requirements for the functioning of the cyber protection system in the banking system of Ukraine, the actualization for banks of the criteria and the procedure for assigning them to objects of critical information infrastructure. These norms are contained in the resolution of the Board of the National Bank of Ukraine dated August 12, 2022 No. 178 “On approval of the Regulation on the organization of cyber protection in the banking system of Ukraine and amendments to the Regulation on the identification of critical infrastructure objects in the banking system of Ukraine” [17]. The National Bank regulated the organization and provision of cyber protection in the banking system of Ukraine and determined:

- the basic principles of the functioning of the cyber protection system;
- principles of ensuring information exchange between the Cyber Protection Center of the National Bank and banks of Ukraine;
- requirements for measures to ensure cyber protection of critical information infrastructure objects;
- requirements for conducting an independent audit of information security of banks.

The cyber protection system in the banking system of Ukraine includes entities, implemented systems, complexes and means of ensuring cyber protection, interrelated measures of an organizational, technical, and informational nature to ensure the appropriate level of cyber security and cyber resilience of the Ukrainian system. For this purpose, the Cyber Defense Center at the NBU (CSIRT-NBU) was created [17]. The CSIRT-NBU cyber incident response team in the banking system of Ukraine offers the following services to banks:

1. Incident Response. Service for providing assistance to banks in solving technical issues during response to cyber incidents (acceptance of an incident report, incident analysis, support in incident response, coordination of actions during incident response);

2. Proactive Risk Monitoring. Proactive risk monitoring service, which includes reconnaissance of current cyber threats and potential vulnerabilities, collection of information using various sources, research and data analysis (detection of phishing domains, detection of data leakage, detection of compromised account data of users and bank customers, monitoring of potential vulnerabilities);

3. Information services. Service for informing banks about current cyber threats and vulnerabilities, measures to counter cyber-attacks and security measures necessary to protect clients' information systems.

4. Training and education. A service for conducting trainings and educational sessions with the aim of increasing the level of awareness and awareness in the field of cyber protection, responding to cyber incidents, countering current cyber threats.

In addition, taking into account the requirements of the EU, the National Bank of Ukraine established responsibility in case of violation by banking institutions of the requirements of regulatory acts on the protection of critical infrastructure, cyber

protection and information security, since in the event of a large-scale threat, this may lead to destabilization and solvency of the banking system as a whole.

The illegal circulation of funds and the financing of organized crime are becoming the main problems that threaten the economy of any country. At the same time, the financial system of the banking sector takes a rather active part in this, as it provides the process that leads to the legalization of such financial transactions. The monitoring of financial transactions, the source of which is criminal activity, is the prerogative of financial monitoring, which is carried out by banking entities and the state. However, the problem is that sometimes such entities are interested in carrying out such operations, the advantage of which is higher for them than the penalties imposed for carrying out transactions with illegal funds [18].

Conclusions. The situation in Ukraine has important implications for the global cyber security sector. The government's effective cooperation with international allies, the private sector and society for 10 years has created a powerful cyber defense of national interests in cyberspace. The country's resilience and ability to resist Russian cyber and information campaigns has increased thanks to investments in cyber defense, preparation for hybrid warfare, giving a high priority to information security and fostering a culture of cyber awareness in society.

Countering cybercrimes in modern conditions is a task not only of international organizations, but also of national regulators in each country. This complex should include legal, technical, organizational and informational measures and tools, the effectiveness of which depends on the timely detection of financial transactions that may be related to cybercrime, the use of banking institutions for money laundering, and terrorist financing.

Therefore, an important step in managing cyber risks in banking is a clearly developed legal framework based on which the participants of the electronic remote network will have a basis of protection and know their responsibility. Attracting reliable investors to finance measures to ensure reliable cyber protection, using cyber insurance services, training personnel on cyber security issues, timely updating software to the latest ones, and developing international cooperation are no less important methods of cyber security in the banking sector.

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11. INTERNATIONAL FOOD E-TRADE EXPERIENCE AND PROSPECTS FOR UKRAINE

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Introduction

Accelerated globalization and digitalization of the economy are accompanied by deep penetration of the Internet and information and communication technologies into all spheres of business and public society. Unhindered access to data and digital services contributes to the expansion of the scale of information exchange between businesses and consumers, the elimination of geographic and physical barriers between markets for goods and services, the development of global digital markets and electronic trade (e-trade) [1]. International e-trade involves not only corporations, but also small and medium-sized enterprises, which contributes to economic growth, the creation of new jobs, increased competition, and an increase in the quality of goods and services. Firms carry out global expansion, expand the scale of business in local markets and optimize costs. Consumers get a wide choice and easier access to goods, services and data all over the world. The digital economy creates unique opportunities for all participants in e-trade and digital markets.

The development of e-trade is a natural consequence of the formation of the digital economy and its penetration into all sectors. The food sector receives a number of competitive advantages due to the development of e-trade, in particular, the growth of sales volumes, ensuring market transparency and pricing, increasing customer loyalty [21]. E-trade in food sector contributes to food security, especially since the global covid-19 pandemic, when consumers have increased their activity on the Internet and online purchases of all goods, including foods [25]. Online trade ensures the stability of the supply chain of food products and the satisfaction of the growing demand of the population for food products, especially during a pandemic, disruption of logistics chains or other global threats to food security.

Literature review

Modern scientific literature has accumulated enough research devoted to the development of the digital economy, e-commerce and e-business. Fundamental works in the field of e-business and e-commerce were published by foreign authors: Zwass V., Chaffey D., Kotler Ph., Berger R., Bickhoff N., Reynolds J., Mark G., Anodal F., Treese C.W., Stewart L.C., Laudon K.C., Traver C.G., Shuai Q., Li Zh., Zhang Y., et al.

Authors Zeng Y., Jia F., Wan L. and Guo H. [20] were among the first to conduct a thorough study of e-commerce in relation to agriculture. The theoretical foundations of entrepreneurship and electronic commerce in agricultural markets are considered in the work of Mueller R.A.E. [14].

The paper of Baourakis G. and Daian G. [2] examines the evolution of the formation and development of electronic commerce in agriculture. The research by Yang H., Zheng Zh. and Sun Ch. [19] presents a completed study of the development of e-commerce in agro-food markets. A fundamental study of food e-commerce during a global pandemic was conducted by FAO [10].

Despite significant progress in e-commerce research in the world, the food e-trade is a relatively new field that began to develop rapidly after the global pandemic and continues to occupy an important place in the formation of global food systems.

In addition, the research of the peculiarities of global development of food e-trade is relevant and actual in the conditions of formation of digital economy and digital markets. The rapid development of digital markets and strengthening the position of Ukraine's food sector in the global food markets need research and recommendations for improvement.

Results

The rapid development of online trade in the agri-food sector was caused by numerous factors: increase in consumer demand, penetration of digital devices and the Internet, growth of consumer confidence in the security of online payment systems, as well as quarantine restrictions due to the global pandemic in 2019-2020 [13]. During the covid-19 pandemic, e-commerce markets in the agri-food sector have grown. E-commerce markets are growing faster in Asia (especially India and China), slower in Europe and Africa, partly due to competition and high transaction costs associated with transportation and delivery. The development of e-commerce in the world was also facilitated by the investments of large online retailers, logistics intermediaries and transport companies.

The global B2B e-commerce market in the agri-food sector reached USD 6.90 billion in 2021 and is expected to grow to USD 11.86 billion by 2030; the compound annual growth rate (CAGR) is 6.4% [16]. Increasing Internet penetration, along with more active use of digital devices, services and platforms, are contributing to the growth of electronic B2B trade in the agricultural market.

The global food and beverage B2C market accounted for USD 57.09 billion in 2022 and is expected to grow to USD 69.77 billion in 2023; CAGR is 22.2%. Due to Russia's war against Ukraine, the global economic recovery after the COVID-19 pandemic has slowed down. As a result of economic sanctions and inflation, the prices of food products in the EU have increased, and supply chains have been disrupted. At the same time, in the conditions of growing demand for food and adaptation of country governments, businesses and consumers to crisis factors and threats to food security, the growth of the world market of electronic trade in food and beverages is predicted to reach 140.42 billion USD in 2027 with an average annual growth rate of 19.1% [12].

Analyzing the e-commerce trends in the EU, in 2022 the share of e-commerce in the turnover of European enterprises amounted to 17.6% (from 6.9% in Bulgaria and Greece to 33.3% in Ireland, 29.9 % in the Czech Republic, 29.1% in Belgium) [9]. Online sales in European countries were carried out by a relatively large number of enterprises of the agri-food sector in the segment of food and beverages (Fig. 1).

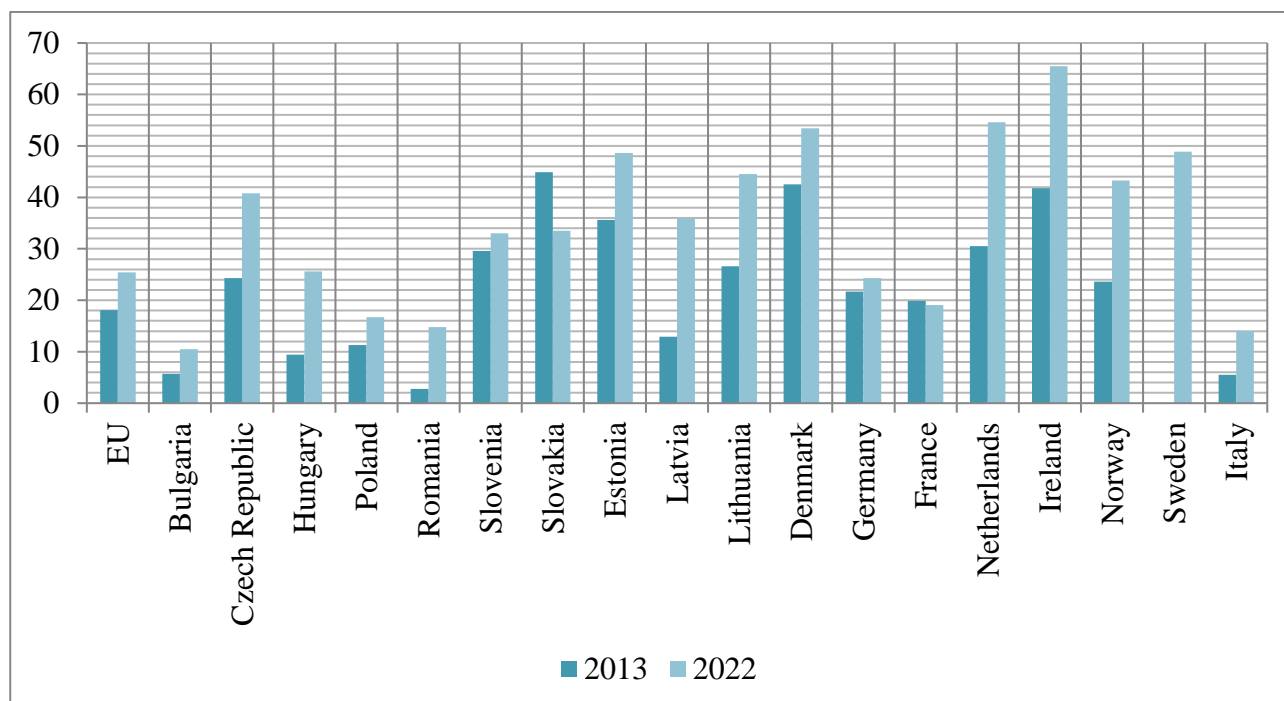


Fig. 1. The share of food enterprises that made online sales, % of the total number of enterprises

Source: Eurostat, 2022 [9]

According to fig. 1, in the EU agri-food sector in 2022, 25.4% of enterprises sold food and beverages online (22.9% in 2021, 18.1% in 2013). This share ranges from 10.5% of enterprises in Bulgaria to 53.4% of enterprises in Denmark, 54.6% in the Netherlands, 65.5% in Ireland, 43.3% in Norway, 48.9% in Sweden, 48, 6% – in Estonia. These countries are the leaders in terms of the number of enterprises engaged in online trade in food and beverages in the B2C segment.

The fig. 2 shows the share of online sales in the turnover of agro-food sector enterprises in EU countries in the segment of food and beverages.

According to fig. 2, the share of online sales in the turnover of EU agri-food enterprises in 2022 was 25.5%, which is less than in 2021 (30.1%) and more than in 2013 (23%). The share of online sales in the total turnover of agri-food enterprises ranges from a minimum of 6.2% in Bulgaria to 56.9% in Sweden and 41.4% in the Czech Republic, 45.2% in Norway, 40.2% in Ireland [9]. These countries are leaders in online trade in food and beverages in the B2C segment.

Farmers use digital platforms to expand their customer base, enter new markets and showcase their products and services, as well as gain access to production resources. Digital platforms reduce costs in supply chains by eliminating

intermediaries. The digital platforms for small and medium agricultural enterprises with small volumes of sales and purchases are most effective.

The global experience e-trade in food and beverages shows the successful implementation of digital projects and platforms for business and confirms their effectiveness. In the EU agri-food market, digital platforms help expand business geography and diversify sales channels.

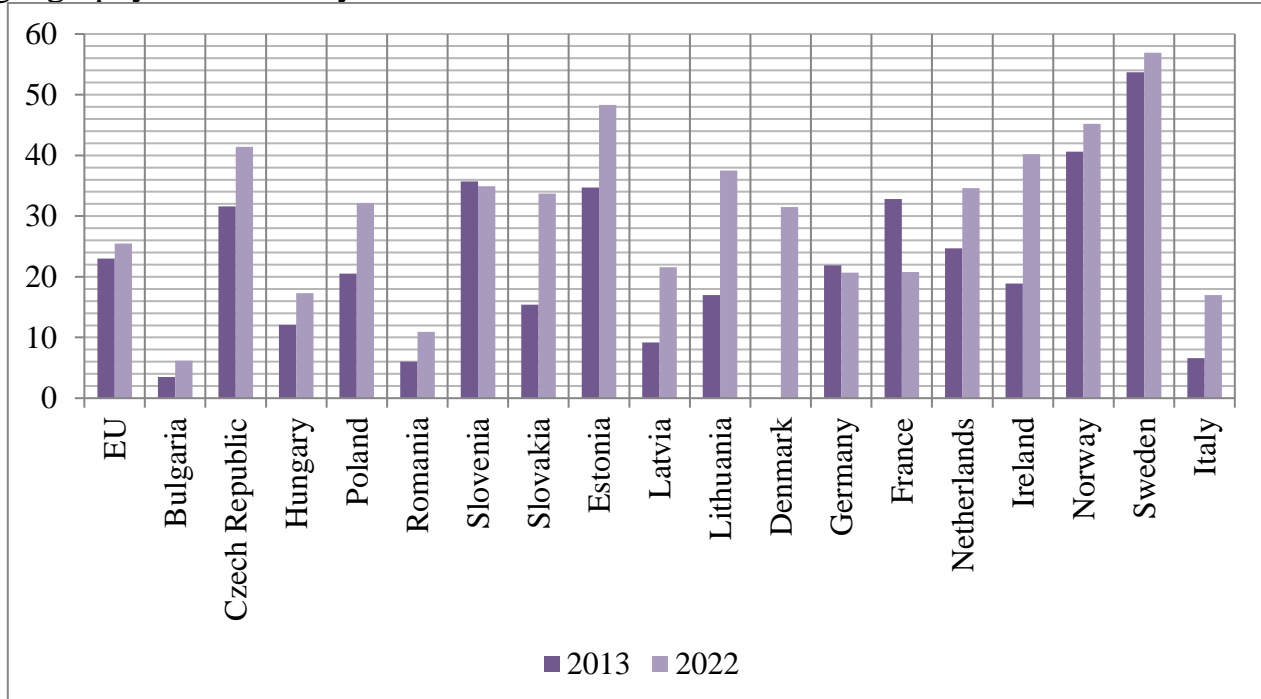


Fig. 2. The share of online sales in the total sales of food enterprises, %
Source: Eurostat, 2022 [9]

During the covid-19 pandemic, there has been an increase in online trade in food and beverages in the B2C segment within the EU and at the local level. But farmers have also gained market access in producing countries through online platforms that provide agri-food suppliers with alternative sales channels and new ways of selling.

As agri-food products have a short shelf life, most international traders still prefer traditional offline sales. However, e-trade is growing and efficient, ensuring both traceability and product freshness.

The growth drivers of online market in the B2C segment are the increasing number of smartphone users, who are the main online buyers of food and beverages. The increase in their number potentially expands the potential of the online market in the food segment. According to DataReportal, the number of smartphone users in the world reached 5.18 billion in the 2nd quarter of 2023, which is about 64.6% of the world's population [5].

Supplier and manufacturer costs are the major restraints for the growth of the food and beverage online market. These include costs incurred for order fulfillment; shipping costs; adaptation of business resources to dynamic market demand; and Internet connection. In addition, one should take into account the cost of packaging, fuel and depreciation of transport, and payment of drivers and/or couriers [12]. As e-trade volumes increase, the profit margin will drop from 6.4% to 4.5% in 2022. Since

most products have a very limited shelf life, the supply chain must be fault-free, reliable and have zero resource wastage to maintain a sufficient level of profitability. Thus, costs borne by the supplier may restrain the growth of the food and beverage online market [12].

With the advancement of technology and the changing online behavior of consumers, online shopping in the food and beverage segment is becoming a daily occurrence. In 2022, there were 2.14 billion online shoppers, accounting for 27% of the world's total population. 80% of consumers prefer detailed information about the product and consider it crucial for making purchase decisions [12]. These trends will stimulate the development of online trade in food and beverages.

E-commerce initiatives in the EU provide consumers with products and producers with the resources necessary for production. E-commerce companies in the B2C segment make a significant contribution to ensuring regional food security. Table 1 shows the business model types and examples of digital platforms in the food sector.

Table 1

Business models and examples of digital platforms in the food sector

Business model types	Examples of digital platforms, initiatives and
Online trade as the main business model	Online grocery stores: Mytime (Germany); Ocado (Great Britain); Picnic (Netherlands); HelloFresh (Great Britain, global); Bidfood (B2B, Europe)
Online trade as an added benefit	Conventional grocery stores with online stores: Tesco (Great Britain; the supermarket with the highest online turnover in Europe); Rewe Online (Germany); Bringmeister (Edeka, Germany); Albert Heijn (Netherlands)
Direct suppliers with a high level of online service	Specialized farm businesses with online sales: Van Gelder (Netherlands, wholesale); From farm to consumer
Digital platforms and marketplaces where e-trade is a service	Independent digital platforms: AmazonFresh; Producers Market; Lima Link; AgriMarketplace; Agritradenet ; Eatfromfarms; OURFARM

Source: compiled by author based on websites

The diversification of online sales channels in Europe contributes to the growth of online sales in the B2C segment. However, the main factors are product availability, assortment and prices, which must be guaranteed by the seller. Successful online sales of food and beverages in EU countries and abroad require efficient logistics, packaging and the ability to track goods from suppliers. For example, consumer packaging should be of high quality and convenient for small sellers. The basic requirements for the product will be similar to offline sales.

The organization of online sales is implemented mainly through the seller's existing distribution network or cooperation with chain offline stores and supermarkets. The format of cooperation depends on the regularity of import deliveries, in particular, part of the fresh produce is shipped to large buyers, and the rest of the products are sold to stores and points with the highest demand. E-trade is

part of this marketing channel. The largest number of online grocery stores is located in Northern Europe, in particular, in Great Britain and the Netherlands [4].

Food retailers have created new services and delivery methods to meet consumer demand, often in partnership with large e-commerce companies and new entrants. For example, the partnership between French food retailer Casino Guichard-Perrachon and German delivery company Gorillas. In addition, delivery companies that previously did not work in the food segment have started to do so, such as Glovo's entry into food delivery [17].

Major food retailers have integrated online trade into their omnichannel strategies even before the COVID-19 pandemic. This has facilitated the adaptation of business models to new realities, as the demand for product delivery continues to grow even after the pandemic. Financially and operationally constrained offline retailers and grocers have been able to adapt their processes to e-trade at lower costs by partnering with delivery service providers. SMEs have also been forced to expand their business operations, either merging with competitors or diversifying their offering and specializing in niche products (e.g. organic, fresh produce, etc.) to be competitive in the online market.

Most countries have local startups for the delivery of food and other consumer goods. However, the global market is dominated by several international firms, such as Bolt, Delivery Hero, Glovo, Uber Eats, Wolt and others [17]. Food retailers cooperate with e-trade and delivery service providers, the latter usually have mobile applications and convenient sites where you can place an order and pay for it online.

E-trade companies in the food sector are diversifying and developing their business. Offline supermarkets are expanding their online assortment, offering pick-up points and delivery services. Yes, Tesco (Great Britain) is a supermarket with the largest online turnover in Europe. New start-ups, online supermarkets focused on online sales from the start, such as Ocado, Mytime and Picnic, are emerging, competing with traditional supermarkets. Thus, the highly competitive business environment of offline food supermarkets is developing thanks to new online sales channels [4].

Specialized wholesalers such as Van Gelder in the Netherlands have implemented an e-commerce platform for online ordering. Such companies offer a high level of service and a personalized online experience due to reliable suppliers and timely guaranteed delivery [4].

In local markets, small retail companies and farms are also switching to online trading, expanding their customer base. For example, in Germany's online fruit and vegetable market, suppliers sell products directly to consumers, while in Spain, small local offline stores expand their customer base through online sales. Farms and small shops prefer online sales in local markets, and sell little abroad, as they are very dependent on local agro-producers.

Digital platforms offer goods manufacturers the services of an intermediary in finding customers and partners, placing orders and their monitoring, as well as delivery. Most of the sellers on such platforms usually do not directly cover the target market and the end consumer.

Most digital platforms in the format of B2C cooperation focus on local markets, offering manufacturers direct access to customers without intermediaries. Europe is home to global e-commerce companies such as Amazon, where local suppliers offer their goods and services to agricultural producers, as well as numerous little-known local B2B and B2C platforms that provide various online services.

The Amazon has organized the AmazonFresh platform for online consumers from European countries. The marketplace was launched in 2016 in London, and then customers and suppliers from Germany, Italy and Spain joined it. This platform has established sustainable supply chains, new agricultural producers and food retailers are constantly joining it. For example, in Spain, AmazonFresh works together with the Día supermarket chain, in Italy – with U2 Supermercato [4].

Eatfromfarms is an innovative digital platform where customers post orders and sellers can offer their products. Participants contact directly, without intermediaries, using order processing and delivery services [6].

E-commerce as a service is also developing in the B2B format of cooperation, providing farmers with opportunities to promote food products on digital platforms at the beginning of the supply chain in producing countries. For example, the Lima Links platform in Zambia, where farmers receive up-to-date information about market prices and contact buyers, as well as Producers Market – an online market where producers sell goods. The TruTrade Africa platform uses cloud-based mobile and online applications where smallholder farmers are able to go to market and sell their goods at fair prices [7].

Today, there is no global digital platform for food sales. But there are platforms, marketplaces, where sellers publish information about their goods and receive inquiries from potential customers, for example: Tridge, Selina Wamucii, Tradekey and Alibaba.

The B2B digital platform OURFARM in June 2020 enabled farmers to directly contact suppliers and reduce the cost of middlemen's services, thereby improving the logistics of agribusiness producers. OURFARM leverages AirAsia's ecosystem, which includes transportation services, logistics and payment services, as well as a large database of companies and consumers. In addition, the platform provides farmers with the opportunity to receive free training on the digitalization of their business at RedBeat Academy e-commerce courses [16]. The digital platform promotes the development of online trade of small farms without intermediaries, which has a positive effect on the growth of the agricultural sector [15].

An EU-funded project with the participation of the EIT Food organization is AgriMarketplace. It is a cloud-based B2B marketplace specializing in e-trade and blockchain food tracking. The service increases the efficiency and transparency of food distribution within various distribution channels in the agri-food sector, and contributes to matching supply and demand in agri-food markets [1].

Agritradenet supports and empowers local farmers to become part of a business network and trade abroad with the highest quality products. This initiative is financed within the framework of the ENI CBC Black Sea Basin programme [3]. The marketplace works in a B2B segment, where each farmer can register his own products and maintain direct contact with potential buyers, be it a wholesaler, supermarket or

distributor. Today, more than 155 companies from six different participating countries of the Black Sea region are registered. This platform enables producers to set prices and conditions themselves, and to sell goods not only in their region, but also in neighboring countries [8].

E-trade contributes to increasing exports and trade and economic integration of the Ukrainian agricultural sector to the European market, because food enterprises gain access to new markets through marketplaces and various trading platforms that specialize in food trade. E-trade gives companies the opportunity to expand the geographical boundaries of food markets and reach new customers, promote goods and services [24]. The main problems of electronic trade in food and agricultural products in Ukraine in terms of economic integration and access to foreign markets are, first of all, ensuring trust between counterparties, guaranteeing and insuring supplies.

Today, important steps have been taken to speed up the development of food e-trade in the context of Ukraine's integration into the EU's Digital Single Market. It will further simplify access to international markets for Ukrainian producers in the future [23]. After Ukraine acquired the status of a candidate for EU accession, Ukrainian business received more favorable conditions for entering European markets. This will contribute to the accelerated integration of the Ukrainian economy into the economy and the EU single market. The EU's Digital Single Market strategy allows the economy, industry and society of Europe and Ukraine to take full advantage of the advantages of the new digital era [11].

The EU's Digital Single Market strategy is the main reference point for the formation and implementation of integration processes in the digital economy and the corresponding measures of the Ukrainian government and business to accelerate the integration of the digital market into the EU's Digital Single Market. Today, the EU is one of the largest e-commerce markets in the world. The Ukraine's integration into the Digital Single Market will have a positive effect for both Ukrainian businesses and consumers. Ukraine's accession to the EU's Digital Single Market will open up new opportunities for the development of Ukrainian e-commerce in all sectors, including agri-food.

Conclusion

The global food online market is growing, and the development of e-trade in the food sector of EU countries is taking place at a fairly stable pace. There is an increase in the share of enterprises selling food products online, as well as the share of online sales in the overall sales structure.

The role of online trade in the food sector is significant in ensuring food security, as online sales help increase the physical availability of food and stabilize market prices through competition. E-trade in the B2B segment optimizes interaction between counterparties, shortening the time to search for partners, goods and services, accelerating transactions due to online payments. Online trade contributes to greater transparency of the agricultural market. Farmers use B2B online platforms to expand their network and interact with counterparties. In turn, consumers increasingly prefer online purchases, which contributes to the expansion of B2C e-trade in food markets.

The prospects of Ukraine's integration into the global digital market, in particular, into the EU's Digital Single Market, open up new opportunities for the food sector, related to the expansion of sales geography, the growth of competitiveness and international trade.

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12. IMPLEMENTATION OF MARKETING COMMUNICATION TECHNOLOGY INTO A COMPANY'S DIGITAL STRATEGY SYSTEM

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Introduction A modern company needs to exchange various information in the internal environment (structural divisions), as well as with the external environment (competitors, clients, suppliers, municipal and state authorities) for its successful functioning. It is digital marketing that makes it possible to ensure the relationship between certain target market segments, and communication with audiences in order to fulfill the tasks assigned to a business entity in a certain market. Thus, firstly, a single, holistic system of activities is formed, which is aimed at obtaining maximum social and economic benefits from the possibly available current or promising resources synthesizing various marketing tools. Secondly, the principles of managing numerous communication processes from the need to produce and evaluate the role and significance of certain areas in the overall strategy (PR, advertising, sales promotion, etc.) are adopted. Thirdly, a search is carried out for the best combination that can ensure the effectiveness and consistency of implementation of marketing communication technologies and clarify the impact of the developed communication projects.

Literature Review Analysis and synthesis of scientific literature has shown that foreign and Ukrainian scientists pay great attention to the study of a) basic Internet marketing tools (D. Chaffey, F. Ellis-Chadwick, R. Mayer, K. Johnston; S. Gnatenko, E. Titovets), b) advantages and features of using digital marketing communication tools (P. Kotler, A. Rohm, K. S. Kumar, E. M. Olson, A. Romanenko, I. Shevkoplyas; Yu. Goryashchenko), c) practical aspects of digital technology usage and managing improvement of relationships with consumers through the use of information technology (A. Amaral, G. Balabanis, L. Barreto, K. Keller, A. Vyshnevs'ky, V. Lyashenko). At the same time, the individual issues on the chosen topic are so versatile, multidimensional and debatable that they need further scientific developments. This especially applies to evaluation indicators and metrics of the effectiveness of introducing digital marketing communication technologies into the commercial practices of companies.

Results Nowadays, a company's package of digital marketing communication is an integral set of managed communication elements through which they are able to present a product/service in an attractive light to their target audiences. Through the

integrated use of communications and the use of digital marketing tools, companies create a large number of advantages associated with competitive strengths, its improved image, increasing sales and profits, reducing costs, saving transaction time, and providing consumers with opportunities to quickly go through various stages of the purchasing process.

The analysis of modern research devoted to digital marketing and the scope of its functioning [1; 2] provided an opportunity to summarize the concepts for the development of its technologies, which include the following four stages:

1) *formation of the information flow* in digital marketing communication (application of methods and tools that make up digital marketing communication technologies);

2) *division of the information flow* into parts/stages (description of the actions of individual segments of the target audience and pricing models of digital marketing); dividing the information flow into parts/stages (the description of the actions of the first segments includes online and price models of digital marketing);

3) *determination of indicators* for monitoring the information flow (analysis of conversion points and ‘breaking points’ that form ‘gaps’ in the processes of interaction with the target audience (in particular, communication); determination of indicators for monitoring the flow of information (analysis of conversion points and points “ turning point,” which define “gaps” in interaction processes with the disconnection of the audience (in particular, communication);

4) *formation of correspondence* between indicators for assessing the effectiveness of digital and classical marketing (metrics of marketing compatibility of characteristics, indicators and criteria reflecting the level of the company’s marketing activities).

In our opinion, when assessing the effectiveness of the implementation of marketing communication technologies in a corporate system of digital strategies, the most important is not the choice of an evaluation measurement tool/method, but rather the design of a set of tools and algorithms in relation to a specific situation and, especially, decision-making procedures. From the point of view of modern statistics, we are talking about the problem of the relationship between heterogeneity (non-additivity) of the properties of digital marketing objects and methods of data generalization (aggregation) to present observed variables in a specific time and lag dimension.

When a company develops digital marketing technologies, taking into account the characteristics of the information flow, the company directly determines [3]:

- the main characteristics of the information flow;
- digital marketing technologies that will be used are determined and classified;
- behavioural characteristics of the target audience which are structured in accordance with the division of information flow. For this purpose, a system of performance indicators for digital marketing technologies is used in the context of interaction (and conversion) of information, communication and information and financial flows;

- ‘gaps’ in the formation of information flow (based on an analysis of the coefficients for assessing the cost of the ‘gap’ areas and the estimated cost of their transformation).

In fact, the correspondence between classical and digital marketing technologies is determined based on the process understanding of the conversion rate (transformation) of the information flow. Moreover, an important feature of the latter is that it allows you to select in the generated information flow the cost and quantitative characteristics of the target audience, which correspond to the indicators for assessing the effectiveness of classical marketing technologies.

As a result, the company operates with indicators of compliance between the achieved and planned (required) characteristics of the information flow, which makes it possible to determine, *firstly*, reserves for increasing the technological efficiency of digital marketing tools based on expert analysis;

Secondly, to introduce systemic corrective actions, ‘filling’ the information flow with indicators (which are in digital form (statistics and analytics) for assessing the effectiveness of classical marketing;

Thirdly, carry out stage-by-stage monitoring of the information flow to obtain the planned market result and make appropriate management decisions.

Expanding the geography of communications requires from the company to have a more homogeneous and consistent brand image in the minds of consumers, which means that positioning should be perceived unambiguously by different categories of consumers [4]. On the one hand, this means planning a promotion campaign for various segments of the target market, achieving a more accurate match to the characteristics of individual consumer groups. On the other hand, this means excluding multidirectional and inconsistent communications, repetition and contradictions in the use of individual communication tools. At the same time, the integrated use of digital marketing tools allows you to optimize your promotion budget and achieve a higher communication effect at lower costs.

In general, digital marketing tools can be divided into three groups: basic, supporting, and additional.

If the main digital marketing communications serve as a means of directly promoting the company’s product, service, and brand, and are focused on the target audience, then supporting and additional ones perform the functions of both promoting the company itself in the marketing environment and are focused on the target public, and are focused on the consumer and promotion in places of sale. At the same time, it should be noted that the effectiveness of promotional means using digital marketing tools for goods in consumer markets and in industrial goods markets is different.

It is important for a company to have a clear understanding of what results can be achieved using a particular digital marketing communication tool and what the strengths and weaknesses of their use are. The synergy is created through the joint use of each of the tools, and each of them works best on its own, ensuring contact with the target audience in various ways, some of which complement and reinforce each other. Consequently, we are talking about concentrating efforts in using the company’s digital marketing communication tools based on an integrated approach [5]. This requires

continuous maintenance of close contact between the manager and clients, partnerships between various groups of participants in the marketing process, between divisions of the company, as well as with external organizations in order to effectively manage marketing communications.

In this regard, the algorithm for using digital marketing communications tools in a company based on an integrated approach requires separate consideration.

At the first stage, the target audience is determined and analyzed by the sales department, special sales campaigns are planned and implemented, aimed at both retail consumers and trade organizations, i.e. mechanisms of influence on retail and wholesale consumers are integrated. Both the main competitors are analyzed in relation to problems, goals, opportunities, perceptions and expectations of the target audience, as well as the relationship between internal resources and the company's current strategy [6].

At the second stage, the budget for the company's use of digital marketing communications tools is calculated based on an integrated approach, taking into account the choice of means of promotion and sales stimulation, an array of informational messages, personal sales and direct marketing. The choice of the budget method depends on the current strategy of the company (method of tasks and goals; method of determining sales volumes calculated as a percentage and assessment of opportunities; method of matching competitors; or method of financing on a residual basis).

At the third stage, marketing activities should fit into the overall concept developed by public relations services, marketing and sales departments with the involvement of independent experts and consulting firms. That is, the efforts of the public relations department are integrated with the services of specialized third-party organizations (consultants, top managers of interested services, etc.) [7]. A special role in this case belongs to integrated advertising agencies, which include account managers, research workers, advertising planners, advertising media plan developers, airtime and print space purchasing managers, and order fulfillment services.

At the fourth stage, an 'information product' is created – a figurative representation of the merchandise, brand and the company itself with the help of specialists in packaging, design, image makers, PR technologists, etc., who work under a common conceptual principle. It is this that is decisive and leads among all the previous ones, since various styles and approaches to solving a common problem are integrated when developing a 'road map' of future events on the one hand. On the other hand, it makes the message accessible and informative for potential buyers who decide whether they will buy this product (interest, loyalty, and motivation to action) or, on the contrary, will ignore it. Scattered messages, untimely reminders in an unplanned sequence without proper integration process cannot reach the end consumer in the form necessary for the company, and thus the desired effect cannot be achieved.

At the fifth stage, the effectiveness of digital marketing communication tools' usage is assessed in the company based on an integrated approach. It is, indeed, the most important element of the algorithm, since it determines whether the set goal has

been achieved, how appropriate certain tools were chosen, whether funds were used rationally, etc.

On the one hand, the issues of assessing the effectiveness of the implementation of marketing communication technologies in the corporate system of digital strategies are the most discussed and relevant in the scientific community and are being currently studied in various directions. On the other hand, all effectiveness assessing methods presented in modern scientific literature and used in practice are not perfect.

For example, P. Doyle proposed assessing effectiveness in relation to the market value of the company, using three different approaches: a) marketing (the effectiveness of communications is determined by indicators such as awareness, brand image, market share (sales volume); b) accounting (marketing expenses are justified only if they provide an adequate increase in sales volume, which provides additional profit greater than the costs of communications; c) value creation (marketing and communication costs are assessed not only in terms of sales volumes or short-term profits, but from the point of view of their impact on the net present value of future cash flows) [8].

J. Burnet and S. Moriarty determined the effectiveness of implementing marketing communication technologies into the corporate system of digital strategies by the degree of their influence on consumer perception/behaviour and adhered to an individual approach to assessment for each type of product/service promotion channel. When assessing, they used indicators of communicative and behavioural factors and distinguished between subjective effectiveness (effects received by subjects of marketing communications) and environmental effectiveness (the effectiveness of the functioning of the environment that creates conditions for increasing subjective effectiveness) [9].

F. Kotler in the article “The 10 principles of the New Marketing” proposed using metrics of the effect of mutual understanding and commercial effect: the effect of mutual understanding shows how effectively the system of marketing communication technology influences the customer; commercial – determines and evaluates its impact on changes in sales [10].

When assessing efficiency, M. Braun identified a system of short-term and long-term economic effects: the short-term one is formed due to the current profit provided by the customer; the long-term is associated with the formation of the customer’s life cycle value, taking into account the likelihood of his retention [11].

In recent years, approaches to the consideration of evaluation indicators vary in a fairly wide range: from issues of the development and implementation of digital marketing technologies in the context of the specific functional areas of financial and personnel competencies [12] to the main processes that form digital marketing technologies [13].

According to the concept of *classical marketing*, it is customary to distinguish two types of evaluative indicators of the effectiveness of the implementation of marketing communication technologies – economic (quantitative) and communicative, which assumes the presence of feedback.

The first type (*economic efficiency*) is calculated, it reflects the overall economic results of the implementation of marketing communication, characterizes its impact on

the economic performance of the company (profit, revenue, sales volumes, profitability, etc.) and uses the following methods:

- method of analyzing the results of the experiment (selection of a sample consumer market being tested);
- method for calculating the elasticity indicator of marketing activities (change in sales volume (percentage) for each percent of additional marketing expenses;
- method of calculating the profitability indicator (the ratio of profit received to costs or the ratio between profit from additional turnover obtained under the influence of marketing communication and its);
- assessment method using the ROI (Return of Investments) indicator – the ratio of profit at the end and beginning of the analyzed period to campaign expenses on marketing communications.

The second type (*communicative effectiveness*) – evaluative, consists of carrying out a stage-by-stage preliminary (pretest) and final (posttest) testing, i.e. in the impact of the message on the target audience. The analysis of the received pretest data leads to select those communication messages that are recommended to be used during the promotion campaign. Eventually, after the promotion campaign has been carried out, its effectiveness is assessed using post-tests based on the following indicators:

- recognition (the number of consumers from the target audience who remembered the essence of the communication message);
- product image (perception of the promoted product by the target audience);
- understanding (the target group comprehends the promoted meaning of the communication message);
- persuasiveness (the communication message provides sufficient interest to make a purchase);
- the brand image (the level of change in the image of a product brand after communication activities, the degree of recognition of the name of the manufacturing company).

However, in our opinion, today particular importance is given to such performance assessment meters, which, *firstly*, make it possible to make operational changes in groups or clusters of indicators that directly affect the quality of the target audience, which helps turn them into real customers. *Secondly*, they reflect the interaction of indicators of economic and communication efficiency (this is true, since each communication effect in digital marketing has a justified economic significance). We are talking about a ‘chain’ of transformations which can be schematically represented as follows. Modern information traffic is transformed into digital marketing communications that affect the online and offline environment (properties of omni-channel marketing); then the latter are converted into orders/requests for goods, works and services of the company, which, in turn, are converted into sales and financial flows.

Indeed, many researchers are now considering various types of indicators for assessing the effectiveness of digital and Internet marketing [14; 15; 16], though, the

problem is that modern digital technologies make it possible to analyze more than a hundred different indicators and metrics. The analysis provided an opportunity to group quantitative indicators for assessing the effectiveness of implementing marketing communication technologies in the corporate system of digital strategies as follows:

1) the number of impressions (total number of advertising contacts recorded by standard Internet marketing systems – Google.Adwords, Facebook.Ads, Target.Mail, etc.);

2) the number of visitors (advertising clicks to contact);

3) CTR (click-touch-rate) – click-through rate, i.e. the ratio of the number of ad clicks to the total number of impressions (reflects the transition of user attention to interest);

4) targeted actions-applications (leads, LD) – request in feedback forms, contacting an online consultant, requesting price lists, sending your contact information, etc.;

5) targeted orders (actions, ORD) – expressed readiness, a message about the consumer's intention to complete a transaction (purchase goods, works or services);

6) sales (sales, SL) – purchase by the target audience of goods, works and services of the company [17; 18].

In this regard, it is necessary to clarify that performance assessment indicators are supplemented by price models of digital and Internet marketing (models of advertising contacts from *CPM* to *CPS*), reflecting the absolute and relative values of the number of attracted customers and users who have passed certain stages on the way to making a purchase through direct communication with the manager of the company/organization. It should also be noted that it is impossible to take into account the dynamics of all indicators of the marketing environment. However, if a company detects trends towards deviations in the market situation or consumer behavior, this can provide a more favorable effect from marketing communications [19].

Currently, when assessing the effectiveness of implementing marketing communication technologies into the corporate system of digital strategies, large companies make a variable selection of solutions that meet their needs and use a continuous three-stage process to identify the areas of digital technology development necessary for implementation.

At the *first stage*, the company's digital marketing specialists study and collect information about changes in digital technologies in the context of the company's adequacy to the existing information environment (comparing the level of technology of activities with the desired), platforms and directions of information flows, to predict the future of communication tools, information traffic and search for innovative solutions in the field of digital marketing.

The *second stage* is the planning process whose fundamental component is the search for appropriate information flows to solve specific marketing problems. This takes into account changes in the vectors of information exchange regarding the positioning of information flows (formation, accounting, filling, balancing or abstraction from the characteristics of information channels), which involves the company identifying potentially profitable tools for operational digital marketing.

At the third stage, based on the development plan and the set of information flows, information channels are selected, traffic is loaded, and personnel is selected to implement changes in marketing technologies. At this time, the key performance indicators are [20]:

a) commercial activity coefficient (the effectiveness of sales of a company's products through a digital marketing system). it calculated as the ratio of the number of customers at the stage of visiting the company's information platform/resource to the number of users who performed a purchase;

b) business activity coefficient (assessment of the effectiveness of performing target actions – traffic loading, ordering cost calculations, etc.) – divides users into groups based on performing a target action;

c) audience interaction coefficient (the effectiveness of involving users in communication with company representatives and other users) – it is calculated as the ratio of the number of users at the customer outreach stage to the number of users who have reached the stage of visiting the company's information platform/resource or performing a target action.

To assess audience activity in digital marketing, an analysis of the 'chain' (sequence) of successive five stages is used: passive state – viewing a profile – consuming the content – interacting with the content – communicating between users and company representatives – performing a commercial action. Based on it, the rating of user activity is determined, where each stage corresponds to the share of audience activity. As for the audience interaction coefficient, it allows specialists from the company's marketing department to: 1) divide users according to the formed stages of activity, 2) identify ineffective elements of the electronic marketing system and 3) obtain information for making management decisions to strengthen the company's marketing activities on the Internet [21].

However, the systematizing indicators for assessing the effectiveness of the implementation of marketing communication technologies in the corporate system of digital strategies is based on the behavioral approach to assessing effectiveness, since it assumes dynamic assessment indicators. It also takes into account the actions of the audience of recipients of information messages as units of this target audience characterized by needs supported by purchasing power, i.e. real demand.

The modular nature of the analysis of key performance indicators for marketing technology management involves defining efficiency as the product of the profit from the implementation of each technology and the value of an individual marketing technology in creating consumer value is divided by the total costs of marketing technologies. When conducting e-commerce, modularity is structured into the digitalization of five of the six stages of the process of interaction between the business and the customer during the purchase and sale operation (advertising goods; offering goods; familiarization with goods; studying goods, comparison with analogues; ordering and paying for goods) and only the sixth stage (delivery of goods) is not digitized. In fact, the potential consumer is not dealing with a real product, but with its digital form – information provided to him by the seller. At the same time, digital

marketing, firstly, positions information traffic in the ‘behavioral’ segment within the framework of the concept of information marketing, the method of which comes down to information management for the purposes of organizing, implementing and intensifying sales, and secondly, it receives a valuation in the context of providing access to target audience [22].

As mentioned above, many authors generally use classical marketing indicators when using modern assessments of the effectiveness of digital marketing activities. For example, the ratio of income to costs for digital marketing activities is determined when calculating return on investment (ROI), return on asset ownership (HRR), return on investment, etc. [23; 24]. At the same time, the advantage of using them is that they are calculated automatically, which allows you to quickly make decisions on adjusting the digital marketing tools used. A disadvantage is the existing ‘lag’ associated with delays in information traffic at the stages of transforming the processes of interaction with the target audience of potential consumers of goods/services. Therefore, it is necessary to permanently monitor the *critical* points of transformation of information flows and information traffic, when the corresponding digital marketing tools become ineffective (the chain ‘advertising material – audience – company/organization offer’ is commercially unprofitable).

Conclusion The analysis has shown that the digital marketing methods of firms/companies and enterprises in one market are not similar to the methods used in another market, which dictates the need to clarify the concept of ‘digital marketing technologies’ when describing their properties. This is also due to the fact that today there are, on the one hand, a variety of communication channels, information flows and digital marketing methods with a large number of signs of segmentation of potential consumers. On the other hand, there is a wide range of decisions in the field of digital marketing activities, which is associated with the format of these decisions made by the top management of firms/companies and marketing expert entities operating on an outsourcing basis. It has been revealed that the decomposition of the information flow by stages of transformation in performance assessment indicators determines the final form of the Internet marketing technology to be implemented. Based on a structural analysis of the processes of developing technologies for digital marketing activities, it was determined that its algorithmization is based, first of all, on the specialization and types of activities of the company (interrelations, formalization and detailing), which are relatively unchanged in the formation of classical marketing strategies.

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13. CARTOGRAPHIC SOCIAL NETWORK SOFTWARE DEVELOPMENT FOR INTERNET USER EVENTS SEARCHING

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Introduction. In today's world, virtual social networks have become an integral part of our lives. They serve as a means for us to connect with friends, make new acquaintances, share our thoughts and experiences, and interact based on shared interests, among other things. There are numerous options for activities, such as taking leisurely walks in picturesque places or attending interesting and educational events. However, discovering such events can be quite challenging. Often, individuals are required to sift through numerous social media groups to gather information about events and then pinpoint their locations on a map. If one is specifically seeking events in a particular area, the task becomes even more daunting. It entails initially identifying events on social networks and then cross-referencing their addresses on a map while calculating the distances to each of them. This extensive search process can be time-consuming before finding something nearby.

In such scenarios, a social network integrated with cartographic methods can prove invaluable. Such a network enables users to plot events directly on a map, significantly simplifying the process of discovering interesting events. For instance, if we're looking for a concert in the city, utilizing this type of social network will allow to swiftly locate all events occurring within a specified radius of current location. We won't need to scour various websites or social media platforms to find individual events, as they will all be conveniently displayed on the map for easy access.

In recent years, people have increasingly relied on online platforms and social networks to discover events, connect with others, and engage in various activities. This shift has created a demand for more efficient and user-friendly tools to search for events and locations. With the widespread availability of GPS-enabled smartphones, location-based services have become an integral part of our daily lives. Users expect applications that can provide them with real-time information about events and activities in their vicinity. As the digital landscape has expanded, so has the sheer volume of information available online. This has led to information overload, making it challenging for users to find relevant events without a dedicated platform to assist them. People are increasingly looking for ways to connect and interact with others who share their interests. A cartographic social network that helps users discover events not only provides valuable information but also fosters social engagement.

There are significant business opportunities in the events and entertainment industry. Developing a platform that connects users with events can benefit event organizers, local businesses, and advertisers looking to target specific audiences. The continuous advancement of technology, including geospatial data processing, machine learning, and mobile app development, provides the necessary tools to create sophisticated and user-friendly cartographic social networks. The COVID-19 pandemic has accelerated the adoption of digital solutions for event discovery as in-person gatherings faced restrictions. Even in the post-pandemic world, digital event discovery is expected to remain a prominent trend. Today's Internet users have high expectations for seamless and personalized experiences. A well-designed cartographic social network can meet these expectations by offering features like event recommendations, location-based notifications, and user-generated content. The development of a cartographic social network for Internet user event searching is a highly relevant and promising area due to the evolving digital landscape, changing user behaviors, and the potential for technological innovation. Such a platform has the potential to provide valuable services to both users and businesses while addressing the challenges of information overload and the need for social interaction.

In today's world, when information comes to us from various sources and the speed of its distribution is increasing, finding the right information can become a difficult task. This is especially true of finding a variety of activities. Today, there are a variety of platforms that allow users to create and join events. However, most of them do not completely solve the problem of finding events, especially in large cities with a large number of events taking place every day.

One of the main problems that arise when searching for events is the lack of extensive filtering and categorization of events. Many platforms offer basic filters such as category and venue, but this is not always enough to find the interests event.

Also a problem is the insufficient use of cartographic methods when searching for events, which forces users to use additional services to clarify the location of events. Cartographic methods allow displaying the location of the event on the map, which makes it easier to find and helps users to avoid problems with finding the location.

In addition, the problem is insufficient functionality for creating user's events, especially if the event is small and does not require additional financial investments. Organizers can have trouble spreading the word and attracting an interested audience, and therefore have to post information on many platforms in the hope of finding visitors. One of the main problems is also insufficient user interactivity with events. Often, platforms provide limited opportunities for communication between event participants, it is impossible to leave comments on events. Another problem is not being able to see the number of people planning to attend the event and the number of seats available. This can lead to the fact that it is impossible to get to the event, because there are too many people. It is also difficult for organizers to plan further details of the event without knowing the number of attendees. Organizers may have to cancel the event due to insufficient number of participants, organizers and participants will be able to find out about this in advance.

Literature review. Location-based services (LBS) have become integral to mobile applications, enabling users to find nearby businesses and services. The article by W. Ahmad, A. Zia, and U. Khalid (2013) proposes a novel approach to exploring information about a specific territory using Google Maps. The authors integrate social networking components into the Google Map platform to facilitate knowledge sharing and discovery among users. The Google Map Based Social Network (GMBSN) platform allows users to create and share location-based content, connect with other users, and collaborate on tasks. The article provides insights into the design and implementation of the GMBSN platform and its potential applications in various fields. [1]. The survey by Pranav Nerurkar et al. (2019) discusses various network embedding techniques for social networks, including DeepWalk, LINE, and Node2Vec. These techniques aim to map networks to lower-dimensional vector representations while preserving their structural properties. The survey highlights the advantages and limitations of each technique and provides a comprehensive overview of the current state of research in this area. [2]. The role of user-generated content (UGC) in promoting events on cartographic social networks has been examined by Xiang et al. (2017). UGC, including event descriptions, photos, and reviews, contributes to event discoverability and engagement. Understanding the dynamics of UGC on such platforms is essential for effective event promotion [3]. GIS technologies are pivotal in the development of cartographic social networks. Researchers Anahid Basiri et al. (2016) have explored the application of GIS for event mapping and visualization. These systems provide users with interactive maps that display event locations, helping users plan their attendance [4]. The article by Khan et al. (2020) presents a comprehensive analysis of location-based social network (LBSN) data for the mega city of Shanghai, China. The study utilizes spatio-temporal modeling to explore the dynamics of social interactions in the city, providing valuable insights into human behavior and urban planning. The authors employ GPS data from LBSNs to construct a spatio-temporal network, which is then analyzed using graph theory and network analysis methods. The study demonstrates the potential of LBSN data for understanding the complex interactions within urban environments, with applications for urban planning, policymaking, and transportation systems. [5].

The literature review demonstrates the growing interest in cartographic social networks for Internet user events searching. These platforms leverage the synergy between social interaction and geographic information to provide users with enhanced event discovery experiences. Researchers have delved into various aspects, including event recommendation, user-generated content, GIS integration, and privacy considerations, to develop effective and user-friendly systems. The continued development of cartographic social networks is likely to have a significant impact on how individuals discover and engage with events in their local communities and beyond [6-10]. As technology continues to advance and the Internet becomes increasingly accessible, a growing number of people rely on map services to access information about geographical areas, roads, business locations, and other points of interest. According to statistics from "Comscore Mobile Metrix," Google Maps, the

largest mapping service, holds the fifth position among mobile applications with the highest number of unique users in the United States. Its direct competitor, Apple Maps, ranks fifteenth. When to combine the unique users of both services, they surpass the user base of any other mobile application.

Cartographic social networks like Meetup and Eventbrite have gained popularity as platforms for organizing and discovering events.

Eventbrite is an online platform for organizing and selling event tickets (Fig. 1). With Eventbrite organizers can create event pages, sell tickets, and manage registration and promotion of their event. Eventbrite offers integrations with other platforms and tools, such as social media and CRM systems, allowing organizers to conveniently and efficiently manage their events and engage guests.

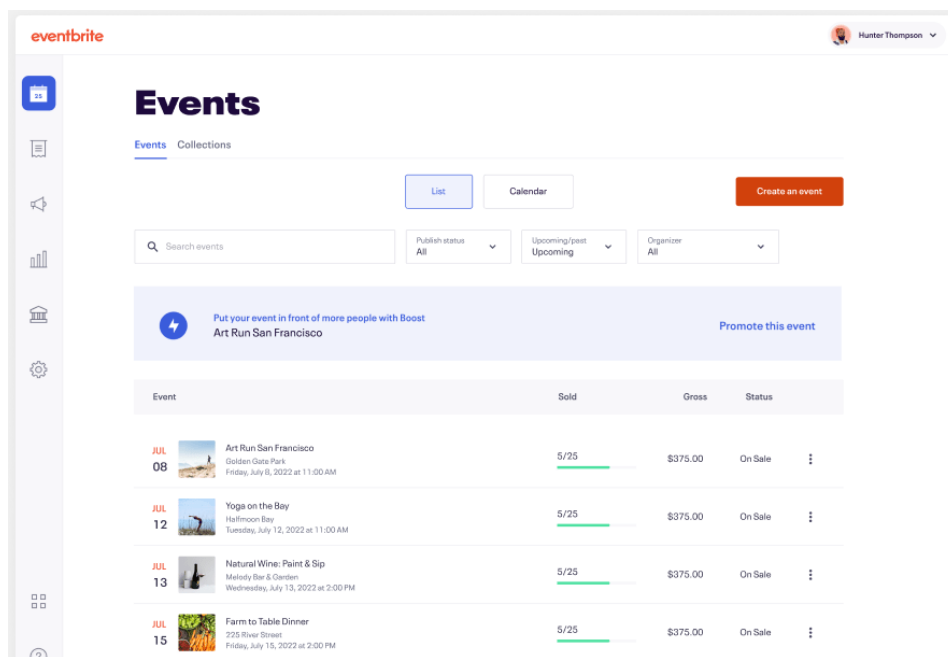


Fig. 1. Eventbrite online platform

Eventbrite can also provide customer support and sales reports, allowing organizers to easily track the success of their event.

Advantages of the Eventbrite platform are ticket management, integration with social networks, ability to create free events, analytics and reporting, availability of search on the map, creating a schedule of events, mobile application.

Disadvantages of the Eventbrite platform are the commission can reach 3.7% of the ticket price plus \$1.79 for each ticket sold, no comments on events, lack of support for the Ukrainian language and the Ukrainian hryvnia, it is not possible to view the number of people who plan to attend the event, no redirection to the organizer's own site and risk of losing access to user data.

Facebook Events is a feature of the Facebook social network that allows users to create, share, and join a variety of events that take place in the real world (Fig. 2). Users

can create events for any group of people, whether they are friends on Facebook or not. Facebook Events allows to create events with a variety of details such as time, location, description, photos and videos, tagging other users, and using hashtags. Users can also configure privacy settings to restrict access to the event to only selected users or groups. Advantages of the Facebook Events platform are ability to organize events of various scales, possibility of wide distribution of information, especially among friends in the Facebook social network, extensive customization options, ability to follow current events and receive notifications, ability to interact with the audience, integration with other services, data analytics, free to use, mobile application.

Create Private Event

✓ **Private Event**
Only invited guests will see this event. The host can choose to let guests invite other people.

Public Event
Anyone can see this event and search for it, even if you're not friends

Choose a Theme

Upload Photo or Video

Recommended Themes

Event Name: Add a short, clear name (0 / 64)

Location: Include a place or address

Date/Time: 5/17/2018 11:00AM UTC+01 + End Time

Description: Tell people more about the event

When you create an event on Facebook the Pages, Groups and Events Policies apply.

Create Private Event

Fig. 2. Facebook Events

Disadvantages of the Facebook Events platform are Facebook platform dependency, spam and advertising, lack of cartographic methods for searching, limitation on the number of participants, limited filtering functionality, excessive number of event notifications, the platform is aimed at large commercial projects and advertising.

Concert.ua is an online service for finding and buying tickets for various entertainment and cultural events in Ukraine, such as concerts, festivals, theater performances, movie screenings, sports competitions and others. The Concert.ua service works with more than 1,000 event organizers and has a wide selection of events throughout Ukraine. In addition to buying tickets, users can find information about events, announcements and reviews on the site.

Advantages of the Concert.ua platform are ticket management, a large number of venues for events, advanced filtering, integration with third-party services like Spotify, mobile application, scheme of the hall.

Disadvantages of the Concert.ua platform are limitation of events to certain sites, the service focuses on large concerts and events, lack of cartographic search methods, lack of comments and communication with the audience.

Results. After studying the features of the software services available on the market for creating events, their advantages and disadvantages were analyzed. On the basis of this analysis, functional requirements were developed for the creation of a new software for internet user events searching, which will be devoid of the shortcomings of each of the existing systems and will take into account the needs of end users:

- possibility of registration in the software;
 - create a new event by adding the event to the map, specifying the name, date, time, venue, description and category;
 - ability to cancel the event;
 - search for events by name, category, date and radius;
 - view detailed information about the event;
 - displaying events on the map and viewing them by location;
 - possibility to join the event;
 - rate and comment on events;
 - the ability to view the number of event participants and the number of seats.
- Also, non-functional requirements for software development were defined:
- the software must be safe for users, it should ensure confidentiality and protection of personal data of users;
 - the software should load fast and run fast online;
 - the software must be compatible with different browsers;
 - the software must be scalable so that it can grow as the number of users grows;
 - the software must be able to process a large flow of information and user requests without failures;
 - the software must be able to recover from unexpected failures.

To create the software backend, the Python language was chosen, because it is object-oriented, has convenient debugging and allows to quickly develop programs and has a large number of libraries. FastAPI was chosen for the web framework, which offers fast and efficient API creation by using an excellent asynchronous approach and automatic documentation generation using OpenAPI.

The TypeScript language was chosen for the frontend part because it has static typing, supports OOP, and compiles to JavaScript, which is supported by browsers to interact with HTML and CSS on the client side. Angular was chosen as the framework, which uses the concept of two-way data communication and allows to keep the application up-to-date. Angular also provides a rich set of tools for developing and maintaining complex web applications, such as routing, form validation, support for HTTP requests, data caching, and others.

The HERE Map API was chosen to display map data, which is one of the leading mapping platforms that provides a wide range of functions and opportunities for working with maps and location. The HERE Map API has powerful APIs that allow to interact with maps, perform geolocation, routing and other operations.

PostgreSQL was chosen for the DBMS because it provides a high level of security and reliability of user data, which is quite important in the operation of a social network. It also supports many types of data, has a wide variety of functionality. PostgreSQL also has advanced capabilities in dealing with transactions and data recovery in case of failures. In addition, the basic functionality of PostgreSQL has been expanded with the help of PostGIS, which provides various opportunities for working with geographic data. PyCharm was chosen as the software development environment because PyCharm provides a large number of useful tools for developing in the Python programming language, such as code prompts, autocompletion, using frameworks, creating virtual environments, testing, and more. PyCharm also supports other programming languages such as JavaScript, HTML, and CSS, allowing work with these languages in the context of Python projects.

Since the format of a web application for a social network was chosen to create user events using mapping services, it would be appropriate to use a client-server architecture for its development. In client-server architecture many clients (remote processors) request and receive services from a centralized server (host computer). Client-server architecture is one of the most common web application architectures, where clients and servers interact with each other over the Internet. In this architecture, the client sends a request to the server, and the server processes it and returns a response. Typically, clients interact with the server using the HTTP protocol, sending requests to the server and receiving responses in the form of JSON or another data format. The client-server architecture allows for the separation of responsibility between the client and the server, which allows for greater scalability, security, and efficiency in web application development (Fig. 3).

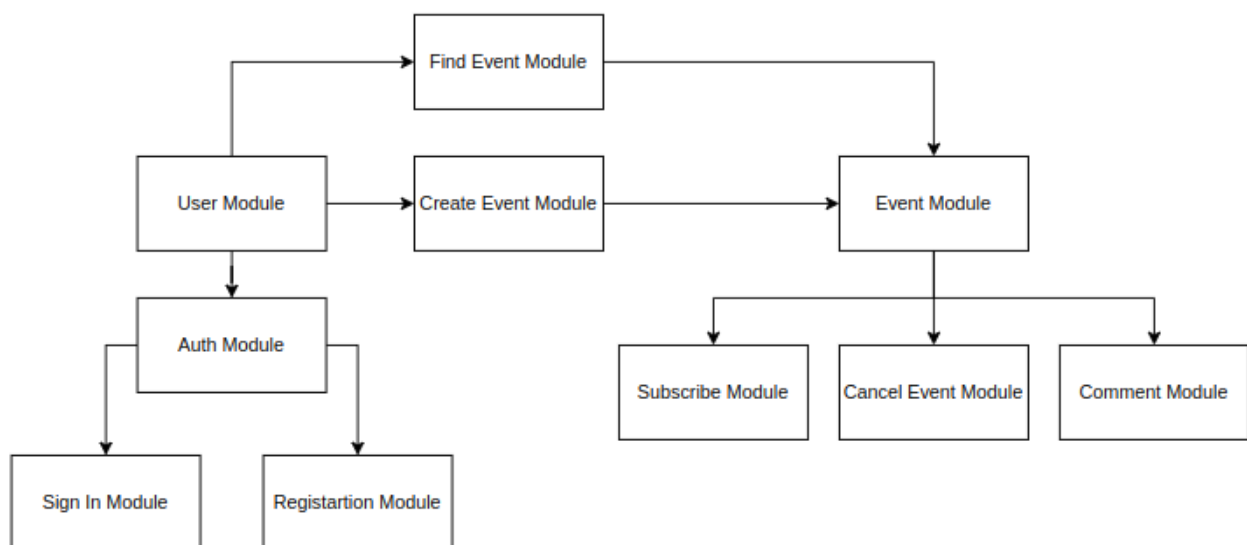


Fig. 3. Component diagram and modules connection of developed software for user events searching

In the developed database for software the user entity consists of the following fields: id – user ID, first_name, last_name, email, password, date_of_birth, gender, email_verified, phone_number, created_at – date and time of user creation, updated_at – date and time of user update (Fig. 4). During registration on the website, the user enters personal data, such as e-mail, first name, last name, phone number and password. After sending data from the client to the server, the password is encrypted with a public key that is on the client side. The server receives the data, decrypts the password, hashes it and writes it to the database. Thus, high data security is ensured, because even with full access to the database, the user's password remains encrypted and inaccessible.

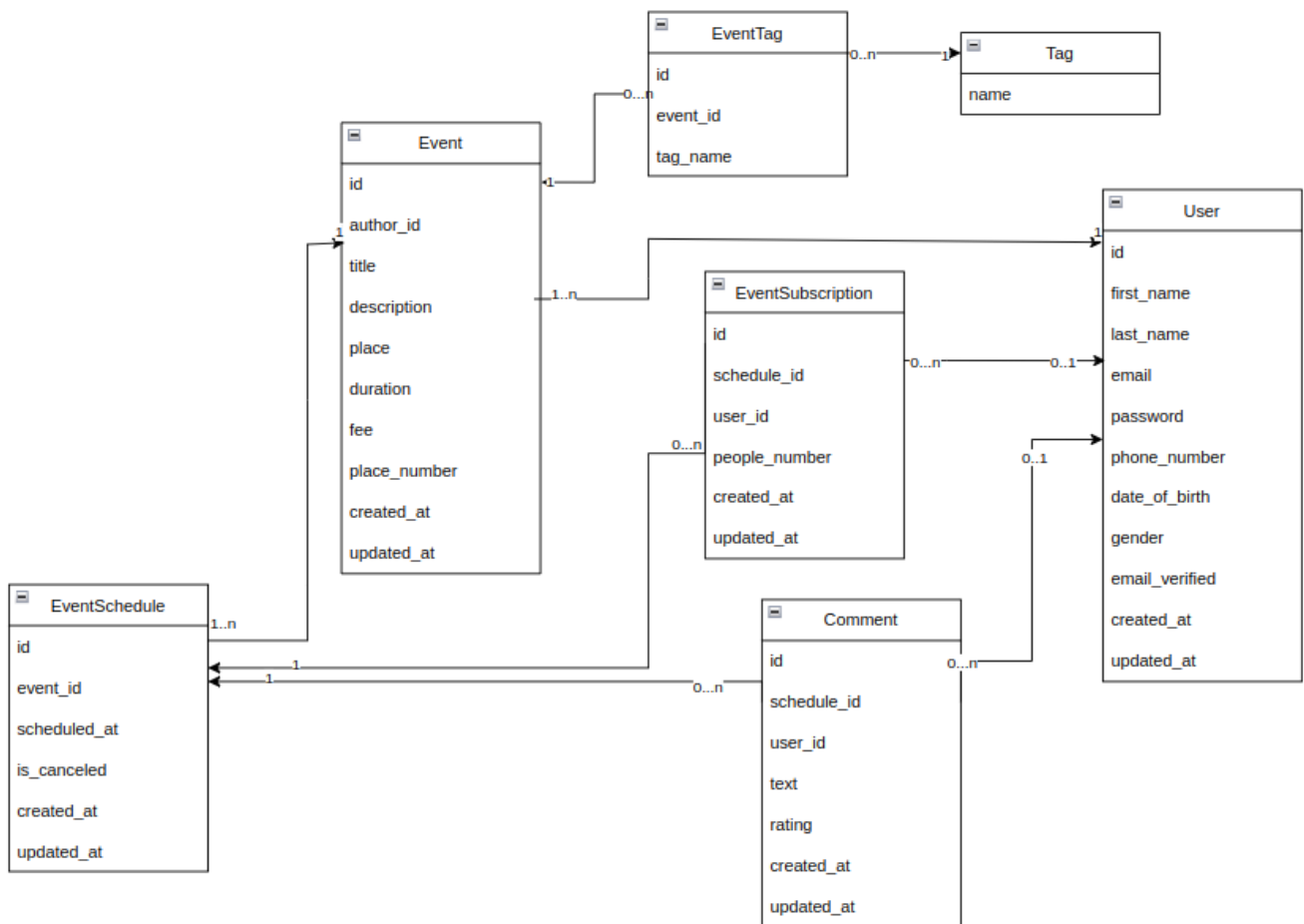


Fig. 4. Database scheme of developed software

If the request to transfer data from the client to the server is intercepted, the password is encrypted and can only be decrypted if the private key is available. After successful registration of the user, data is stored in the database, after which a letter confirming the registration is sent to user's e-mail. This email contains information that the registration was successful and a link to confirm the account.

The user must follow this link to confirm his registration. This is necessary to prevent the creation of fake accounts and ensure the safety of all users. After the user has successfully completed the authorization process, the server generates a JSON web token (JWT) and returns it to the client. This token contains information about the user

and other metadata that can be used to authenticate and identify the user. The token has a limited validity period of 15 minutes, after which the client must automatically request a token from the server. The client stores the token in local storage such and adds it to the request headers to prove its identity to the server during subsequent interactions with it. JWT token allows to ensure the security of the application and protect it from unauthorized access to resources.

An event is the main entity in the developed software. The event entity consists of the following fields: id – event identifier, author_id – ID of the user who created the event, title – name of the event, description – description of the event, place – the place of the event, which uses the GEOGRAPHY type; duration – duration of the event, fee – ticket price, place_number – number of seats for the event, created_at – date and time of event creation, updated_at – date and time of event update.

In the developed software the user selects a place on the map. After the user has chosen a place on the map, he fills out the event creation form, in which he indicates the necessary data, such as the event name, description, time and date, as well as additional tags to classify the event. If the desired tag is not in the list, the user can create a new one. After filling out the form, the data is sent to the server to be saved in the database. Since there is a many-to-many relationship between tags and events, there is a Tag entity and a one-to-many relationship table to implement such a relationship. The main goal of the developed software is to enable users to find interesting events, so a separate search and filtering module was developed for this. First, the user chooses his location (or the approximate place where the user plans to be). Next, the user sets the filtering parameters: tags, date, distance from the specified point, price parameters.

It starts searching for events. All found events that meet the set criteria are displayed on the map. When searching on the event map, the user can view more detailed information about the event by selecting it on the map (Fig. 5).

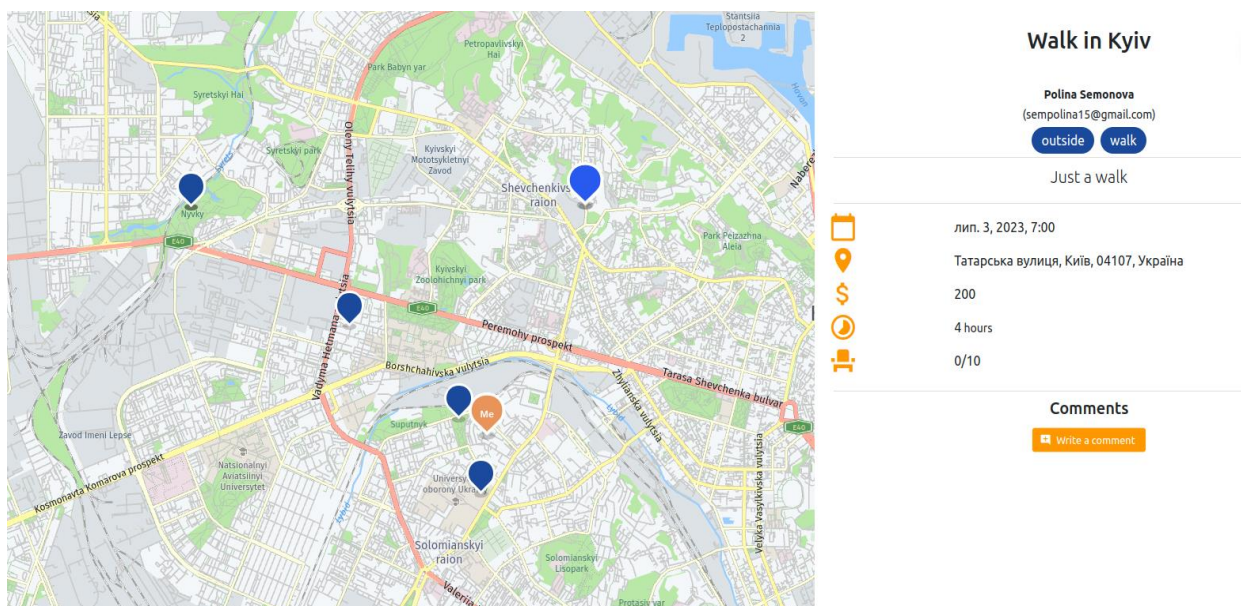
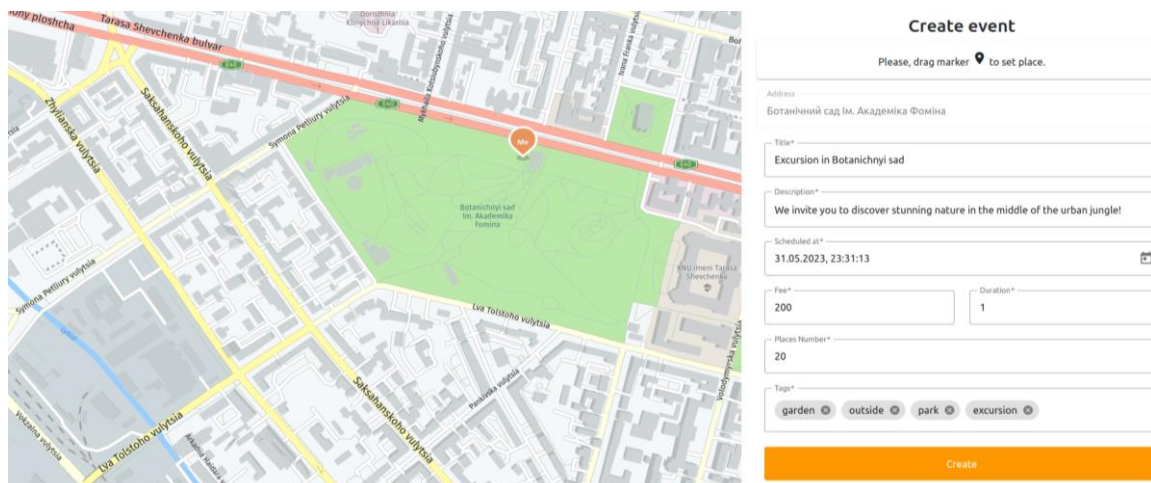


Fig. 5. Viewing the event found by the user

The user who created the event has the right to cancel it if necessary (Fig. 6).

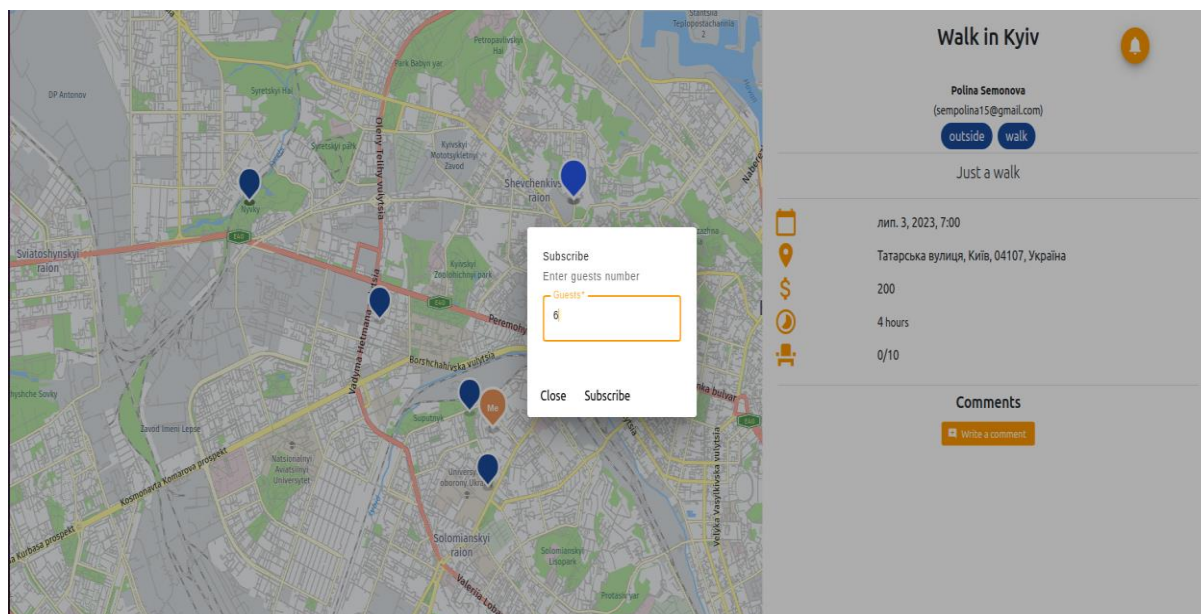


The image shows a map of Kyiv on the left and a 'Create event' form on the right. The map highlights the Botanical Garden of the National Academy of Sciences of Ukraine. The form contains the following fields:

- Create event**
- Please, drag marker to set place.
- Address: Ботанічний сад ім. Академіка Фоміна
- Title*: Excursion in Botanichnyi sad
- Description*: We invite you to discover stunning nature in the middle of the urban jungle!
- Scheduled at*: 31.05.2023, 23:31:13
- Fee*: 200
- Duration*: 1
- Places Number*: 20
- Tags*: garden, outside, park, excursion
- Create

Fig. 6. Adding a new event

This can be done through the web interface using the appropriate button. After that, users cannot sign up for the event and when viewing the event, users can see the corresponding mark of the canceled event. If necessary, the users can also restore the event and all relevant functionality of the event will be restored. While viewing the event, the user has the opportunity to leave a comment. If the event has already taken place, users can also leave an evaluation of the event. In addition, the comment can be edited or deleted (Fig. 7, 8).



The image shows a map of Kyiv on the left and a 'Walk in Kyiv' event page on the right. The event page contains the following information:

- Walk in Kyiv**
- Polina Semonova (sempolina15@gmail.com)
- outside walk
- Just a walk
- лип. 3, 2023, 7:00
- Татарська вулиця, Київ, 04107, Україна
- 200
- 4 hours
- 0/10
- Comments
- Write a comment

A modal window is open over the map, titled 'Subscribe'. It contains the following fields:

- Subscribe
- Enter guests number
- Guests*: 6
- Close
- Subscribe

Fig. 7. User subscription to the event

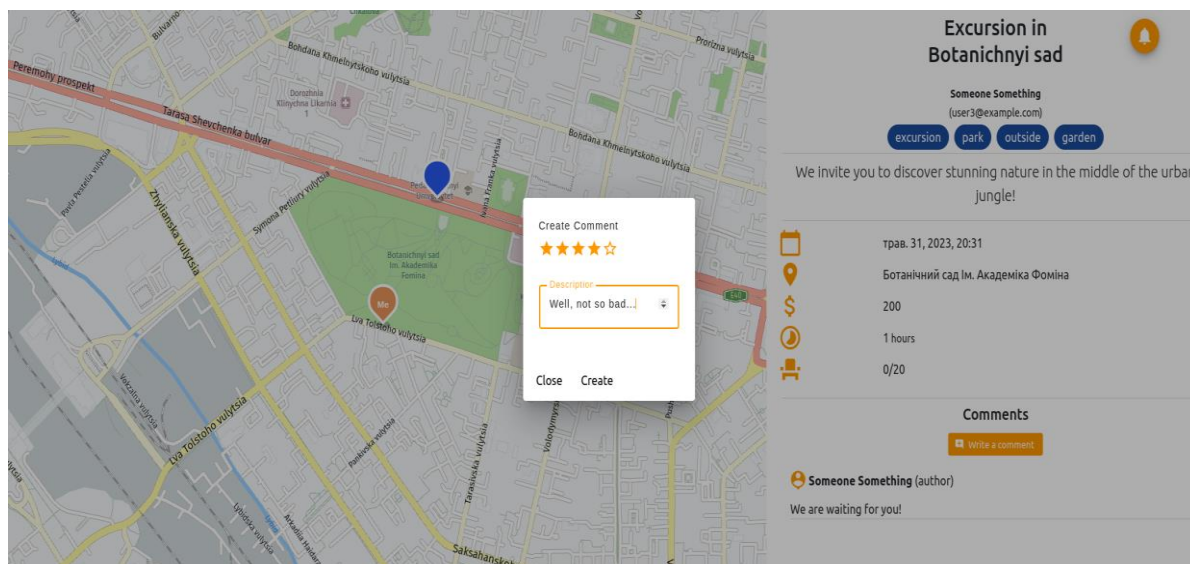


Fig. 8. Evaluation and creation of a comment by the user

The HTTPS protocol is used in the developed software to transmit data from the client to the server, which ensures encryption of all basic data transmitted, such as URL requests, request parameters, headers, and cookies containing user identification data (authorization token). The host (website) name or address and port are not encrypted because they are used to establish a connection using the TCP/IP transport protocol.

The password is additionally encrypted during transmission from the client to the server, and then hashed in the database management system (DBMS) for greater security. In addition, the user's private data is also hashed in the DBMS.

Based on testing of the developed software in the open source Lighthouse performance improvement tool, the performance of the implemented application can be expected to range from 80% to 25%, with an average of approximately 63%. For the optimal case, when testing is performed on a computer without simulating 3G Internet and without limiting the processor. For the worst case, when testing is carried out on a computer with a 3G Internet simulation and a processor limitation of 4 times (Fig. 9).

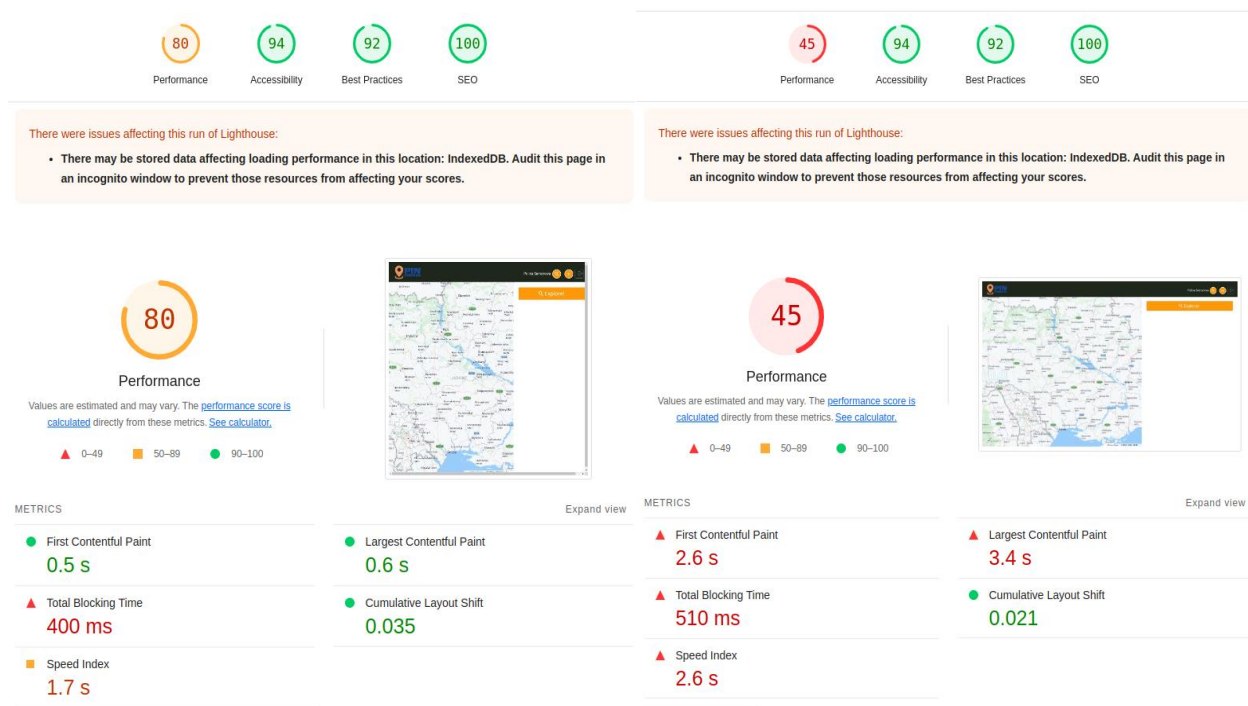


Fig. 8. The result of testing the developed software

Conclusion. The peculiarities of creating and searching for events according to the interests of users are analyzed, as well as the existing services for creating and searching for events are analyzed with a description of their advantages and disadvantages. Existing services can generate free events, are easy for average users to use, and have search filtering. However, the lack of cartographic methods for searching and creating events and the limited possibility of interaction with the audience are among the shortcomings of the considered software platforms. Taking into account the identified shortcomings, the requirements for the development of a new software product were formulated. The main requirement is the use of cartographic methods to display searches on the map and create events. A wide range of opportunities to interact with the audience is also required. A description of the architecture and modules of the proposed developed software is given. The authorization and registration modules, the event creation module, the event search and filtering module, the event viewing module, the event recording module, the comment creation module, and the security module were described. Technologies such as SAP, FastAPI and Angular frameworks, as well as Bootstrap, HERE and PostGIS libraries were used during the creation of the proposed software. The main goal of this development was to create a social network web application for creating user events using mapping services. The events search based on the interests of users has been implemented. The Python language with the FastAPI framework was chosen to create the backend part. The TypeScript language was chosen for the frontend part, and Angular was chosen as the framework using the Here Maps Data API library for displaying map data. In addition, PostgreSQL was chosen for the DBMS and was extended with the help of PostGIS, which provides functionality for working with cartographic data.

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14. KEY TRENDS IN THE FORMATION OF UKRAINIAN VOLUNTEERISM UNDER CONDITIONS OF UNDECLARED WAR: NEW OPPORTUNITIES IN THE LIGHT OF NETWORK-DIGITAL REBOOT

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Introduction. Now Ukraine is undergoing an existential test with the undeclared war unleashed by Russia. Every single day, in this war, Ukraine is suffering unprecedented human losses, large-scale financial and economic losses, and significant destruction of the industrial and infrastructure potential that was created over many years. Russia's full-scale armed aggression against Ukraine is not only an existential threat to the existence of Ukraine as an independent state, it is a real challenge to the world system of collective security, which generates global threats, primarily in the security and humanitarian fields.

One of the most powerful manifestations of the mobilization of internal social resources of Ukrainian civil society is self-organizational processes aimed at solving the most difficult problems that have arisen as a result of the armed aggression and at

the needs of post-war reconstruction. A striking manifestation of such self-organization was the 'outbreak' of volunteer activity of Ukrainians, which reveals the power of civil society as an actor of social transformations in Ukraine. Previous experience has shown that volunteering is a quick, flexible and effective internal mechanism of social self-organization of Ukrainian citizens, which mobilizes and directs resources to preserve the life and health of citizens, to solve problems of socio-economic, security etc in critica

l situations.

The volunteer movement in Ukraine has its own history of initiation and development, but in general it fits into the global context. The first outbreak of volunteer activity, which covered the whole country, took place at the end of 2013, and unfolded with particular force in 2014-2016 as a reaction to the armed conflict in Donbas. This is the first wave of the flash-like growth of the volunteer movement. After that, a certain lull lasted for several years, including in the manifestations of volunteer activity of citizens. At that time, the focus of volunteer aid was determined by the urgent need to save the lives of people in the occupied territories, to support the Ukrainian military (Defense Forces of Ukraine, volunteer battalions), and to help internally displaced persons from the zone of armed conflict. The mobilization of civil society resources in Ukraine was implemented through volunteering as a result of the impact of the external threat of loss of the territorial integrity of the Ukrainian state. Such a factor is not typical for the activation of the volunteer movement in other countries of the world. This is our Ukrainian specificity.

Starting from February 24, 2022, the full-scale invasion caused the second wave of the 'outbreak' of the volunteer movement in Ukraine, which unfolded instantly, en masse, with new strength and power. The experience of public self-organization gained during 2014-2016 has become extremely useful. Actually, Ukraine faced the same challenges, but on an incomparably larger scale and severity and with a much greater destructive power of the enemy. Large-scale armed aggression has become a challenge not only for Ukraine, but also for the entire world community.

In this context, an important aspect that requires the study of the volunteer movement in Ukraine is the emergence and development of new forms of interaction and communication of its participants, based on the use of the capabilities of modern information, communication and network technologies. Researching these issues, finding ways to further develop and involve volunteering resources (using modern technological base) is an important task for scientists, practitioners, politicians, representatives of the volunteer movement and state authorities. In the strategic dimension, we are talking about unlocking the internal reserves of Ukrainian society through volunteering under conditions of limited resources and armed aggression, considering the needs of further post-war reconstruction of Ukraine.

The second wave of activation of volunteerism, associated with the full-scale Russian invasion of Ukraine, again brought the study of this phenomenon into focus, given the scale and real role played by volunteerism in resisting armed aggression and overcoming its consequences. Thus, the opinions and moods of Ukrainians, their

volunteering and charitable involvement, social well-being under conditions of war are systematically measured by the sociological group 'Rating' [1]. Specialists of the National Institute of Strategic Studies are investigating the economic principles of promoting community cohesion in the conditions of martial law [2]. The Ukrainian scientific community, together with representatives of state authorities, actively conducts expert discussions on the development of the Strategy for the post-war recovery of Ukraine [3].

The research problem lies in the need to form a holistic vision of key development trends, the role and significance of Ukrainian volunteering as a powerful internal resource of civil society – an active subject that resists armed Russian aggression and overcomes its devastating consequences. The basis for the formation of a holistic vision of promising areas for the development of volunteering in Ukraine is a comparison of two waves of the 'outbreak' of volunteering (active phases: 2014-2016 and starting from 2022).

The purpose of the study is to identify the key trends in the development of Ukrainian volunteering and the most significant factors influencing it, in particular, the impact of digitalization, network and digital technologies on volunteering in Ukraine.

Results. The institutionalization and transformation of the Ukrainian volunteer movement are closely correlated with the transformations taking place in the field of modern information and communication, network and digital technologies, the development of which directly affects the organizational, information and communication component of volunteering in Ukraine. In itself, the rapid spread and use of modern digital, information, communication and network technologies, the implementation of platform ideology in the field of volunteering in Ukraine is not a consequence of a force majeure situation connected with the start of an undeclared full-scale war. This process is due to the internal logic of the comprehensive penetration of modern digital technologies into virtually all spheres of social and economic life of society (which manifested itself and accelerated with particular force during the COVID-19 pandemic), including the sphere of volunteering.

A comparison of the features of providing volunteer assistance to the main target groups during the first and second waves is shown in Fig. 1.

UKRAINIAN VOLUNTEERING UNDER CONDITIONS OF ARMED AGGRESSION

The first wave – 2014-2016

1. The first wave of powerful volunteerism took place in the context of the anti-terrorist operation in Donbas (regional scale).

2. In 2014, an unprecedented number of volunteers and donors appeared in Ukraine, and in terms of the scale of its spreading, public self-organization grew into a powerful volunteer movement.

3. In the situation of imbalance of the state administration system, lack of resources under conditions of armed conflict, volunteer organizations took over the functions of the state for humanitarian support of the Defense Forces of Ukraine and affected citizens, IDPs.

4. Spontaneity, mass manifestations of heroism in saving the lives and health of citizens and soldiers.

5. Insufficient institutionalization and legislative regulation of volunteers' activities.

6. Inconsistency of interaction between the state authorities and volunteer organizations in 2014-2016.

7. Volunteer aid was mainly aimed at:

- meeting the basic needs of IDPs and military personnel (food, clothing, footwear, protective equipment);
- provision of the necessary medical care to victims, wounded soldiers and residents, their transportation to safe places;
- assistance in transporting the bodies of the dead;

The second wave - starting from 2022.

1. The second wave of the 'outbreak' of volunteer activity in 2022 takes place in the context of Russia's full-scale armed aggression against Ukraine (on a national scale).

2. The experience gained in self-organized volunteering of Ukrainian citizens in 2014-2016 grew into a powerful volunteer movement in 2022-2023. There is a strong continuity with the first wave of volunteering.

3. The level of coordination of cooperation between volunteer organizations and government agencies when providing the necessary aid to target groups has increased significantly.

4. There was a wide involvement and use of digital, information and communication technologies (including the creation of joint platforms and funds 'state bodies + volunteer structures') to help both the Defense Forces of Ukraine and citizens affected by armed aggression.

5. An effective and transparent system for accounting for aid received from donors for the needs of the Defense Forces and affected citizens was created and put into operation.

6. Volunteers got the opportunity to purchase high-tech equipment to help the Defense Forces.

7. Thanks to the institutionalization, sustainability of volunteer structures, and the use of digitalization resources, the transparency of volunteers' activities has significantly increased, and the level of fraud has decreased.

8. Improving the legislative framework, adapting current legislation to martial law, combating fraud, expanding the rights of volunteers, and easing the tax burden.

Fig. 1. Generalized comparative analysis of two waves of outbreak of volunteer activity to help the Defense Forces of Ukraine and citizens affected by armed aggression (*made by the authors*).

Basing on the comparison of the two waves, the processes of development of the volunteer movement in general can be described by the triad of '**institutionalization**' (as the formation of powerful volunteer structures with significant experience, organizational and financial capacity and characterized by a high level of authority and trust) – '**platformization**' (as a process of combining various aspects and components of the implementation of volunteering activities with the help of Internet platforms - information and communication platforms that ensure effective interaction of all participants - volunteers themselves, donors/philanthropists, government bodies and aid recipients) – '**networking**' (as a process of gradual transfer of a significant part of interaction to the Internet and combining all participants into an integrated multi-branched system that has a network, not a hierarchical structure).

Platformization and networking are inextricably linked, on the one hand, with the development of modern information, communication and digital technologies, and on the other hand, with the opportunities and skills of volunteer entities to use the potential of these technologies for interaction and implementation of their tasks.

In this context, the development of the use of modern information, communication and digital technologies in volunteer activities is of great interest. In general, the key changes in the use of these technologies in the first and second waves of the 'outbreak of volunteering' (both in technological and substantive aspects) are shown in Fig. 2.

Thus, the use of modern information and communication, network and digital technologies in volunteering has really reached a qualitatively new level, and this is one of the key factors that contributed to the powerful institutionalization of the volunteer movement in Ukraine.

In the context of the above-mentioned triad of '*institutionalization*' - '*platformization*' - '*networking*' of volunteering, the analysis allows to identify the key trends in its development in Ukraine as a manifestation of a certain 'symbiosis' of the processes of development of volunteering and the development of modern technologies. These processes take place in parallel and synchronously, both in the field of volunteering and in the field of information and communication technologies, when the use of their capabilities in the implementation of volunteer activities contributes to the development and institutionalization of the volunteer movement in Ukraine during the transition from its first to the second wave. Understanding these manifestations creates the necessary research and organizational-managerial context, which allows to provide a systematic vision of trends in the development of volunteer activities and is a prerequisite for ensuring effective management decision-making. The main among these trends are the following.

USE OF INFORMATION AND COMMUNICATION, DIGITAL AND NETWORK TECHNOLOGIES DURING TWO WAVES OF VOLUNTEERING

The first wave – 2014-2016

In this period, smartphones and related mobile applications were not yet so widespread, so the technical possibilities were much more limited than during the second wave of volunteering.

Main tools:

1. Mobile communication and various mobile services (voice and SMS services, mobile Internet).
2. Social networks (usually Facebook, but the use of Russian networks such as VKontakte, which at that time had not yet been blocked in Ukraine, was widespread).
3. Messengers (at that time – mainly Viber and WhatsApp).
4. Email and electronic bulletin boards, etc.

The main ways to use information and communication technologies:

1. Messaging, voice communication.
2. Fundraising for the Defense Forces via paid SMS.
3. Creation of specialized volunteer groups in social networks in various areas (including self-help groups).
4. Informing and thematic targeted mailings.
5. Maintaining online databases on the needs of certain target groups, lists of the missing, dead and wounded.
6. Consulting on a wide range of issues, both online and using mobile communications.
7. Organization of activities to provide aid to both the Defense Forces and affected citizens.

The second wave - starting from 2022.

Mobile communications, relevant mobile applications and a smartphone as a basic communication device provided the opportunity to communicate with users to provide volunteer assistance in all areas.

Main tools:

1. Platformization of volunteer activities through the creation of web portals, platforms, aggregated information and communication resources to coordinate the interaction.
2. Institutionalized volunteer resources on the Internet - sites of leading volunteer organizations and associations.
3. Advanced features of social networks and messengers.
4. Specialized mobile applications – access to public services and information, mobile banking, universal payment platforms, geolocation services, etc.

The main ways to use information and communication technologies:

1. Promotion of projects on the Internet to help the Defense Forces of Ukraine and affected citizens in various areas.
2. Creating specialized volunteer groups and communities on social networks and supporting their activities.
3. Fundraising to help the Defence Forces and victims (primarily through online banking and payment platforms).
4. Maintaining online databases on the needs of certain target groups.
5. Informing through relevant groups or thematic chatbots in messengers.
6. Online consultations on a wide range of issues (primarily for affected citizens).
7. Providing transparency and accountability of activities.
8. Intelligence (using the capabilities of modern mobile applications and messengers).

Fig. 4. Generalized comparative analysis of key changes regarding the use of opportunities of information, communication and digital technologies in the first and second waves of volunteering (made by the authors).

1. *Institutionalization* of volunteering through its *platformization* through the creation of Internet platforms, web portals, information and communication platforms, the purpose of which is to combine the resources of volunteers, public authorities, donors, philanthropists, as well as directly those who need volunteer help. This allows to create a holistic and accessible information and communication space. There are many examples of platformization of the interaction of key actors involved in the implementation of volunteer activities and receiving assistance. For example, the online platform 'Volunteering in Ukraine' (<https://platforma.volunteer.country>) has become an important online volunteer resource. This is an online portal that combines volunteering resources throughout Ukraine and is an information and communication platform for the interaction of volunteers, citizens in need with non-profit public and charitable organizations. This platform also provides opportunities to carry out volunteer activities in international organizations. Another example is the online platform 'Work in the Rear' (<https://v-tylu.work/>), which helps in finding volunteers for those who need 'free hands' and in finding initiatives for those who want to help. There are many such platforms, we have given only a few examples.

2. *Institutionalization* of volunteering through the emergence of powerful institutionalized volunteer Internet resources, portals (websites of leading volunteer organizations and associations – 'Wings of the Phoenix', 'Come Back Alive', 'Army SOS', 'Donbas SOS', 'Serhiy Prytula Charitable Foundation', 'People's Project' and others). A key feature of these resources and related volunteer structures is the extremely high authority and level of trust that have resulted from their productive activities since the first wave of volunteering (2014-2016). They have what sociology calls 'institutional trust', the presence of which significantly increases the efficiency, scale and speed of interaction. In difficult crisis situations, trust is extremely important for the effective unification of efforts of the actors of interaction and the quick solution of the most acute problems.

3. *Institutionalization* of volunteering through the expansion of the range of areas of volunteer activity, the emergence of specific areas, the basis and prerequisite for which is the maximum use of modern information and communication, network and digital technologies. The digital and network environment itself becomes a field for the emergence and development of online volunteering, for the implementation of many areas of volunteering – primarily in countering the information war, providing information on the actions of the enemy, searching for missing persons, intelligence activities, etc. An example is specialized Telegram channels (for example, 'Internet of the Army of Ukraine': <https://t.me/ivukr>; 'IT Army of Ukraine': <https://t.me/itarmyofukraine2022> and others), social networks, Internet pages of volunteer organizations, which post up-to-date information about the war, about the needs of military personnel and internally displaced persons. Another example is the communication platform 'Volunteer Information Front' (<https://www.facebook.com/vif.krop/>) to support volunteer organizations, coordinate their activities to aid the Defense Forces of Ukraine.

4. The key technical and technological trend in the use of opportunities of information and communication, digital and network technologies by volunteers consists in transferring a significant share of interaction to the sphere of use of individual mobile devices (first of all - smartphones) - through the use of mobile versions of websites, social networks and various mobile applications. This was facilitated by the massive spread of smartphones as the main and, at the same time, fully functional individual communication tools, with the corresponding development of the mobile Internet, media, geolocation, etc. The basis of this trend is also the increase in the speed and availability of mobile Internet. In the context of this trend, volunteering receives strong support on the network not only through specialized platforms, but also through the introduction of specialized mobile applications for volunteers, the distribution of memos and instructions for involving citizens in volunteer activities.

Thus, under conditions of full-scale armed aggression, modern information and communication, network and digital technologies make it possible to carry out strategic and tactical communications. In many cases, they remain almost the only means of maintaining interaction, uniting and coordinating the joint efforts of partners, communities, and organizations to ensure fruitful cooperation to provide aid to those in need. Without these technologies, a large number of activities, projects, and initiatives to help the army and people would simply be impossible. The dominance of young people among those involved in one or another form of volunteering indicates, firstly, the presence of significant potential for the further development of volunteering in Ukraine, and secondly, the prospect of using the latest network technologies in volunteering, the use of which young people are well aware of. Thus, in Ukraine there is a strong social base for the further development of volunteering, which is focused on the use of the possibilities of modern digital and information and communication technologies.

The trends and processes described above, which are actively developing at the moment, are a certain answer to the question: 'What is the secret of the stability of the volunteer movement in Ukraine?'. We believe that the formation, rapid and powerful institutionalization of the volunteer movement in Ukraine in its current form is based on three basic premises:

1. Extremely high level of motivation and cohesion of citizens, which is related to the need to defend their land from the enemy, readiness to self-organize and get involved in solving acute social problems for the sake of Victory and peace.

2. A strong public demand for the mobilization of internal resources of society and the state to ensure self-defense, self-preservation of people, the country, the nation, for further recovery.

3. Wide involvement and use of modern network, digital and information and communication technologies in the processes of formation of Ukrainian volunteerism, which makes it extremely flexible, accessible, convenient, and at the same time - all-encompassing.

As a rule, certain social movements need the support of certain powerful external information and resource structures for their development. But Ukrainian volunteers, using the capabilities of modern information, communication, digital and network technologies, went further – they created their own powerful not just information network, but a full-fledged information and communication environment. This allows them to solve a significant number of issues of their activities on their own, without help from external actors, and, accordingly, to act even more independently, in a coordinated and effective manner. This is the technological network and digital basis for the functioning of the modern volunteer movement. Thus, the processes of institutionalization of the Ukrainian volunteer movement continue and make it possible to strengthen the social resource of civil society for the urgent needs of the individual and the country as a whole.

Conclusions.

1. The Ukrainian volunteer movement, which became more active under conditions of armed aggression, became a manifestation of the power of civil society, cohesion and effective self-organization of active, conscious citizens, volunteer organizations and associations in Ukraine and abroad.

2. Ukrainian volunteering forms a new culture aimed at spreading the values of peace, security, responsibility, and humanism.

3. The experience of volunteering acquired by Ukrainian society, both of the first and second waves, is extremely valuable from the point of view of mobilizing internal resources of civil society to solve current tasks and overcome challenges, and – in a strategic perspective, as an important social tool for the post-war recovery of Ukraine, as a promise area of development of civil society in Ukraine and, accordingly, the formation of Ukraine as a modern European state.

4. The results of the study indicate a large-scale and constantly growing use of the potential of modern information, communication, digital and network technologies in the organization of volunteering in Ukraine, with a pronounced tendency towards its institutionalization through the processes of platformization and networking of volunteer activities.

5. The key trends in the development of Ukrainian volunteering at this stage are the following:

- a significant increase in the level of institutionalization of the volunteer movement, the formation of powerful volunteer structures with a high level of authority and trust, while the number of situational and random pseudo-volunteer organizations has significantly decreased;

- the spectrum and scale of aid, the organizational and financial capacity of volunteer organizations have significantly increased and continue to increase;

- a significant increase in the use of modern information, communication and network technologies, a significant increase in the number of users of volunteer Internet resources, the platformization of volunteer activities - all this creates a communicative and technological basis for the organization of interaction (both within

the volunteer community itself and in interaction with target groups and donors) and contribute to the unification of efforts of all partners (including public authorities).

6. The identified key trends largely allow us to determine the areas of state policy on the development of the volunteer movement in Ukraine in the context of national and global challenges, countering armed aggression and opportunities for post-war reconstruction of Ukraine.

7. The Ukrainian experience of volunteering has shown its role and significance in strengthening the national, economic, social, and food security of Ukraine; in preserving the country's human potential, strengthening its defense capability and overcoming the devastating consequences of the war.

8. The powerful potential of Ukrainian volunteering, together with international volunteering and charity aimed at helping Ukraine, serves as the basis for the post-war reconstruction of Ukraine, contributes to the formation and strengthening of a culture of peace and security at the interstate level, stimulates the processes of updating the system of collective security of Europe and international cooperation.

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15. THE CURRENT STATE AND PROSPECTS OF IMPLEMENTING E-BUSINESS TECHNOLOGIES AT ENTERPRISES

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Introduction. Modern trends in globalization and the development of the world economy convincingly demonstrate the need for reevaluating business practices and models under the influence of IT systems and technologies [1]. This opens up new perspectives for businesses. The internet has become a contemporary area for conducting business, significantly expanding the opportunities for representing real-world economics in the virtual global environment. As a result of the aforementioned processes, the development of the economic and legal phenomenon known as electronic business has emerged [2].

Literature review. In the present circumstances, it can be concluded that electronic business is an integral part of the modern world. The impact of the informatization process and the implementation of new innovative technologies has had a profound effect on the development of commerce, completely changing the fundamental principles of this type of business [3]. Today, according to many researchers, electronic commerce forms the basis of electronic business worldwide. Consequently, the active development of electronic business in recent years, the

deepening diversity of its types, and the sectors where information technologies are actively used emphasize the importance of its growth and necessitate scientific research in this field. Many authors, such as Arcibasov V. [4], Balik U. [5], Boreyko N. [6], Borisova Y. [7], Visotska V. [8], Neskorodzhena L. [9], Yevtushenko D. [10], and others, have dedicated significant amounts of research to explore the essence of electronic business, its types, and their role in economic development.

Each of the authors provides his own interpretation of electronic business, but overall, researchers identify common characteristics of the explored concept and converge towards a single concept. For example, Strakharchuk V. and Strakharchuk A. understand e-business as a qualitatively new model of integrated economic activity based on the use of information and communication technologies and networks as a unique macroeconomic environment and the primary means of production for operational commercial and financial activities aimed at increasing the efficiency of existing or extensive, dynamic development of new business segments and achieving stable socio-economic effects [11].

Naumenkova S. V. and Mishchenko S. V. consider electronic business (e-business) as the integration of systems, processes, organizations, value chains that create value and markets that use the Internet and related technologies and concepts [12]. Marusei T. V. interprets electronic business as any business activity that uses the opportunities of global information networks to transform internal and external relationships with the aim of generating profit [13]."

Results. Thus, considering the outlined meaningful characteristics of the category "electronic business", it can be stated that electronic business is a type of economic activity within which information and communication technologies and networks are actively used, and their application allows to create added value and income.

Defining the essence of electronic business more specifically can be quite challenging, as there are numerous ways of conducting economic activities using information and communication technologies and networks. Often, this type of business develops concurrently with traditional business.

Electronic business, as one of the forms of economic activity, has its defining characteristics [14]:

- it is directly associated with the use of information and communication technologies and the Internet, which serve as its technological foundation;
- it is oriented towards achieving specific goals for the business entity, such as profit generation, optimization of business operations, information management, transformation and optimization of business processes, changes in marketing practices, improving customer relations, aligning with customer demands, enhancing the company's image, expanding markets, and venturing into new areas of activity, among others, through the use of information technologies;
- electronic business is a specific system, comprising a combination of certain components, including: information exchange system, facilitating the exchange of information, Internet marketing system, electronic payment system, global data

search system, corporate internet representation, electronic commerce system, electronic consulting system, mobile office system - enabling mobile office capabilities, distance banking.

The development of electronic commerce is closely linked to the intensive and dynamic growth of the digital economy. The term "digital economy" refers to the communication environment of economic activities on the Internet, which is the result of transformative effects of new general-purpose technologies in the fields of information, communication, and nanotechnologies [15].

The concept of the "Digital Economy" typically comprises three main components [16]:

- Supporting infrastructure includes hardware, software, telecommunications, networks, and related technologies that form the foundation for digital activities.
- Electronic business encompasses all business processes and activities conducted by organizations through computer networks and digital technologies.
- Electronic commerce refers to the online exchange of goods and services, such as when a book is sold online, and involves various e-commerce models and platforms.

Digital and electronic economy are practically synonymous terms. Therefore, American author Kevin Kelly, in his work "The Inevitable: 12 Technological Forces That Will Shape Our Future," formulated the fundamental principles of how the electronic economy operates [17]:

1. The principle of a unified systemic connection. Personal computers and other computing devices are interconnected through telecommunications, forming a global network.

2. The principle of completeness.. In the electronic economy, the value of a product or service is driven by the diversity of offerings. This means that the more products are available in the network, the more valuable they become. However, this principle contradicts well-known axioms that reflect the corresponding regularities of traditional economics (the first axiom: value is determined by the rarity of a product since its quantity is limited; the second axiom: excessive production of goods leads to a significant loss of its value).

3. The exponential principle. The development of the electronic economy occurs exponentially, which is associated with the nonlinear growth of its elements.

4. The principle of increasing returns (effects): The entry of new participants into the electronic economy leads to the expansion of the network. With the growth of the Internet's reach, more and more business entities become a part of it. Ultimately, this results in increased sales of goods and services, leading to a growth in the participant's profits within the business processes.

5. The principle of reverse pricing. This principle involves the fact that prices for the best goods and services in the electronic economy tend to decrease noticeably from year to year. Internet companies, to survive in intense competition, are constantly introducing new products to the market. Therefore, in the Internet economy, the

significance of banner advertising and the value of innovations being implemented are on the rise. The system of reverse pricing extends to microprocessors, telecommunications, microchips, and more. Prices for telecommunications services decrease, while telecommunications capabilities grow rapidly.

6. The principle of "freemium" – free of charge. In the electronic economy, the value of a product or service is directly proportional to the scale of its distribution. Therefore, increasing the number of copies provided to users (e.g., software products) leads to an increase in the value of each of them. By selling versions of a product that will be upgraded in the future and additional service offerings, an Internet company can continuously and sufficiently monetize its operations. Meanwhile, it continues to distribute the initial version of the product for free.

7. The loyalty principle. The essence of this principle lies in the simultaneous use of both the network and network platforms by customers of a particular Internet company. In traditional economics, the quality of life for each citizen largely depends on the efficiency of the national economy. However, in the Internet economy, the well-being of a citizen is determined by the level of prosperity within the network. This leads to the conclusion that to ensure the highest quality of life for every citizen, it is necessary to actively promote the expansion and improvement of the network and the opportunities it offers.

8. The principle of value reassessment. This principle involves the gradual replacement of material values with knowledge and information values. A portion of the value in modern goods is continually increasing as information components. According to this principle, providers of products on the Internet create their catalogs and offers tailored to specific groups of buyers or market segments.

9. The principle of globalization. Electronic economy represents a collection of closely interconnected global markets. The geographical location of Internet companies is not fundamentally important. Any business on the Internet can spread almost instantly to all countries worldwide. With the same speed, competitors also emerge, leading to various risks. Powerful American Internet companies engaged in telecommunications face significant competition from similar European Union companies.

10. The principle of chaos. This principle involves the vitality of companies in the electronic economy being achieved through a state of imbalance. When this state occurs, it leads to the destruction of old electronic businesses and simultaneously creates favorable conditions for the emergence of new, more efficient businesses. It has been observed that the lifespan of new businesses in the online sphere is significantly shorter than in traditional economies. However, the destruction of old jobs is often followed by the creation of a much larger number of new jobs. According to some experts, the electronic economy operates in conditions of periodic chaos.

11. The principle of decentralization. Anarchy is the primary mode of existence in the electronic economy. There is no central planning authority that coordinates and directs the movement of all network participants. The electronic economy is practically immune to regulation.

12. The cloning principle. In the electronic economy, the real number of customers increases at an extremely high rate each year, forming new segments in the virtual market composed of homogeneous groups of customers. In this process, trade boundaries disappear, and electronic commerce (EC) truly becomes borderless on a global scale. While it took television 113 years to form a user base of 50 million people, radio 38 years, the Internet accomplished this in just 5 years.

The boundaries of electronic business are determined by the network economy. The development of electronic business occurs in two ways: the gradual transition of some business processes of existing enterprises into the electronic environment or the creation of new enterprises in the field of electronic business from the very beginning [18].

The defining characteristic of electronic business is the use of information and communication technologies, networks, cloud technologies, and the multi-channel activities of business entities; processing a significant amount of information. Managing electronic business includes components such as electronic document management; digitization of individual or all business processes; electronic payment systems; electronic marketing; electronic commerce [19].

The purpose of using information technologies in business is to gather data for analysis and make appropriate management decisions based on that data.

Today's business environment is constantly changing, so it is important for a company's management to analyze the surrounding environment and forecast its development trends in order to understand the current state of affairs and make effective decisions.

The collection and processing of analytical data allow for identifying solutions to potential problems and discovering and evaluating new opportunities. Important information is consolidated by gathering data from various sources, which can then be used to make informed operational and strategic management decisions. At the highest intellectual level, content processing becomes a key competitive advantage, and information technologies integrated into business processes enable full automation and efficient management of business entities.

At the same time, the use of electronic business systems opens up fundamentally new opportunities for conducting business, including the ability to:

- Quickly create and deploy the organization's information resources.
- Accelerate user access to information anytime and anywhere.
- Integrate information resources with those of suppliers, business partners, and global information resources.
- Conduct advertising campaigns.
- Engage potential customers with new products and services, as well as discount systems.
- Enhance the quality of business process management, information security, and more.

The widespread use of electronic business technologies will contribute to improving the quality of business operations, the effectiveness of business process management,

and the formation of a successful business standard. This will become a competitive advantage in the global economy.

To enhance competitiveness and facilitate the effective development of enterprises, it is essential to address the usage of e-commerce opportunities in the context of the growing digital economy. Taking into account that e-commerce is rapidly expanding worldwide due to a combination of economic, social, electronic technological, and organizational-legal factors, the need for implementing modern e-business technologies becomes increasingly relevant. This implementation can ensure the efficiency of business operations, including expanding market reach and growing the customer base. Introducing e-commerce, particularly by establishing an online store, will enable the utilization of contemporary information technologies to increase product sales, explore new customer and supplier opportunities, and enhance the profitability and competitiveness of the enterprise.

Enhancing e-commerce operations and establishing ones own online store will provide a range of new opportunities and benefits, both for the enterprise itself and for potential consumers and future business partners. Some of the advantages of conducting e-commerce for the enterprise include: minimizing initial and non-production expenses, automating business processes, supporting online business processes, and enhancing competitiveness among similar businesses in the industry, and so on.

Consumers also get benefits from using e-commerce methods, including access to a wide range and assortment of products, the availability of product or service choices, convenience, and a high level of customer service.

The advantages of collaborating through an online store for prospective partners include the speed of information retrieval, the ability to remotely familiarize themselves with the company's products and services, and more.

In addition, an automated online store performs functions such as:

- Handling transactions with the customer's electronic "shopping cart."
- Customer registration.
- Order processing with options for payment and delivery methods, as well as selecting the optimal delivery route.
- Providing prompt customer support.
- Ensuring the security of the customer's personal information.
- Automatically transferring order information to the sales system.
- Generating invoices and processing payments.
- Providing technical and warranty support to customers.

In our opinion, the recommended process for choosing an e-commerce technology for a company should consist of a sequence of organizational steps. First and foremost, for company management that has decided to sell goods, services, or products using an online store, it is necessary to choose the method of presenting information about the products and services. This can be done either on existing e-commerce platforms (such as OLX, Prom.ua, Rozetka, etc.) or by opening their own

online store. For most large companies, it is appropriate to consider opening their own online store. Today, there are several ways to develop an online store, including:

- custom development. Building a completely custom online store tailored to the company's specific needs. This provides full control but requires more development effort and resources;
- E-commerce platforms. Usage of popular e-commerce platforms like Shopify, WooCommerce, Magento, or BigCommerce, which offer pre-built solutions with customization options;
- cloud-based solutions. Opting for cloud-based e-commerce solutions, which are hosted and managed by third-party providers. This approach is typically more accessible and scalable;
- open source. Leveraging open-source e-commerce software like OpenCart, PrestaShop, or osCommerce, which provides flexibility for customization but may require more technical expertise.

The choice of the development method should depend on the company's budget, technical capabilities, scalability requirements, and specific business needs. Each of these methods has its own advantages and disadvantages, and a thorough evaluation should be conducted before making a decision.

Today, there are several ways to develop an online store, including:

1. Hiring Specialists. This approach involves engaging professionals or a development team with expertise in creating custom online stores. They will design and develop the online store from scratch, tailored to the company's specific needs. This method provides maximum flexibility and customization but can be more resource-intensive in terms of time and cost.
2. DIY Website Builders: Using DIY (Do-It-Yourself) website builders or website templates. Many platforms, such as Shopify, WooCommerce, Wix, Squarespace, and others, offer user-friendly tools and templates that allow businesses to create an online store without extensive technical knowledge. This approach can be quicker and more budget-friendly, but it may have limitations in terms of customization and scalability compared to custom development.

Most companies that are just starting in the field of e-commerce can choose to create an online store using their own resources, based on the use of existing templates with free hosting, which minimizes the potential costs of opening an online store in the context of expanding foreign economic operations. For example, an organization can opt for the service 7910 e-commerce, which is a platform that allows you to create an Internet store for a trading company for free. This platform offers a convenient and multifunctional administrative panel for managing your store. It also provides ready-made templates, integration with payment systems, a built-in search system, and integration with email marketing services and social networks.

When creating the structure of an online store, the primary goal is to establish a visually pleasing and user-friendly interface while transforming website visitors into potential customers. For Internet users, a web page should be convenient and intuitively

understandable. Upon landing on the site, consumers should immediately know where to find the necessary information about a product or service.

At the same time, conducting electronic business requires assessing its effectiveness and making management decisions based on the obtained results. Under such circumstances, there is a need to employ a comprehensive methodology for evaluating the effectiveness of e-commerce operations. The indicators for the comprehensive evaluation of e-commerce effectiveness constitute a unified system in which each element is considered to maximize economic benefits and minimize current expenses. They are closely interrelated, and each of them significantly influences the final outcome, which is the economic effect of creating an Internet resource.

The comprehensive methodology for the analytical evaluation of e-commerce effectiveness in a company should be conducted based on three recommended groups of indicators, as listed in Table 1. At the same time, among the three identified groups of indicators in the comprehensive methodology for analytical evaluation of the effectiveness of e-commerce operations in the enterprise, it is proposed to detail the group of economic indicators for assessing the effectiveness of e-commerce. This group of indicators is the most representative and indicates the efficiency and effectiveness of e-commerce operations in the enterprise. The economic efficiency of establishing e-commerce in an enterprise, based on an Internet store, is determined by the ratio of the result from the functioning of the Internet resource to the expenses associated with its creation.

$$\text{Efficiency} = \text{Result} / \text{Costs} \quad (1)$$

Table 1

The recommended groups of indicators for the comprehensive methodology of analytical evaluation of e-commerce effectiveness in a company

Group of indicators	Characteristics	List and method of calculation of indicators of the group
1	2	3
1. Economic	They include the ratio of economic benefits to the expenses associated with the operation and operational support of the Internet resource.	<p>1.1. Circulation costs: $CC=TC+CTT$, where CT are transaction costs, CTT are costs for the trade and technical process;</p> <p>1.2. Economic efficiency: $E=E_i/E_{ci}$, where E_i is the result obtained during the implementation of e-commerce, E_{ci} is the costs associated with this implementation;</p> <p>1.3. Indicators of evaluation of the effectiveness of the creation of an Internet resource, the effectiveness of functioning, evaluation of investment attractiveness, etc.</p>

2. Operational	They characterize the technologies used in creating the Internet resource, their effectiveness, the feasibility of conducting business operations on the Internet, consumer interest, as well as the efficiency and reliability of hardware and software, hosting provider servers, and the potential risks of losing customers in case of technical unavailability of the Internet resource to users.	2.1. The degree of integration of the information system: $Iis=Nf/Tnf$, where Nf is the total number of functions based on the Internet, Tnf is the total number of functions of the enterprise; 2.2. Initial analysis and planning costs; 2.3. Expenses for improving the qualifications of employees, etc.
3. Marketing	They are aimed at targeting target markets and target consumers.	Calculation of the effectiveness of various options for entering the service, website traffic, the effectiveness of the transition of first and repeat visitors to the web page, the effectiveness of advertising: 3.1. $CTR=(\text{number of clicks})/(\text{number of impressions}) \cdot 100$; 3.2. $CTB=(\text{number of buyers})/(\text{total number of visitors})$; 3.3. $CTI=(\text{number of interested visitors})/(\text{total number of visitors})$.

At the same time, the full costs of implementing this measure will be calculated as:

$$C = C_{inv} + C_o, \quad (2)$$

C_{inv} - total investment in the project, C_o - operating costs.

The effect of the functioning of e-commerce at the enterprise is defined as:

$$S_t = P_t - C_t, \quad (3)$$

Where S_t is the effect due to the reduction of costs during time t due to the use of a new Internet system, P_t is the total amount of profit from the sale of products/services using the Internet resource, C_t is the total amount of material and other costs.

So, economic efficiency includes the calculation of the main cost items and cost reduction through the use of the Internet resource in the system.

Conclusion. The information base for the implementation of a comprehensive assessment of the economic efficiency of online commerce is the following data from accounting: net income from the sale of goods (services), cost of goods sold (services), gross profit, other operating income, operating expenses of the reporting period, profit from electronic transactions, total net income from the sale of goods (services), the total amount of the cost of sale of goods (services), the total gross profit of the enterprise, the total amount of other operating income from the activity, the total amount of operating expenses of the reporting period, the total amount of operating profit.

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16. IDENTYFIKACJA KORZYŚCI WYNIKAJĄCYCH Z WDROŻENIA SYSTEMU WSPOMAGANIA INFORMACYJNEGO DLA DZIAŁALNOŚCI ZARZĄDCZEJ PRZEDSIĘBIORSTWA W WARUNKACH GOSPODARKI CYFROWEJ

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Intensyfikacja procesów transformacji gospodarczej, stały wzrost poziomu konkurencji na zglobalizowanych rynkach światowych, a także wysokie ryzyko dalszej działalności przedsiębiorczej aktualizują potrzebę elastycznego i szybkiego reagowania przedsiębiorstw na wyzwania zmieniającego się otoczenia rynkowego. W takich warunkach zarządzanie przedsiębiorstwem powinno opierać się nie tylko na wiodących koncepcjach i narzędziach zarządzania, ale także masowo wykorzystywać nowoczesne trendy informatyzacji.

Przez informatyzację rozumie się «proces wprowadzania rozwiązań informatycznych, które wspomagają funkcjonowanie przedsiębiorstw lub instytucji. Stanowi ona ilościowe rozwinięcie procesu komputeryzacji o wymiar ludzko-organizacyjny wdrażanych rozwiązań, które cechuje zaawansowanie merytoryczne i technologiczne» [1, s. 142].

Informatyzacja - zespół powiązanych ze sobą procesów organizacyjnych, prawnych, politycznych, społeczno-gospodarczych, naukowo-technicznych, technologicznych i produkcyjnych, mających na celu stworzenie warunków dla zapewnienia rozwoju społeczeństwa informacyjnego oraz wprowadzenia technologii informacyjnych, komunikacyjnych i cyfrowych [2, s. 5].

W ramach informatyzacji należy wykonać następujące prace: wyposażenie stanowisk pracy w sprzęt komputerowy i peryferyjny; utworzenie systemu komunikacji elektronicznej, dzięki któremu została ustanowiona wymiana informacji operacyjnych o sytuacji politycznej, gospodarczej, społecznej, środowiskowej i innej; uzyskać dostęp do globalnego Internetu; w oparciu o wewnętrzną sieć lokalną zbudować system elektronicznego obiegu dokumentów i poczty wewnętrznej, automatyzując tym samym pracę komórek organizacyjnych, monitorując realizację dokumentów, sporządzanie i składanie raportów; stworzyć jedno scentralizowane repozytorium dokumentów do prowadzenia analitycznego księgowania dokumentów przychodzących i wychodzących; rozwoju strony internetowej, gdyż wykorzystanie technologii internetowej zwiększa efektywność organizacji i zarządzania działaniami sprzedażowymi przedsiębiorstwa, w szczególności w zakresie promocji produktów na rynek.

Narzędzia informacyjne ułatwiają pracę i oszczędzają czas na różnych poziomach zarządzania przedsiębiorstwem, pomagają osiągnąć cele i strategie. W procesach podejmowania decyzji ważne jest generowanie odpowiedniej informacji z ogromnych baz danych, co umożliwia wykorzystanie narzędzi informacyjnych.

Stworzony w przedsiębiorstwie system informacyjny będzie wspomagał prowadzenie działalności gospodarczej. Zadanie informatyzacji w przedsiębiorstwie ma polegać na tym, żeby zapewnić pracownikom «możliwości korzystania z praktycznych, bezpiecznych i łatwych w obsłudze, ogólnie dostępnych oraz technologicznie neutralnych narzędzi» [3, s. 258].

Systemy informacyjny dzielą się na: systemy transakcyjne które opracowują kontakty z otoczeniem; systemy informowania kierownictwa które są tworzone na bazie systemów ewidencyjno-sprawozdawczych; systemy wspomagania decyzji mogą być związane z konkretnym zamówieniem; systemy ekspertowe które są wyposażone w umiejętność rozwiązywania problemów [4, s. 70].

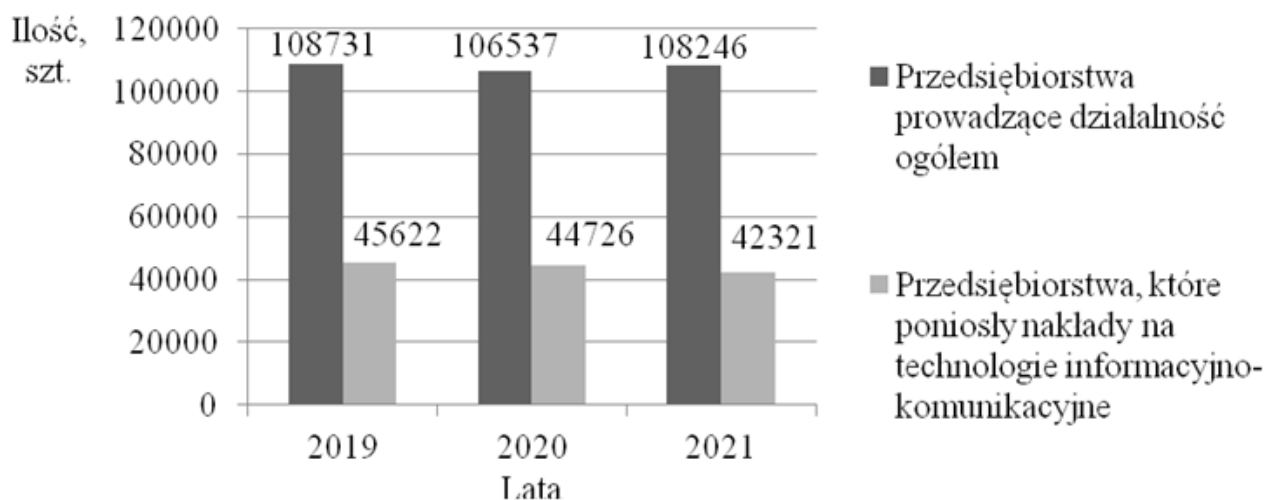
Na obecnym etapie rozwoju technologie informacyjne w przedsiębiorstwach istnieją jako część różnych systemów informacyjnych, kompleksów informacyjnych i są wykorzystywane w różnych segmentach działalności organizacyjnej i zarządczej.

Natalia Michałek definiuje technologię informacyjną tak: «umiejętność efektywnego stosowania środków i narzędzi oraz źródeł informacji do analizy, przetwarzania i prezentowania informacji, do modelowania i pomiaru urządzeń oraz wydarzeń, a także do sterowania nimi» [5, s. 303]. Jacek Wysocki określa technologię informacyjną jak zespół środków informatycznych (media, komputery, sieci komputerowe), narzędzi (oprogramowania), technologii telekomunikacyjnych i metod posługiwania się nimi, dla przetwarzania i posługiwania się informacją. Technologia informacyjna ma szersze znaczenie od technologii informatycznej i obejmuje komputery, informację, informatykę oraz komunikację w ramach podmiotu [6, s. 352].

Technologie informacyjne są jednym z elementów przedsiębiorstwa, kształtujących jego strukturę organizacyjną. Wpływają one na skrócenie kanałów komunikacyjnych w przedsiębiorstwie, przeniesienie uprawnień decyzyjnych na niższe szczeble hierarchii oraz uproszczenie struktury organizacyjnej, a także uproszczenie hierarchii. Struktura taka bardziej sprzyja innowacyjności organizacji. Nowoczesne, efektywne technologie informacyjne powstają w oparciu o najnowocześniejszy sprzęt komputerowy i telekomunikacyjny. Ich zastosowanie pociąga za sobą radykalne zmiany w procesach zarządzania, jego treści, potencjału kadrowego, dokumentacji [7, s. 357].

Analiza poziomu wykorzystania narzędzi informacyjnych w zarządzaniu jest dość trudna. Dla tego wybrano analizę danych dotyczących przedsiębiorstw Polski, które poniosły nakłady na technologie informacyjno-komunikacyjne ze względu na dostępność takich danych w zbiorach GUS. Na wykresie 1 przedstawiono ilość przedsiębiorstw, które poniosły nakłady na technologie informacyjno-komunikacyjne.

Wykres 1. Przedsiębiorstwa Polski, które poniosły nakłady na technologie informacyjno-komunikacyjne w 2019-2021 latach (szt.)

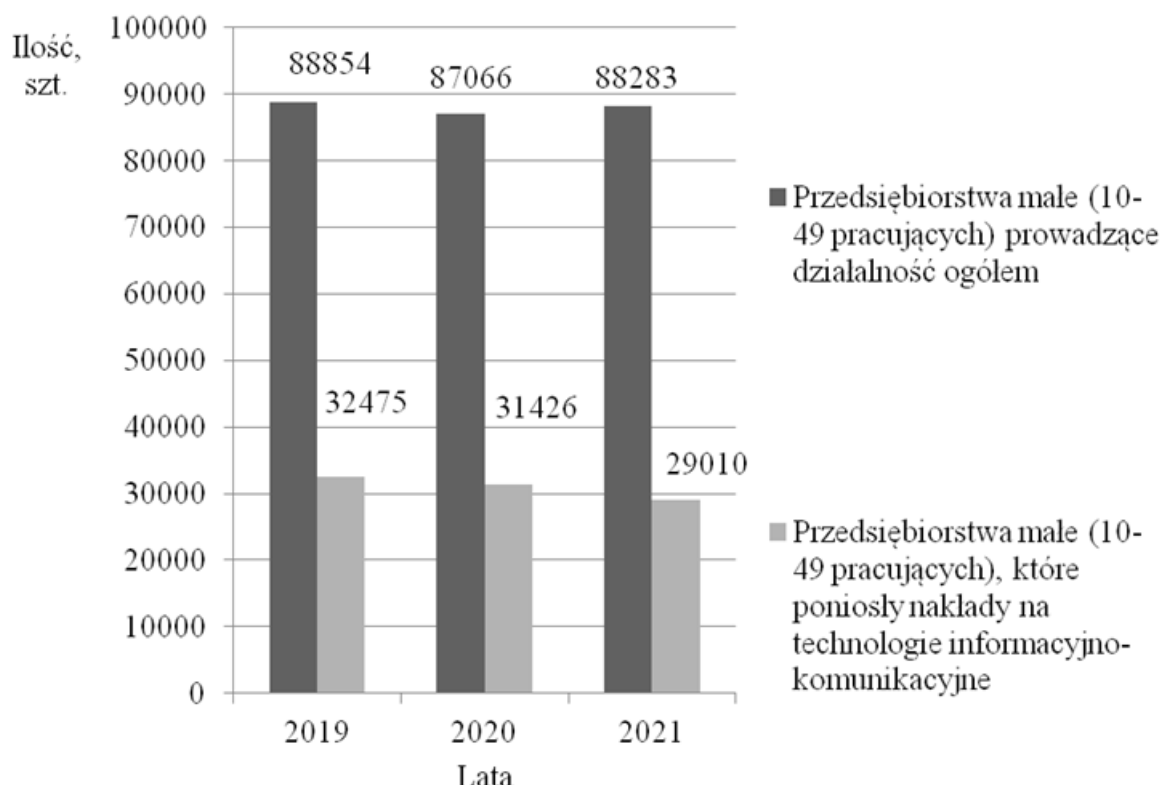


Źródło: opracowanie własne, na podstawie [8, 9, 10]

Obserwuje się tendencję spadkową liczby przedsiębiorstw, które poniosły nakłady na technologie informacyjno-komunikacyjne. W 2021 roku ilość zmniejszyła się o 3301 przedsiębiorstwo w porównaniu z 2019 rokiem. Procentowy udział przedsiębiorstw, które poniosły nakłady na technologie informacyjno-komunikacyjne: 2019 r. – 42%, 2020 r. – 42%, 2021 r. – 39,1%. Więc liczba przedsiębiorstw które poniosły nakłady na technologie informacyjno-komunikacyjne w analizowanym okresie malała.

Poniżej dokonano analizy wydatków na zakup technologii informacyjno-komunikacyjnych biorąc pod uwagę wielkość przedsiębiorstw. Na wykresie 2 przedstawiono ilość przedsiębiorstw małych (zatrudniających 10-49 pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne.

Wykres 2. Przedsiębiorstwa małe (10-49 pracujących) Polski, które poniosły nakłady na technologie informacyjno-komunikacyjne w 2019-2021 latach (szt.)

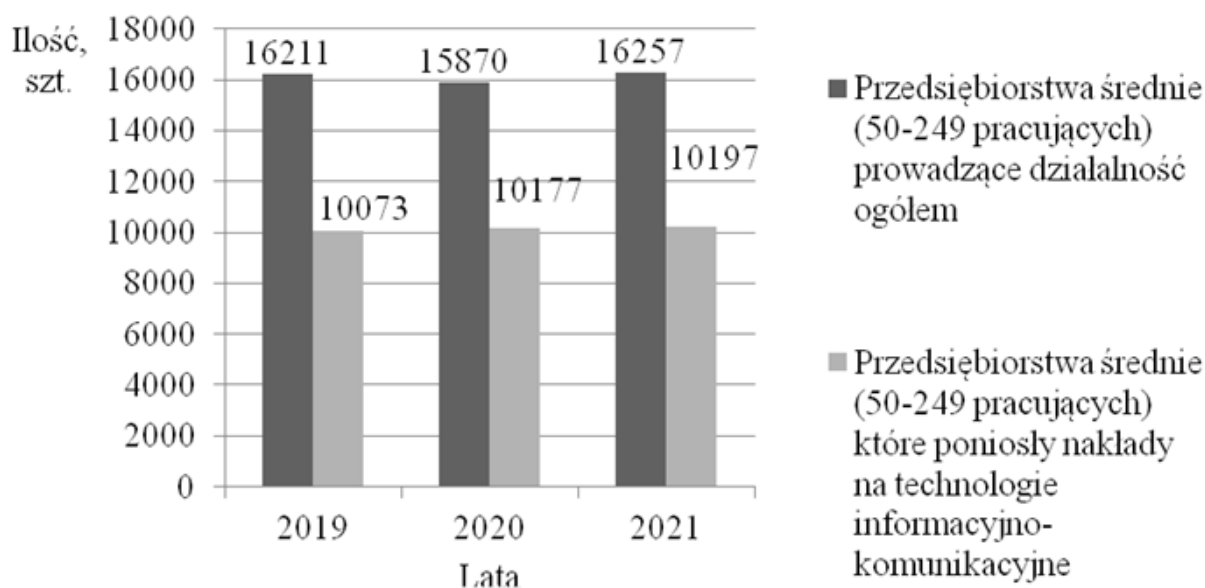


Źródło: opracowanie własne, na podstawie [8, 9, 10]

W 2021 roku ilość przedsiębiorstw małych (zatrudniających 10-49 pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne zmniejszyła się o 3465 w porównaniu z 2019 rokiem. Procentowy udział przedsiębiorstw małych (10-49 pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne w poszczególnych latach wynosił: 2019 r. – 36,5%, 2020 r. – 36,1%, 2021 r. – 32,9%. Obserwuje się tendencję spadkową udziału przedsiębiorstw małych, które zakupywały technologie informacyjno-komunikacyjne w Polsce.

Na wykresie 3 przedstawiono ilość przedsiębiorstw średnich (zatrudniających 50-249 pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne.

Wykres 3. Przedsiębiorstwa średnie (50-249 pracujących) Polski, które poniosły nakłady na technologie informacyjno-komunikacyjne w 2019-2021 latach (szt.)

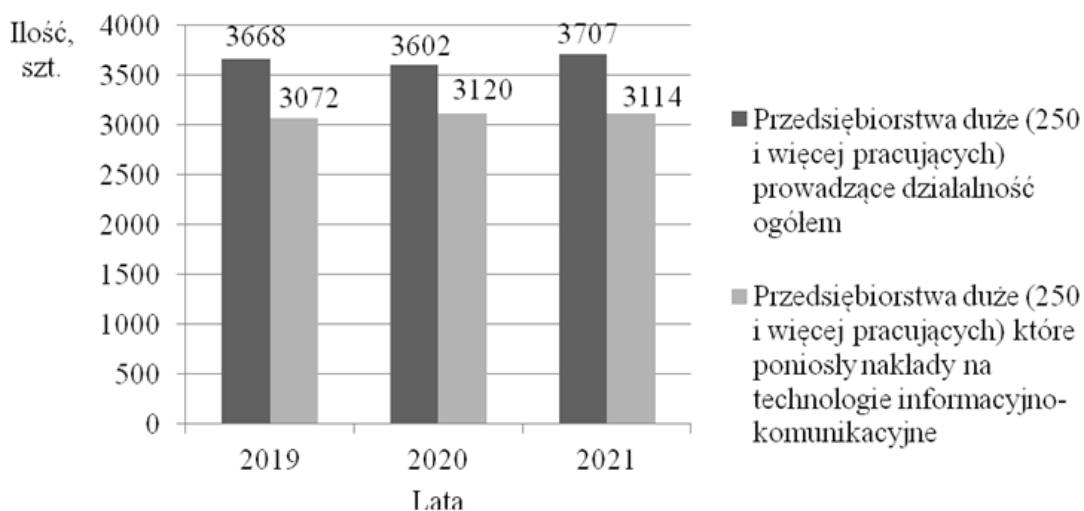


Źródło: opracowanie własne, na podstawie [8, 9, 10]

W analizowanym okresie obserwuje się tendencję wzrostową liczby przedsiębiorstw średnich (zatrudniające 50-249 pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne. W 2021 roku ilość takich przedsiębiorstw zwiększyła się o 124 przedsiębiorstwa średnie (50-249 pracujących) w porównaniu z 2019 rokiem. Procentowy udział przedsiębiorstw średnich (50-249 pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne zmniejszył się o 1,4% punkta procentowego w 2021 roku w porównaniu z 2020 rokiem (2020 r. – 64,1%, 2021 r. – 62,7%).

Na wykresie 4 przedstawiono ilość przedsiębiorstw dużych (250 i więcej pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne.

Wykres 4. Przedsiębiorstwa duże (250 i więcej pracujących) Polski, które poniosły nakłady na technologie informacyjno-komunikacyjne w 2019-2021 latach (szt.)

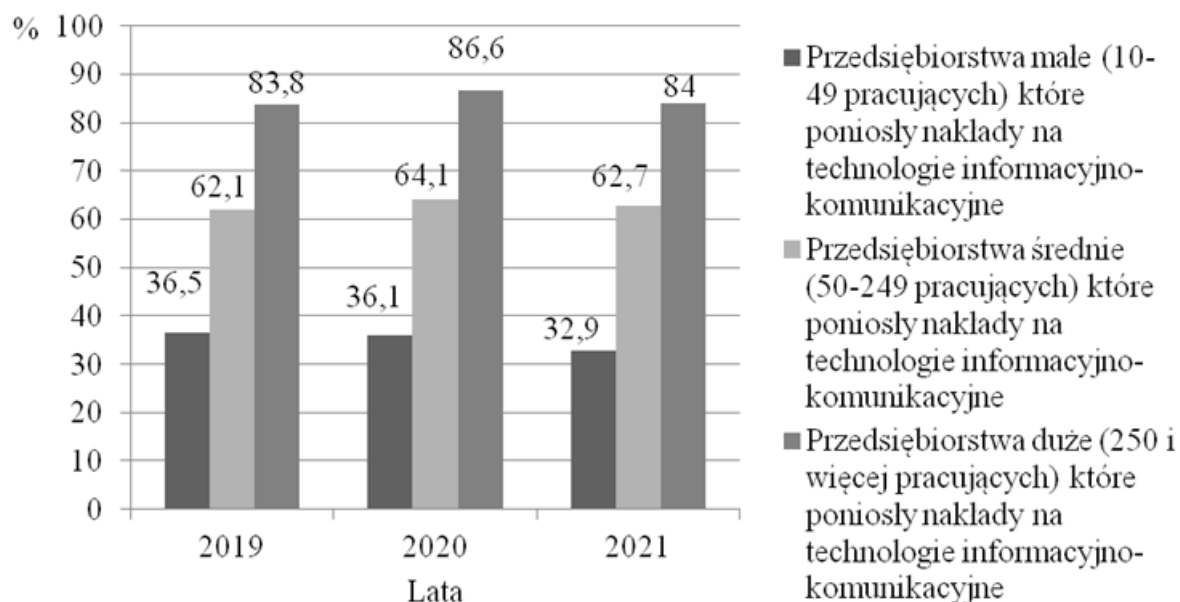


Źródło: opracowanie własne, na podstawie [8, 9, 10]

Procentowy udział przedsiębiorstw dużych (zatrudniających 250 i więcej pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne zmniejszył się o 2,6 punkta procentowego w 2021 roku w porównaniu z 2020 rokiem. W poszczególnych latach wynosił 83,8% (2019 r.), 86,6% (2020 r.), 84,0% (2021 r.). W 2021 roku ilość zwiększyła się na 42 przedsiębiorstwa duże (250 i więcej pracujących) w porównaniu z 2019 rokiem. Obserwuje się tendencję wzrostową liczby przedsiębiorstw dużych (250 i więcej pracujących), które poniosły nakłady na technologie informacyjno-komunikacyjne.

Analiza danych wskazuje, że znaczna dysproporcja w poniesieniu nakładów na technologie informacyjno-komunikacyjne istnieje między małymi, średnimi i dużymi przedsiębiorstwami (wykres 5). Niewielka liczba małych przedsiębiorstw inwestuje środki finansowe w technologie informacyjno-komunikacyjne. Wraz ze wzrostem wielkości przedsiębiorstw rośnie udział przedsiębiorstw ponoszących takie wydatki inwestycyjne.

Wykres 5. Procentowy udział przedsiębiorstw Polski, które poniosły nakłady na technologie informacyjno-komunikacyjne w 2019-2021 latach

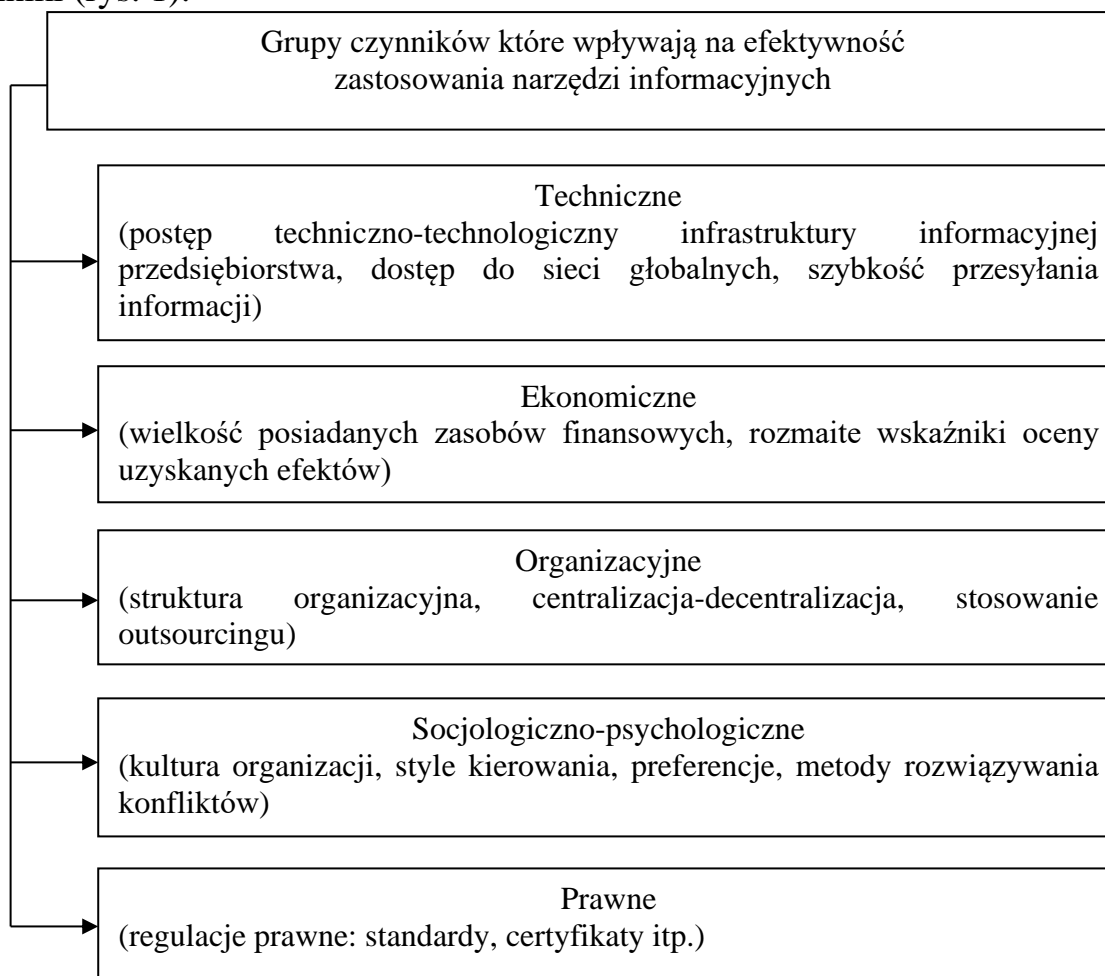


Źródło: opracowanie własne, na podstawie [8, 9, 10]

Analiza przedstawionych danych w latach 2019-2021 wskazuje, że duża część małych i średnich przedsiębiorstw w mniejszym stopniu wykorzystuje narzędzia informacyjne. Potrzeba korzystania z tych narzędzi w zarządzaniu małymi i średnimi przedsiębiorstwami istnieje, bo oni muszą dokonywać racjonalnych wyborów. Ograniczenia do wykorzystania narzędzi informacyjnych mogą być finansowe (wpływ COVID-19 i kryzysu na gospodarkę).

Stały rozwój narzędzi informacyjnych we współczesnej organizacji wymaga wzrostu nakładów na te narzędzia co zaprezentowano w przypadku polskiego rynku. Nerozwiązanym zadaniem do dziś jest wyznaczenie wartości informacji, jaką przetwarzają narzędzia informacyjne. Właśnie istnieje problem obliczania efektywności zastosowania narzędzi informacyjnych.

Na efektywność zastosowania narzędzi informacyjnych mają wpływ różnorodne czynniki (rys. 1).



Rysunek 1. Różnorodne czynniki które wpływają na efektywność zastosowania narzędzi informacyjnych

Źródło: opracowano na podstawie [11, s. 444]

Ocena zastosowania narzędzi informacyjnych powinna być wieloaspektowa i powiązana z tym, jaki udział w efektach przedsiębiorstwa bierze i na jakie wyniki wpływa. W kontekście zastosowania narzędzi informacyjnych efekty dzielą się na ilościowy (można określić w jednostkach wartościowych (zł.) lub fizycznych (czas)) i jakościowy (możemy opisać ten efekt, a nie zmierzyć) [11, s. 447].

Użytkowanie narzędzi informacyjnych w przedsiębiorstwie niesie taką korzyść jak skrócenie czasu działań, bo mamy:

- zwiększenie szybkości przetwarzania informacji;
- wzrost szczegółowości informacji;
- poprawę jakości informacji;
- eliminację zbędnej pracy administracyjnej i błędów;
- wzrost komfortu pracy;
- poprawę koordynacji zadań;
- automatyzację wielu codziennych czynności;
- poprawę komunikacji pomiędzy różnymi jednostkami organizacyjnymi przedsiębiorstwa.

Wykorzystanie narzędzi informacyjnych sprawia, że wszystkie potrzebne dane są dostępne użytkownikom i w rezultacie mamy zmniejszenie i ograniczenie czasu na wykonywanie raportów i analiz. Nowe technologie informacyjne i systemy informacyjno-analityczne, które zostaną wdrożone w przedsiębiorstwach, bezpośrednio zwiększą wydajność pracy, przede wszystkim w zakresie pracy umysłowej i zarządzania, a główny efekt zostanie osiągnięty w rozwoju ekonomicznym przedsiębiorstwa dzięki podejmowaniu lepszych decyzji zarządczych.

W ramach ewolucji społeczeństwa informacyjnego do społeczeństwa wiedzy nowoczesne przedsiębiorstwa mają możliwość tworzenia, zdobywania, organizowania i wymiany wiedzy oraz wykorzystywania jej do poprawy efektywności i konkurencyjności na rynku globalnym [12, s. 55]. Szeroka idea SMAC (eng. Social, Mobile, Analytics, Cloud) polega na tym, że sieci społecznościowe, takie jak Facebook i Twitter, mogą być wykorzystywane do tworzenia brandów i przyciągania klientów; analitykę dużych zbiorów danych można wykorzystać do analizy dużych ilości danych; przetwarzanie w chmurze zapewnia wspólne zasoby; a aplikacje mobilne zapewniają dostęp do usług w ruchu. SMAC opiera się na następujących czterech podstawowych elementach (tab. 1).

Tabela 1. Cztery podstawowe elementy SMAC

Komponenty SMAC	Wyjaśnienie
1. Komponent społeczny	Sieci społecznościowe przełamują bariery przepływu informacji między ludźmi i stają się platformami, dzięki którym szybka wymiana wiedzy jest czasem bardziej efektywna. Komunikacja na platformach społecznościowych wypiera komunikację przez telefon czy e-mail. Zjawisko to występuje również w obszarze biznesu, gdzie niezwykle ważna jest szybka wymiana informacji.
2. Komponent mobilny	Urządzenia takie jak smartfony, tablety czy laptopy stały się głównym narzędziem współczesnego pracownika.
3. Komponent analityczny	Zrozumienie zachowań i preferencji klientów to jedna z największych zalet korzystania z narzędzi analitycznych. Z zebranych danych, analizowanych w oparciu o złożone algorytmy, przedsiębiorcy są w stanie budować lojalność klientów, ulepszać kampanie marketingowe, optymalizować procesy rozwoju produktów i świadczyć usługi, spełniające preferencje klientów.
4. Komponent chmury	Technologie chmurowe oferują narzędzia do sprawnego gromadzenia i przetwarzania danych na serwerach sieciowych, co przekłada się na efektywne zarządzanie organizacją.

Źródło: opracowano na podstawie [13]

Wykorzystanie portali społecznościowych umożliwia lepszą interakcję z klientami, dzięki czemu przedsiębiorstwo szybciej reaguje na problemy i tworzy bazę wiedzy w oparciu o preferencje i zachowania użytkowników. Rosnąca popularność rozmaitych gadżetów wymusiła na wielu przedsiębiorstwach rozwój kanałów

marketingu internetowego i zapewnienie klientom mobilnych warunków zakupu towarów. Wykorzystanie narzędzi analitycznych w biznesie ma na celu podejmowanie właściwych decyzji w oparciu o aktualne i zagregowane informacje. Wykorzystanie narzędzi, dostępnych w chmurze, pozwala na obniżenie kosztów zarządzania systemami informacyjnymi, przełamywanie barier geograficznych oraz dostęp do danych w dowolnym czasie i miejscu. Chmura jest czynnikiem, który łączy pozostałe komponenty SMAC.

Aby określić działanie technologii SMAC w strategii rozwoju przedsiębiorstwa, można wyróżnić trzy główne kierunki uzyskiwania pozytywnych efektów [14, s. 225]:

- 1 kierunek: poprawa interakcji przedsiębiorstwa z szeroką siecią klientów. Dzięki mobilności rozwiązań SMAC poprawia się zasięg klienta, dzięki analityce poprawia się zrozumienie potrzeb klienta, dzięki wykorzystaniu portali społecznościowych komunikacja z klientami staje się bardziej efektywna, dzięki wykorzystaniu rozwiązań chmurowych, przy przetwarzaniu danych koszty są obniżone.

- 2 kierunek: poprawa interakcji przedsiębiorstwa z dostawcami. Wykorzystanie potężnych narzędzi analitycznych, wdrożenie technologii chmurowych i mobilnych SMAC przy podejmowaniu wielu decyzji operacyjnych, pozwala na skrócenie zarówno czasu, jak i kosztów transakcji, eliminację centrów strat, zwiększenie synchronizacji działań, przyspieszenie liczby operacji i procedur, które nie wnoszą wartości dodanej, przyspieszanie obiegu dokumentów.

- 3 kierunek: lepsze zarządzanie przepływem informacji w przedsiębiorstwie na wszystkich jego poziomach.

Zastosowanie technologii SMAC może pomóc w odkryciu unikalnych potrzeb każdego klienta i nowych możliwości rynkowych. Technologia ta pomaga lepiej zrozumieć klientów, budować z nimi indywidualne relacje, uwzględniając wszystkie dotychczasowe doświadczenia interakcji. Bezpośredni cyfrowy dostęp do klientów w połączeniu z zaawansowaną technologią pozwala na zmianę strategicznej orientacji przedsiębiorstwa i wprowadzanie na rynek nowych produktów i usług szybciej niż konkurenci. Dzięki technologii SMAC przedsiębiorstwo może nie tylko tworzyć oferty dla konkretnych klientów, ale także zaspokajać ich potrzeby w dowolnym momencie.

Cyfryzacja przyczyniła się do zmiany zapotrzebowania na dokumenty papierowe. Za pomocą systemu elektronicznego obiegu dokumentów pracownicy przedsiębiorstwa z pomocą aplikacji mają możliwość wglądu do potrzebnych akt w formie elektronicznej. Prawie każdy aspekt działalności współczesnych przedsiębiorstw jest związany z systemem elektronicznego obiegu dokumentów i ten system odgrywa bardzo istotną rolę przy formowaniu konkurencyjnej przewagi.

Wdrażając system elektronicznego obiegu dokumentów, przedsiębiorstwo ma skupić się na następujących głównych parametrach:

- wielkość obiegu dokumentów;
- szybkość przepływu dokumentów;
- koszt wykonywania typowych operacji na dokumentach.

Zastosowanie systemu elektronicznego obiegu dokumentów znacznie zmniejsza koszty papieru, przyspiesza przepływ informacji w przedsiębiorstwie i poza nim, zmniejsza nieprodukcyjne koszty czasu pracy, podnosi poziom kultury korporacyjnej.

System elektronicznego obiegu dokumentów spełnia w systemie zarządzania następujące funkcje:

- zapewnia efektywniejsze zarządzanie dzięki automatycznej kontroli wykonania, przejrzystości działań całej organizacji na wszystkich poziomach;
- kształtuje efektywny dostęp wszystkich pracowników do informacji i wiedzy;
- wspiera komunikację wewnątrz przedsiębiorstwa dzięki środkom zaawansowanego elektronicznego przesyłania dokumentów.

Wprowadzając system elektronicznego obiegu dokumentów menedżerowie przedsiębiorstwa będą pomyślnie przezwycięzać problemy organizacyjne, ekonomiczne i techniczne. Problemy organizacyjne – związane z czynnikiem ludzkim - niewystarczająca motywacja pracowników do pracy z nowym systemem, niewystarczający poziom ich znajomości obsługi komputera, niepełne lub błędne określenie zadań stojących przed systemem. Problemy ekonomiczne - konieczność zainwestowania znacznych środków, mimo że efekt ekonomiczny wdrożenia nie jest od razu zauważalny. Problemy techniczne – konieczność stworzenia wysokiej jakości infrastruktury, złożoność integracji z już istniejącymi systemami na przedsiębiorstwie.

Radykalne, rewolucyjne podejście do automatyzacji obiegu dokumentów jest niebezpieczne, gdyż może prowadzić do poważnych problemów w zarządzaniu, a nawet dezorganizacji działań. Dlatego przy wprowadzaniu systemu elektronicznego obiegu dokumentów przedsiębiorstwo zastosowuje podejście oparte na spójności, systematyczności i nieodwracalności.

Określimy następujące podstawowe wymagania dla systemu elektronicznego obiegu dokumentów:

- skalowalność, czyli system obsługuje dowolną liczbę użytkowników dzięki mocy odpowiedniego oprogramowania;
- modułowość, czyli system składa się z pojedynczych, zintegrowanych ze sobą modułów, w przypadku gdy użytkownik systemu nie musi wdrażać wszystkich elementów systemu na raz;
- otwartość oznacza, że system posiada otwarte interfejsy umożliwiające jego udoskonalenie i integrację z innymi systemami przedsiębiorstwa.

System przechowujący dokumenty elektroniczne konieczne wymaga spełnienia następujących wymagań:

- 1) informacje zawarte w dokumentach elektronicznych będą dostępne do dalszego wykorzystania;
- 2) zapewniona jest możliwość odtworzenia dokumentu elektronicznego w formie, w jakim został utworzony, wysłany lub otrzymany;
- 3) jeżeli są dostępne, przechowywane są informacje pozwalające ustalić pochodzenie i przeznaczenie dokumentu elektronicznego, a także datę i godzinę jego wysłania lub otrzymania.

Efektywnie realizować obecne cele i strategie przedsiębiorstwu pomaga odpowiedzialność zarządu systemem elektronicznego obiegu dokumentów i technologiami informacyjnymi ogólnie, co obejmuje struktury organizacyjne i niezbędne do tego procesy. Usystematyzowane podejście do efektywnego zastosowania systemu elektronicznego obiegu dokumentów przedsiębiorstwa przedstawiono w tabeli 2.

Tabela 2. Usystematyzowane podejście do efektywnego zastosowania systemu elektronicznego obiegu dokumentów przedsiębiorstwa

Ilość obszarów	Nazwa obszarów usystematyzowanego podejścia	Wyjaśnienie
1 obszar	Dopasowanie strategiczne systemu	Na przedsiębiorstwie odbywa się strategiczne planowanie popytu i podaży usług systemu dla osiągnięcia konsensusu w dziedzinie pomocy systemu w rozwoju działalności i kierunku rozwoju samego przedsiębiorstwa. Dopasowanie strategiczne systemu nigdy się nie skończy, bo zmienia się środowisko wewnętrzne i zewnętrzne przedsiębiorstwa. Menedżerowie przedsiębiorstwa pragną lepiej dopasować strategię i operacje systemu do strategii i celów przedsiębiorstwa niż konkurencji
2 obszar	Dostarczanie wartości przez system	Główną miarą wartości systemu jest zwiększenie produktywności pracowników, satysfakcji klientów, skrócenie czasu realizacji zamówień i t.p. W hierarii poziomów zarządzania w przedsiębiorstwie wykorzystują się miary techniczne i biznesowe. Menedżerowie mogą niemal natychmiast dostrzec efekty techniczne, ale przełożenie na poprawę wyników przedsiębiorstwa zabiera miesiące (lata)
3 obszar	Zarządzanie ryzykiem systemu	Menedżerowie przedsiębiorstwa znają wymagania regulacyjne oraz swoją odpowiedzialność za ryzyko. Do zarządzania ryzykiem należy zabezpieczenie zasobów wykorzystania systemu, zapewnienie ciągłości jej działania, odzyskiwanie danych po awarii
4 obszar	Pomiar efektywności systemu	Dzięki pomiarowi efektywności przedsiębiorstwo zyskuje pewne korzyści, takie jak efektywna alokacja zasobów, lepsze usługi, polepszona wydajność systemu. Łatwe do zmierzenia są miary obiektywne (udział wydatków na system w przychodach i t.p.). Miary subiektywne są trudne do pomiaru (poziom jakości, dostępność, funkcjonalność, odpowiedniość i t.p.)

Źródło: opracowanie własne

Dzięki usystematyzowanemu podejściu do efektywnego zastosowania systemu elektronicznego obiegu dokumentów przedsiębiorstwo maksymalizuje korzyści biznesowe, które wynikają przy największym stopniu wykorzystania posiadanych informacji z systemu elektronicznego obiegu dokumentów. Im więcej pracowników w

przedsiębiorstwie, im bardziej złożone są procesy zarządzania, tym większe zainteresowanie kierownictwa wdrożeniem systemu elektronicznego obiegu dokumentów. Ten system pozwala stworzyć jedną przestrzeń informacyjną w przedsiębiorstwie.

Systemy informacyjne tworzone w przedsiębiorstwach wykorzystujących najnowsze postępowe technologie informacyjno-komunikacyjne zapewniają radykalne zmiany w procesach zarządzania, obsadzie kadr i charakterze pracy, znacznie poszerzają zakres ich możliwości w kształtowaniu optymalnych rozwiązań zarządczych.

Efektywne wykorzystanie systemów wspomagania informacyjnego działalności zarządczej przedsiębiorstwa przyczynia się do poprawy i rozwoju informatyzacji procesów biznesowych przedsiębiorstwa przy aktywnym wykorzystaniu zasobów intelektualnych, tworzenie wsparcia informacyjnego działalności poszczególnych jednostek strukturalnych w oparciu o nowoczesne systemy elektronicznego obiegu dokumentów, utworzenie i rozwój wyspecjalizowanej struktury wewnętrznej zajmującej się świadczeniem usług informacyjnych i telekomunikacyjnych w strategicznie ważnych pionach.

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17. STRATEGIC MANAGEMENT OF CRITICAL INFRASTRUCTURE DEVELOPMENT IN THE DIGITAL ENVIRONMENT

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Introduction. In recent years, the role of critical infrastructure [1-6] as an important component of national economies in terms of ensuring information security and minimizing cyber risks and threats [7-9] has been growing in the world. This is due to the rapid development of the digital economy [10-14], the actualization of the problem of information security of states in the direction of digital transformation of economic systems of various levels. This, in turn, requires the formation of a new paradigm of strategic management of the development of critical information infrastructure, taking into account global challenges and possible barriers.

Literature review. A critical analysis of scientific sources shows that, to date, a unified approach to the interpretation of information security and cybersecurity has not yet been identified. For the most part, researchers understand the concept of “information security” as: a priority function of the state; the state of legal norms and their corresponding security institutions; a set of means of ensuring the information sovereignty of the state; security status; integrated component of national security; a component of economic security; the state of information work of business entities; the state of legal norms and their corresponding security institutions; legislative formation of state information policy; creation and implementation of safe information technologies; a multi-aspect system from the standpoint of a systemic approach, etc.

A significant number of scientific works are devoted to issues of strategic management (D. Aaker, D. McLoughlin [15], H. Ansoff [16], A. Chandler [17], G. Hamel [18], B. Henderson [19], R. Hoskisson et al [20], S. Jofre [21], R. Kaplan, D. Norton [22], P. Lorange, R. Vacil [23], M. Mescon et al. [24], H. Mintzberg et al. [25, 26], D. Schendel, K. Hatten [27], G. Steiner [28], C. Stern, M. Deimler [29], A. Thompson, A. Strickland [30], I. Wilson [31]).

The analysis of scientific literature on management shows that ten significantly different systems of knowledge about strategic management have been created, which have the names “Schools of strategic management” [26]:

- 1) school of design: strategy as understanding;
- 2) school of planning: strategy as a formal process;
- 3) school of positioning: strategy as an analytical process;
- 4) school of entrepreneurship: strategy as a forecasting process;

- 5) cognitive school: strategy as a mental process;
- 6) school of learning: strategy as a developing process;
- 7) school of power: strategy as negotiation;
- 8) school of culture: strategy as a collective process;
- 9) school of the external environment: strategy as a reactive process;
- 10) configuration school: strategy as a process of transformation.

It should be noted that there is no unified interpretation of the concepts “strategy”, “strategic development”, “strategic management” in modern scientific thought. This is due to the fact that the researchers are representatives of different scientific schools, which are based on the application of different economic theories, have their own specifics, differences and approaches.

As a rule, strategy is understood as the art of planning; a set of strategic decisions; definition of goals and objectives; a set of rules and techniques; a means of achieving the goal; system; tool; mechanism; model; principle of behaviour; plan; development program; the way the company operates; a system of measures to achieve the goal.

For the most part, scientists interpret strategic management as an analysis of the company's external and internal environment; formation of the company's mission and goals; selection and development of strategies; designing the organizational structure of the enterprise; management styles; the process of making management decisions; development of the mission, goals and methods of achieving them; development of company policy and tactics, etc.

At the same time, it should be emphasized that among the latest studies in economics and management (M. Barbosa et al. [32]; H. Dźwigoł [33]; L. Guerras-Martín et al. [34]; M. Holmlunda et al. [35]; D. Horvata et al. [36]; M. Köseoglu et al. [37]; M. Kurtyka, G. Roth [38]; A. Kwilinski [39-40]; R. Slagmulder, B. Devoldere [41]; R. Sliwinski [42]; J. Villagrasa et al. [43]), there is a tendency to search for new approaches, forms, methods and mechanisms of strategic management.

Despite the wide range of scientific research on the chosen topic, the multifacetedness and debatable nature of certain issues require further development. And especially the solution to this problem is actualized at the current stage of changing strategic thinking and the concept of strategic management of the development of the national economy in the conditions of digital transformations. Thus, this problem determined *the purpose of this study*, which is to substantiate the need for the formation of a fundamentally new paradigm of strategic management of the development of critical infrastructure in the conditions of digitalization of the economy.

Results. According to Forbes expert estimates, global information security spending increased in 2020 compared to 2015 by 2.3 times, or from 75 billion to 170 billion dollars. The annual growth of the global cybersecurity market was 9.8% in 2015-2020.

The EY Global Information Security Survey showed that annual spending on information security amounted to an average of 5.28 million dollars in 2021. USA,

although the revenue of the companies was approximately 11 billion dollars. According to a report by Cybersecurity Ventures, global losses caused by cybercrime will grow by 15% annually from 2021-2025 and may reach 10.5 trillion dollars USA. The number of attacks is increasing due to the activation of digital transformation processes.

According to the results of a survey of 600 top managers of large international companies conducted by Deloitte as part of the study “The Future of Cyberspace in 2021”, it was found that 69% of respondents note a significant increase in cyber threats and risks to their business since the beginning of 2020. Almost 75% of respondents who had an income of more than 30 billion dollars. The United States announced that it will spend more than 100 million dollars on cybersecurity.

In Barracuda Networks' State of Industrial Security 2022 Report, which is based on a survey of 800 CIOs, senior IT security managers and project managers responsible for the Internet of Things (IIoT) and operational technology (OT) in their organizations, it is stated that critical infrastructure is at risk of cyber-attacks. In the current threat environment, critical infrastructure is an attractive target for cybercriminals. But IIoT/OT security projects often lag behind other security initiatives or fail due to cost or complexity, exposing them to risk. Issues such as the lack of network segmentation and the number of organizations that do not require multifactor authentication (MFA) make networks vulnerable to attack and require immediate and special attention. Research shows that 94% of surveyed organizations have experienced security incidents in the past year. All survey participants recognized the importance of further investment in IIoT and OT security. At the same time, 96% of business leaders noted that their organizations need to increase investments in industrial security. 72% of companies reported that they have either already implemented or are in the process of implementing IIoT/OT security projects. However, many face significant challenges when it comes to implementation. 93% of companies have failed their IIoT/OT security projects. Critical infrastructure organizations are leading the way in implementing cybersecurity solutions, and 50% of oil and gas companies have completed projects. Completed projects in production make up 24%, in the field of health care – 17%. It found that only 49% of organizations can install security updates themselves. This suggests a lack of job skills to make informed cybersecurity decisions.

According to the World Economic Forum (WEF) Cybersecurity Center's Global Cybersecurity Outlook to 2022 Report, 92% of surveyed business leaders agree that cyber resilience is integrated into risk management strategies. However, only 55% of security-oriented respondents agree with this statement. 84% of respondents say that cyber resilience is considered a business priority in their organization, supported by management. However, 68% of respondents see cyber resilience as a core part of overall risk management. According to the results of the survey, 59% of all respondents consider it difficult to adequately respond to a cybersecurity incident due to the lack of qualified specialists in their team.

According to the results of a survey of 43 company managers in various sectors of the economy conducted by KPMG in the period from July to October 2022 as part

of the study “View of business managers in Ukraine 2022”, it was established that 61% of respondents are confident that their organization is well-prepared for cyberattacks and has all resources for its counteraction (in the world – 56%). But 21% of managers in Ukraine claim that their companies are still not ready or not sufficiently prepared for cyberattacks (in the world – 24%). At the same time, 84% of Ukrainian managers answered that the creation of a cybersecurity culture is as important as the creation of technological means of control (in the world – 73%). Moreover, Ukrainian business leaders believe that a strong cyber strategy is critical to building trust among key stakeholders (65%) and is a strategic function of a potential source of competitive advantage (65%).

KPMG's “Cyber trust insights 2022 survey” (1881 CEOs worldwide) found that more than 80% of respondents recognized the importance of improving cybersecurity and data protection, including increased transparency of data usage. In particular, 51% considered protecting IT assets from attacks extremely important. As organizations undergo digital transformation, it will be necessary to budget for investments in cybersecurity and privacy. And it will increasingly be seen as an integral part of these strategic initiatives. 31% of respondents are concerned about the growing requirements for critical infrastructure facilities, which are subject to increased regulation in Great Britain, the EU and the United States.

In the survey, 44% of respondents say that collaborating on cybersecurity issues within the broader ecosystem will help them, for example, predict attacks. In addition, 38% of surveyed company executives note that confidentiality issues stand in the way of external partnerships in the field of cybersecurity, and 36% fear that they will disclose too much information about their own security measures. Other challenges include regulatory constraints, lack of support from senior management, and insufficient resources.

A global cybersecurity survey found that 18% of respondents expect future cyberattacks on their organizations by state-sponsored hackers. And although 8% expressed the opinion that they do not expect an effective solution to this problem at all (this opinion is shared by respondents whose organization is on the list of critical infrastructure objects). It is worth emphasizing that 10% of surveyed organizations still do not have a cybersecurity strategy. Respondents indicated that limited skills, outdated network technologies and security tools increase vulnerability. Most respondents (over 90%) say they have shared information about attacks, but not always complete information about the attack or its consequences. About 9 in 10 respondents believe their government should do more to support organizations (91%) and protect critical infrastructure (90%) from cyberattacks sponsored by a hostile state.

According to the Report “How Security Cultures Impact Employee Behaviour”, which was prepared by the Tessian company on the basis of a survey of managers and employees of the security service of various industries, it was found that one in three employees is not aware of the importance of cybersecurity. Despite the fact that 99% of security leaders surveyed say that the reliability of the security system depends on the security culture, employees of the companies still do not pay enough attention to

the issues of cybersecurity. Although 48% of security managers consider training to be one of the most important factors influencing the creation of a robust security system, employees are not very interested in it. Just 28% of UK and US workers say safety training is exciting, and only 36% say they pay a lot of attention to it.

Therefore, the digital transformation observed in many sectors of the national economy has led to the emergence of new challenges and risks of information security, which should be given special attention for effective infrastructural provision.

The generalization of theoretical provisions regarding this problem allowed us to propose an approach to defining the essence and content of the following concepts:

- “information security” is an important factor in achieving stable and effective functioning of critical infrastructure objects in the system of the national economy;

- “cybersecurity” is an effective tool for protecting critical infrastructure in cyberspace;

- “critical information infrastructure” (*from two positions*) – a set of objects and digital networks used to activate their interaction with each other; a set of information systems and telecommunication networks that are critically important for the operation of key spheres of life activity of the state and society;

- “critical infrastructure development” from the point of view of cybersecurity – the process of transformational changes in information systems and telecommunication networks by moving key components of the infrastructure to a qualitatively new level of functioning due to adaptation to the variability and instability of the digital environment, taking into account the impact of possible cyber threats, risks and modern challenges of the digital economy;

- “strategic management of the critical infrastructure development” is the process of implementing management decisions, based on the use of a strategy for the development of critical infrastructure, taking into account the possibilities of its constant changes in the digital space.

Now in the era of global instability, there is a need for a new paradigm of strategic management, which should be based on the search for new opportunities. Ideology combines three components: strategic intentions; challenges; capabilities, along with existing limitations.

It should be emphasized that strategic intentions assume that their implementation will result in specific actions. Firstly, it is about building a modern system of effective management of the development of critical infrastructure. Another important component of the new paradigm is global challenges. One of these challenges is digitalization of the economy.

For a more meaningful disclosure of the essence of strategic management, its principles are defined:

- 1) long-term (ensures the successful development of critical infrastructure in the future);

- 2) feasibility (when setting strategic goals for the development of critical infrastructure, it is necessary to take into account its external and internal resources in order to assess the possibility of their implementation);

3) flexibility (taking into account possible changes in the process of implementing strategic management, due to changes in external and internal factors influencing the development of critical infrastructure facilities);

4) organization (the process of strategic management of the development of critical infrastructure should be clearly defined, regulated and implemented);

5) economic efficiency and effectiveness (income from the implementation of strategic management must exceed the costs of its implementation);

6) complexity (the process of implementing strategic management should be carried out for all critical infrastructure facilities. At the same time, all components of the infrastructure should be focused on a single goal);

7) controllability (the process of implementing strategic management of the development of critical infrastructure must be fully controllable, i.e., benchmarks must be determined, as well as responsible executors).

A practical approach to the strategic management of critical infrastructure development involves the implementation of a strategic management model in the process of implementing four elements – stages: strategic analysis; strategic decision; strategy implementation; control over the implementation of the strategy.

In the process of strategic analysis, the management of critical infrastructure facilities evaluates external factors, as well as the potential of internal resources. On the basis of which further goals and objectives of the functioning of the infrastructure are determined. When developing strategic decisions, the options for the developed strategies are evaluated, as well as the choice of the most functional strategy. When implementing this element, an analysis of strategic plans, the need for labour resources and capital, additional economic and scientific research is carried out. In the process of implementing the strategy, its direct implementation is carried out. In the event of significant changes in external factors that have a direct impact on the development of critical infrastructure, as well as changes in internal capacity that impede the implementation of a pre-planned strategic management process, management adjusts the strategic management model at the necessary stages.

Thus, it can be noted that at the heart of the strategic management model is a guideline for strategic actions, which, through the implementation of the strategic process, is transformed into the result of strategic management. The condition for the implementation of the model will be the achievement of competitive advantages in the development of critical infrastructure.

Conclusion. As a result of the conducted research, it has been proven that for the effective development of critical infrastructure, it is necessary to determine the basic provisions of the corresponding strategy, the constituent elements of which are resources; influencing factors; goals, principles, functions, methods, control levers; digital technologies and information systems; financial instruments of financing (crowdsourcing, crowdfunding, grants of European and international financial organizations, technical assistance of MFIs, financial resources of investment funds, etc.); public-private partnership mechanisms; performance criteria.

In order to effectively implement the strategy for the development of critical infrastructure in the conditions of digitalization, it is advisable to develop an organizational and economic mechanism, the essence of which is a set of principles, tools, functions, methods and means aimed at reducing the level of cyber risks, the costs of managing information flows and the introduction of digital technologies and software.

In order to minimize the negative consequences of possible cyber threats, it is necessary to pay attention to: levelling of information security risks; improvement of legislation on national and information security of the state; application of appropriate methodological tools; creation of a national model of the digital environment; formation of critical information infrastructure; implementation of a set of measures and relevant mechanisms of regulatory, institutional, financial, organizational and economic support for the development of critical infrastructure; implementation of the national cyber security strategy.

Therefore, the protection of critical infrastructure from numerous global cyber threats and information risks becomes a strategic task at the national level and is crucial for maintaining the adequate functioning of ecosystems and ensuring their sustainable and inclusive development.

Prospects for further research consist in substantiating the conceptual and methodological provisions of strategic management of the development of critical infrastructure from the standpoint of national security.

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18. ANALYSIS OF THE IMPACT OF THE CENTRAL BANK DIGITAL CURRENCY ATTENTION INDEX ON THE VOLATILITY OF FOREIGN EXCHANGE MARKETS

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Introduction. The financial world is currently on the cusp of significant innovation, with central bank digital currencies (CBDCs) playing a key role. CBDCs are digital assets registered in centralized or decentralized accounting systems and can be exchanged for traditional forms of money. As of September 2023, 64 countries have seen active development of central bank digital currencies, including processes from development to piloting and even launch. Among the Group of Twenty (G20) countries, 19 countries are actively developing their CBDCs, of which 9 are already implementing pilot projects in this area. Over the past six months, each of these G20 countries has made notable progress by investing additional resources in developing their CBDC projects. To date, more than 130 countries, which account for almost 98% of global GDP, are actively exploring the possibilities of implementing CBDC.

However, there are more and more questions about the impact of CBDC on foreign exchange markets and their volatility. Recent studies, in particular [1,2,3], indicate a potential relationship between the volatility of the index of attention to CBDC and currency markets. Thus, this work seeks to examine exactly how central bank digital currencies can affect the dynamics of currency markets, as well as how they can change the characteristics of their functioning.

The specialty of this study is the application of quantitative analysis to investigate the impact of the volatility of the CBDC attention index on foreign exchange markets. The main question is whether CBDCs can change the markets' perception of news and affect the level of volatility. It is also important to determine

whether the CBDC attention index is the cause of volatility in currency markets or simply reflects it.

It explores the interaction between CBDC and currency markets, which are key to global financial stability and investment decisions. The aim is to examine the impact of central bank digital currencies on the behaviour of currency markets.

Literature review. Central bank digital currencies (CBDCs) can have a significant impact on financial stability and monetary policy. Studies have found various effects and consequences of CBDC, such as:

- CBDCs can affect central bank seigniorage, monetary policy, the banking system, financial stability and payments [4].
- CBDCs can enhance financial stability by accelerating the adoption of digital payments, improving anti-money laundering measures, and supporting the financial capacity of banks [5].
- CBDCs are seen as a virtually free medium of exchange, a reliable store of value, and a stable unit of account, potentially contributing to true price stability in the monetary system [6].
- CBDCs can pose problems in both economic and legal spheres [7].
- Issuance of CBDC equivalent to 30% of GDP could permanently increase GDP to 3% through lower real interest rates, reduced tax distortions, and reduced monetary operating costs [8].
- CBDC initiatives can strengthen financial stability and monetary policy by increasing confidence in the financial system and allowing direct deposits into central bank accounts [9].

It is worth taking a closer look at the impact of CBDC on financial markets. It is noted that CBDCs raise concerns about competition, fairness in the payment system, and security, affecting monetary structure, monetary stability, and financial policy [10]. Regarding banking sector risks, CBDCs may lead to high funding risks, disintermediation risks, and solvency risks for commercial banks, suggesting the need for restrictions and caps to prevent disintermediation [11]. The introduction of CBDCs is believed to generate significant balance sheet adjustments, cause significant changes in security prices, and cause changes in network structure [12]. It is also noted that CBDC can change the price or quantity of central bank money, potentially strengthening the transmission mechanism for changes in policy instruments [13]. It has been argued that the introduction of a CBDC could reduce the supply of private credit by commercial banks, raise nominal interest rates, and lower the ratio of reserves to deposits, potentially exacerbating bank panics [14]. CBDC allows central banks to compete with private financial intermediaries for deposits, influencing financial markets by changing maturity dates [15]. It has been argued that an interest-bearing CBDC can increase financial availability and reduce the demand for cash, potentially expanding banks' depositor base [16]. CBDC can also lead to policy diffusion and influence the global financial network, potentially leading to a flatter network [17]. The introduction of CBDC will significantly affect monetary regulation and the role and position of major financial intermediaries in financial markets and infrastructure [18].

In summary, CBDCs can significantly affect financial markets in a variety of ways, including effects on the banking sector, changes in financial networks, effects on monetary transmission mechanisms, and effects on global financial structures. These impacts require careful consideration and regulation to ensure financial stability and efficiency.

In a study [1] published in 2022, innovative indices were developed - the Central Bank Digital Currency Uncertainty Index (CBDCUI) and the Central Bank Digital Currency Attention Index (CBDCAI) to analyze the impact of CBDC on financial markets. The authors used such analysis methods as structural vector autoregression (SVAR) and the dynamic conditional correlation model with generalized autoregressive conditional heteroskedasticity (DCC-GARCH). The CBDC Uncertainty Index (CBDCUI) was created by analyzing the frequency of mentions of CBDC-related terms in the media using the LexisNexis database News and Business. This index reflects the level of uncertainty or volatility associated with CBDC implementation.

The CBDC Attention Index (CBDCAI) is also based on the frequency of CBDC mentions, but focuses on measuring the level of attention that audiences pay to CBDC news. In studies [1,2] it was found that the reactions of financial markets to the announcements of central banks about CBDC can be different depending on the nature of the news - positive or negative. This indicates the high sensitivity of financial markets to information related to central bank digital currencies, and that their reactions may vary depending on the specific context and circumstances.

Results. Weekly data from January 2015 to July 2023 was collected to analyze the impact of central bank digital currency attention index volatility on currency markets. This starting point of the analysis is chosen due to the availability of the attention index CBDCAI, which was calculated in [1] and is available weekly. We believe that using weekly data will increase the number of observations. In addition, the use of the TVP-VAR model with a variable structure of the variance- covariance matrix will allow taking into account the unstable nature of high-frequency financial variables, as indicated in [2,19].

For the study, an empirical analysis was conducted to study the impact of CBDCAI volatility on foreign exchange markets. The following currencies were selected for this: EUR/USD, CNY/USD, SEK/USD, INR/USD, SAR/USD, JPY/USD, SGD/USD, GBP/USD. The US dollar was chosen as the quotation currency. For the purpose of this analysis, the TVP-VAR model with stochastic volatility, developed by Primicheri in 2005 [19], was used. The model was applied to weekly data from January 2015 to July 2023 to determine the impact of the central bank digital currency attention index on currency markets. The CBDCAI Index, which was developed in 2022 [1] and covers over 660 million news sources from LexisNexis News and Business, which have been available since January 2015, when Ecuador first implemented its own CBDC.

The TVP-VAR model has its advantages, especially compared to other nonlinear models. It allows taking into account the evolution of parameters and error terms over

time, which makes it possible to record both gradual and unexpected changes in financial markets.

Except for CBDCAI, all data were obtained from Yahoo Finance Provider. Similar to [1,2,3], the Cholesky decomposition based on the recursive ordering of variables from the most exogenous to the most endogenous is used in VAR estimation. In this setup, the CBDC news attention index is ranked first, followed by currencies accordingly, as we examine the impact of CBDC news on the currency market.

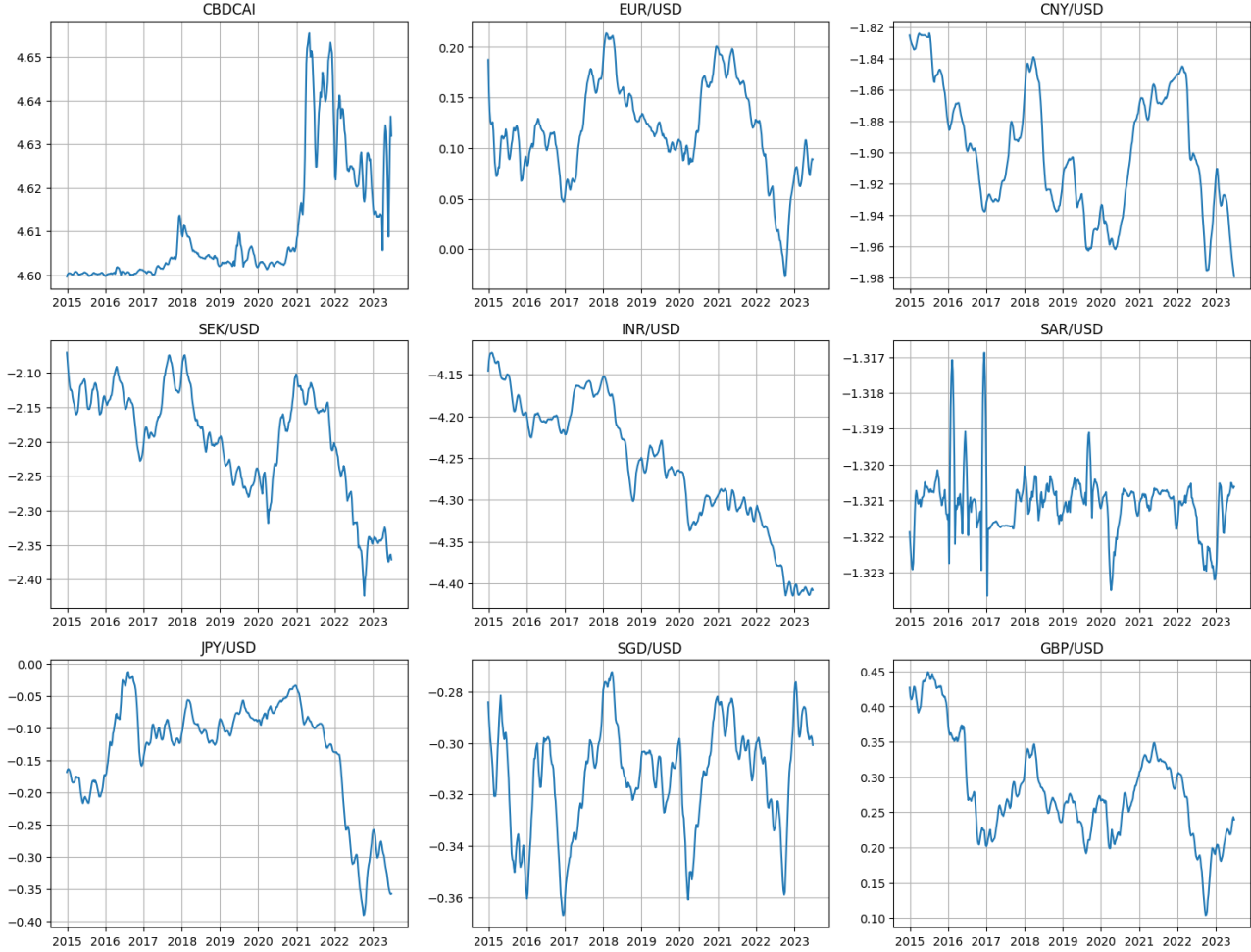


Figure 1. Dataset of input data (vertically the value of the natural logarithm of the value of the currency)

Source: data obtained from the authors' calculations

Therefore, when evaluating the TVP-VAR model, the following vector of endogenous variables is considered (Figure 1):

$$y'_t = [CBDCAI_t, EUR/USD_t, CNY/USD_t, SEK/USD_t, INR/USD_t, SAR/USD_t, JPY/USD_t, SGD/USD_t, GBP/USD_t] \quad (1)$$

where $CBDCAI_t$ denotes the natural logarithm of the CBDC news attention index calculated [1]; EUR/USD_t is the natural logarithm of the value of EUR to USD, CNY/USD_t is the natural logarithm of the value of CNY to USD, SEK/USD_t is the natural logarithm of the value of SEK to USD, INR/USD_t is the natural logarithm of the value of INR to USD, is the natural logarithm of the SAR/USD_t value of SAR

to USD, JPY/USD_t is the natural logarithm of the value JPY to USD SGD/USD_t is the natural log of SGD to USD GBP/USD_t is the natural log of GBP to USD.

Consider the statistical characteristics of the used endogenous variables (Table 1):

Table 1

Statistical data analysis

	count	mean	std	min	25%	50%	75%	max	range	kurtosis	skewness	iqr	jarque_bera	sum
CBDCAI	444	100.55	1.50	99.44	99.59	99.85	100.90	109.58	10.14	4.26	1.98	1.31	626.81	44645.08
EUR/USD	444	1.13	0.05	0.97	1.09	1.12	1.17	1.25	0.28	-0.03	-0.13	0.07	1.32	500.02
CNY/USD	444	0.15	0.01	0.14	0.14	0.15	0.15	0.16	0.02	-1.07	0.13	0.01	22.33	66.57
SEK/USD	444	0.11	0.01	0.09	0.11	0.11	0.12	0.13	0.04	-0.49	-0.57	0.01	28.80	49.53
INR/USD	444	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.00	-0.93	-0.20	0.00	18.71	6.30
SAR/USD	444	0.27	0.00	0.27	0.27	0.27	0.27	0.27	0.01	91.51	7.80	0.00	159418.42	118.48
JPY/USD	444	0.88	0.07	0.67	0.84	0.90	0.92	1.00	0.33	0.31	-1.02	0.08	79.08	388.96
SGD/USD	444	0.73	0.02	0.69	0.72	0.73	0.74	0.76	0.07	-0.24	-0.48	0.02	18.48	324.87
GBP/USD	444	1.33	0.10	1.09	1.26	1.31	1.38	1.59	0.50	0.03	0.65	0.13	31.75	590.10

Source: data obtained from the authors' calculations

Standard deviation (std): Indicates the variance of a data set relative to its mean. The higher the value, the more scattered the observations. For the CBDCAI, a standard score of 1.50 indicates a relatively low level of attention fluctuations. Minimum (min.) and maximum (max.): show the lowest and highest observed values. For CBDCAI, the range is from 99.44 to 109.58, indicating some significant spikes in focus. Percentiles (25%, 50%, 75%): The values show the distribution of the data. For example, the 50% percentile (median) for the CBDCAI is 99.85, which is below the mean, indicating skew in the data. Range (range): the difference between the maximum and minimum values. For CBDCAI, it is 10.14, showing a moderate spread of data points. Skewness: measures the "tailedness" of a distribution. High kurtosis for SAR/USD (91.51) suggests a heavy-tailed distribution, indicating high risk of investment outliers. Asymmetry: indicates the asymmetry of the distribution. Positive asymmetry for CBDCAI (1.98) implies a right-sided tail, indicating infrequent but significant spikes in attention. Interquartile range (iqr): measures the middle 50% of the data. The higher IQR for the CBDCAI (1.31) indicates greater variability in the mean range of the data. Jarque-Bera (jarque_bera): A test statistic for the hypothesis that the series is normally distributed. A high Jarque-Bera value for SAR/USD indicates that the distribution of this currency pair is significantly different from the normal distribution. In summary, currency pairs are showing varying levels of stability against the USD, with SAR/USD

showing particularly high kurtosis, indicating a heavy-tailed distribution, and JPY/USD showing negative skewness, indicating a left-skewed distribution.

Consider the stationarity of input data.

Table 2

ADF and Phillips-Perron stationarity tests

	ADF	Phillips-Perron
CBDCAI	-11.75	-47.57
EUR/USD	-23.32	-23.38
CNY/USD	-6.79	-19.31
SEK/USD	-27.05	-28.36
INR/USD	- 21.12	-21.16
SAR/USD	-8.48	-87.99
JPY/USD	-16.23	-21.46
SGD/USD	- 16.35	-21.36
GBP/USD	-16.60	-22.81

Source: data obtained from the authors' calculations

The Augmented Dickey-Fuller (ADF) test and the Phillips-Perron test are used to determine the presence of a unit root in a time series, which is a way to test for stationarity. A time series is said to be stationary if its statistical properties, such as mean and variance, do not change over time. ADF test: A more negative value indicates stronger evidence against the null hypothesis of a unit root (non-stationarity). A CBDCAI value of -11.75 indicates that we can reject the null hypothesis of non-stationarity by assuming that the series is stationary. SEK/USD has the most negative value at -27.05, which is strong evidence of stationarity.

Phillips-Perron test: Similar to the ADF test, this test corrects for autocorrelation and heteroskedasticity in the error terms. More negative values indicate stationarity. SAR/USD shows an extremely negative reading of -87.99, which strongly rejects the null hypothesis of a unit root, indicating that the series is stationary. The CBDCAI, although less negative than the SAR/USD, still shows a significant value of -47.57, which also indicates stationarity.

For all currencies and CBDCAI, negative values in both tests suggest that the null hypothesis of a unit root can be rejected, implying that the time series is stationary. This is important for time series analysis because many modelling and forecasting techniques are based on the assumption that the series is stationary.

Correlation analysis (Table 3) is used to determine the degree of association between two variables. Correlation coefficients range from -1 to 1, where 1 means perfect positive correlation, -1 means perfect negative correlation, and 0 means no correlation.

Table 3

Correlation analysis

	CBDC AI	EUR/U SD	CNY/U SD	SEK/U SD	INR/U SD	SAR/U SD	JPY/U SD	SGD/U SD	GBP/U SD
CBDC AI	1.00								
EUR/U SD	0.07	1.00							
CNY/U SD	0.15	0.44	1.00						
SEK/U SD	-0.19	0.70	0.69	1.00					
INR/U SD	-0.54	0.30	0.48	0.76	1.00				
SAR/U SD	-0.04	0.14	0.10	0.15	0.12	1.00			
JPY/U SD	-0.27	0.64	0.08	0.56	0.42	0.13	1.00		
SGD/U SD	0.27	0.61	0.41	0.25	-0.02	0.03	0.17	1.00	
GBP/U SD	-0.12	0.40	0.83	0.72	0.61	0.18	0.13	0.20	1.00

Source: data obtained from the authors' calculations

In general, currency pairs show mixed correlation dynamics, with some pairs showing stronger correlations with each other and others having weak or negative correlations with the CBDC attention index.

When considering the static total volatility correlation (Table 4), it is important to pay attention to the "From" values, which are given in the far right column of Table 4 (the "From" column others "). The "From" variables represent the impact of volatility transferred from the other 8 variables to each individual variable in the context of the forecast error variance. The "From" values range from 40.65% (EUR/USD) to 1.83% (CBDCAI). Most "From" currencies do not exceed 50%, such as: CNY/USD (14.87%), SEK/USD (36.03%), INR/USD (9.06%), SAR/USD (4.31%), JPY/USD (15.33%), SGD/USD (20.34%), GBP/USD (35.75%). The "From" values for CBDCAI are the lowest, indicating that the impact of currency markets, global financial factors and uncertainty on the CBDCAI index is limited.

Table 4

Statistical distribution of volatility

	CBD CAI	EU R/U SD	CNY/ USD	SEK / USD	INR/ USD	SA R/U SD	JPY/ USD	SGD/ USD	GB P/U SD	FRO M OTHE RS
CBDCAI	98.17	0.14	0.38	0.42	0.22	0.15	0.27	0.09	0.16	1.83
EUR/USD	0.13	59.35	1.85	9.36	0.54	0.11	3.99	20.74	3.92	40.65
CNY/USD	0.62	0.55	85.13	0.21	0.15	0.08	4.23	8.97	0.06	14.87

SEK/USD	0.53	8.72	3.83	63.9 7	0.36	0.07	1.99	14.98	5.54	36.03
INR/USD	0.49	0.95	1.47	0.45	90.94	0.52	0.13	4.51	0.55	9.06
SAR/USD	0.12	0.08	0.12	0.09	0.63	95.6 9	2.27	0.94	0.06	4.31
JPY/USD	0.08	0.00	4.08	0.05	0.49	0.29	84.67	9.80	0.55	15.33
SGD/USD	0.36	0.69	8.49	0.30	0.14	0.79	8.52	79.66	1.03	20.34
GBP/USD	0.49	2.94	3.00	9.39	0.10	0.65	4.90	14.28	64.2 5	35.75
Directional to others	2.83	14.0 7	23.22	20.2 7	2.63	2.65	26.31	74.30	11.8 8	TCI = 19.80 %
Directional including own	101.0 0	73.4 2	108.3 5	84.2 4	93.57	98.3 4	110.9 8	153.9 6	76.1 3	
NET Directional Connectedness	1.00	- 26.5 8	8.35	- 15.7 6	-6.43	- 1.66	10.98	53.96	- 23.8 7	-

Source: data obtained from the authors' calculations

Regarding the static relationship of the total volatility spillover "To", which is displayed in Table 5 (line "Directional that others"), "To" represents the relationship of the total volatility spillover between the volatility of each variable and the volatility of the other variables. In other words, it is the contribution of each variable to the variance decomposition of the forecast error of the other variables. The values of "To" vary from 2.63% (INR/USD) to 74.30% (SGD/USD). SGD/USD has the highest level of volatility (74.30%), followed by JPY/USD (26.31%), CNY/USD (23.22%) and SEK/USD (20.27%).

Regarding the static "net" relationship of the total volatility spillover, which is also presented in Table 5 (row "Net directional Connectedness"), net values indicate the difference between the static total volatility spillover connection with others and the static total volatility spillover connection from others. The net value for CBDCAI was at 1.00%, indicating that the impact of CBDCAI on the volatility of the other 8 variables is insignificant and smaller than the impact of the volatility of the other 11 variables on it. In other words, CBDCAI absorbs the impact of other currencies, but has a limited impact on their volatility. Therefore, in stressful situations, CBDCAI can act as an overflow shock absorber. In comparison, SGD/USD is the most important source of volatility with 53.96% of the total volatility.

The off-diagonal elements of the 12x12 matrix in Table 4 illustrate the static "pure" pairwise volatility relationship between the volatilities of the two variables. For example, the value of 0.49% in row 5, column 2 represents the percentage of the distribution of the variance of the forecast error of INR/USD volatility due to shocks from CBDCAI. Regarding the impact from CBDCAI, the relationship of static "pure" pairwise volatility between CBDCAI and other financial markets is low, ranging from 0.08% (JPY/USD) to 0.62% (CNY/USD). Most of CBDCAI's volatility is the result of internal shocks (98.17%).

Consider the dynamic directional connectivity of the volatility spillover.

Figure 2 shows the relationship in the direction of volatility transmission, showing how volatility spreads among markets. The vast majority of volatility values for CBDCAI are negative, indicating that volatility is transmitted to the CBDC market more than from it. In other words, the CBDC market absorbs volatility. This is consistent with the results for the static volatility transmission relationship, suggesting the ability of the CBDC market to absorb volatility in general.

Figure 2 shows that SGD/USD, JPY/USD, CNY/USD, SAR/USD are the key sources of volatility in foreign exchange markets. On the other hand, EUR/USD and GBP/USD appear to be volatility sinks, similar to the CBDC attention index. However, in 2022 CBDCAI changed from a volatility sink to a volatility transmitter. This may be due to the global discussions regarding the implementation of CBDC. But as shown in Figure 2, CBDC usually acts as a volatility sink.

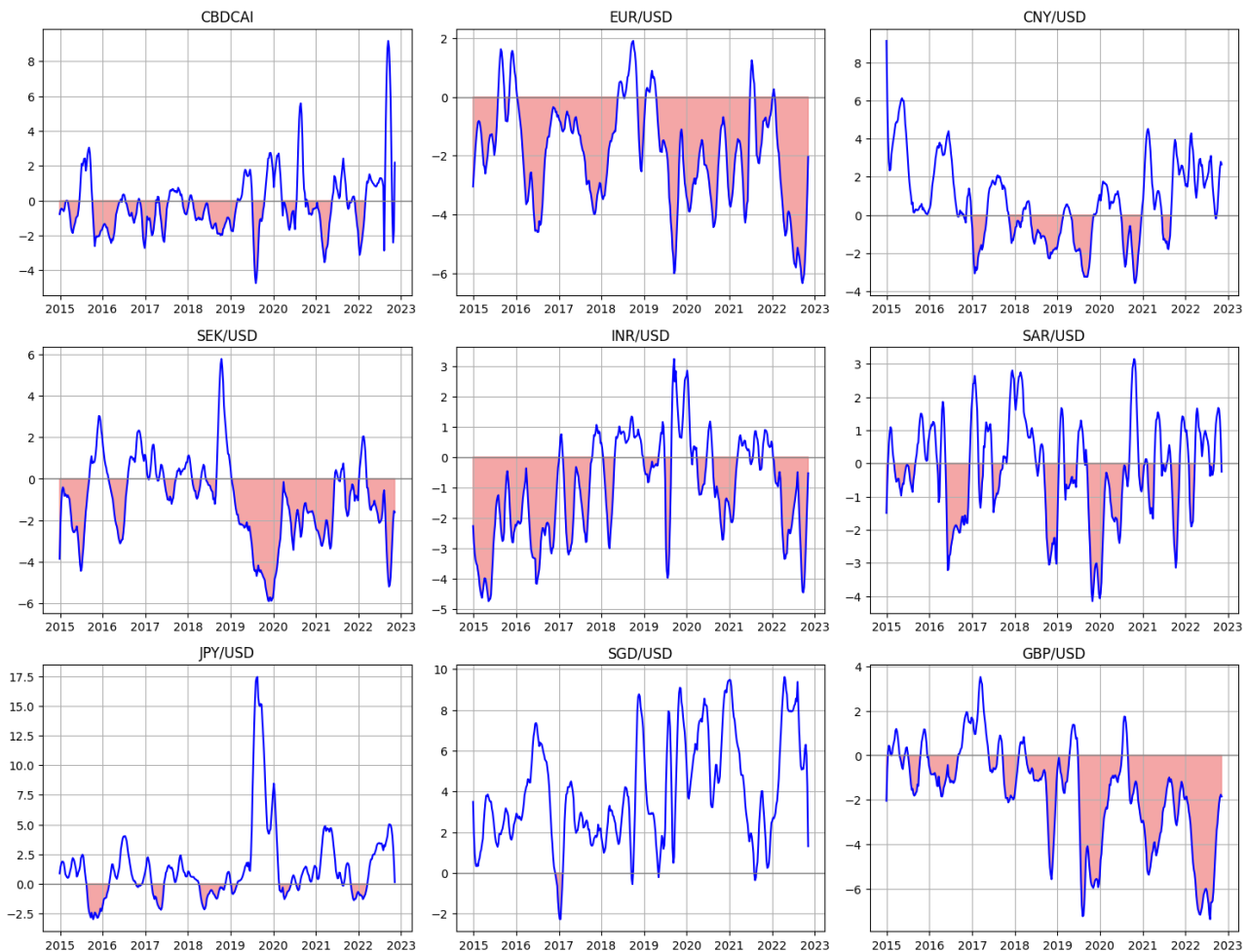


Figure 2. Distribution of volatility among currencies and CBDCAI (negative values mean that the index receives volatility, positive values - it is a source of volatility)

Source: data obtained from the authors' calculations.

Consider a pure pairwise volatility spillover.

The values in Figure 3 are "pure" pairwise directional volatility spillovers, which represent the difference between the relationship of the static total directional volatility spillover to others and the relationship of the static total directional volatility spillover from others.

During the covered period, variations in the net directional effects of volatility are observed. The values show some fluctuations, which indicates a change in the levels of correlation between the CBDCAI and other currencies. Negative values in the table indicate that CBDCAI tends to receive more directional volatility spillovers from other currencies (variables), while positive values indicate that CBDCAI is a source of directional volatility spillovers to other currencies. This targeted information is critical to risk assessment. The results show that most currencies are transmitters of volatility for CBDCAI volatility.

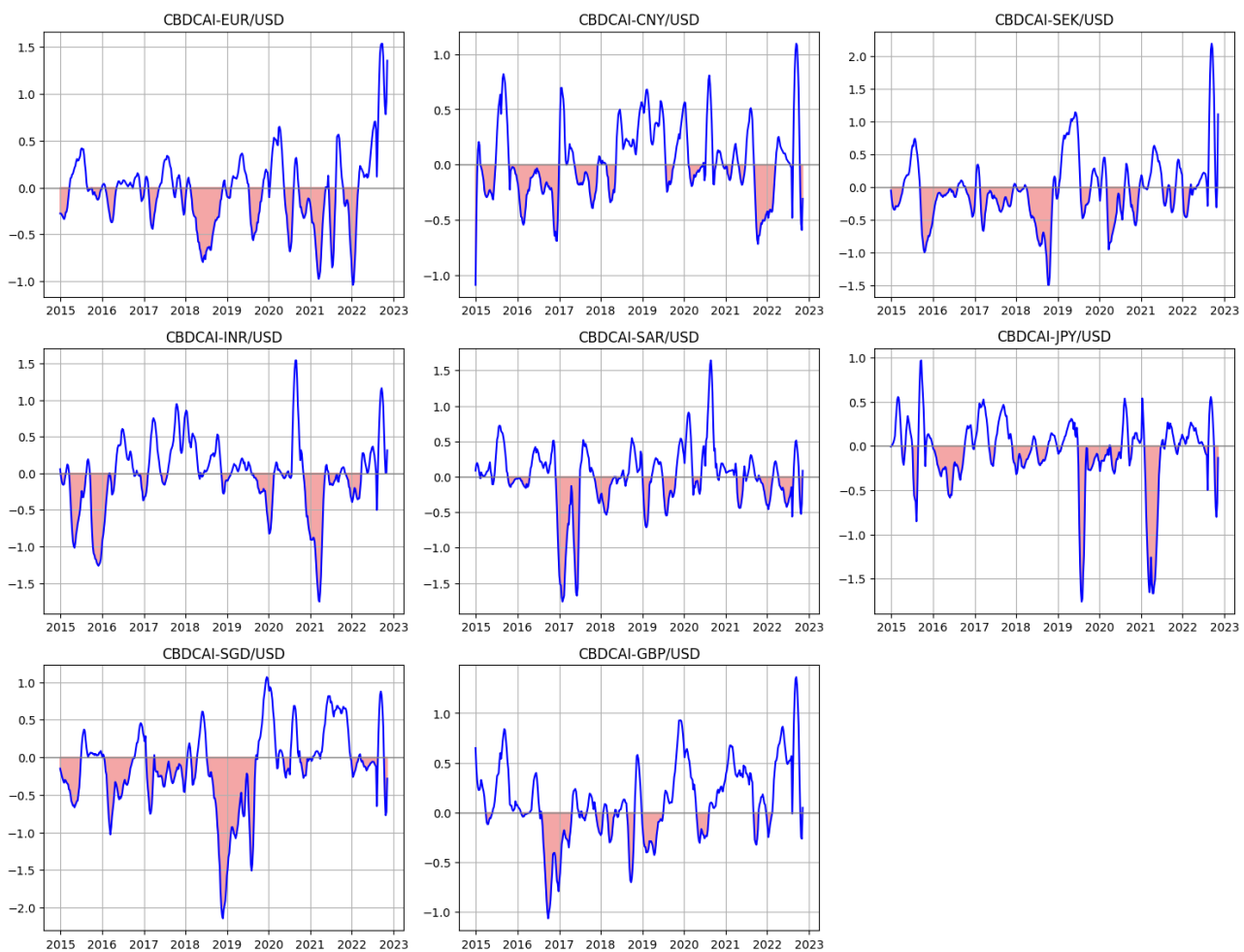


Figure 3. Pairwise directional spillover of volatility of the CBDCAI index (negative values mean that in the specified pair CBDCAI receives directional spillovers of volatility, positive values - is the source of directional spillovers of volatility)

Source: data obtained from the authors' calculations.

It should also be noted that the data reflect the dynamic nature of financial markets. For example, there are negative spillovers from most currencies to CBDCAI in the initial period. However, this pattern changes over time, and some currencies become sources of volatility.

net volatility values highlight the degree of interrelationship with traditional currency markets. It has been observed that over time it becomes more interconnected with certain markets, while at the same time disconnecting from others.

Analysis of this data can help investors and financial analysts assess the risks and potential effects of the connection between the CBDC market and traditional currency markets. Positive values can mean that shocks in the CBDC market can affect traditional markets and vice versa.

Conclusion. This work aims to study the impact of digital currencies of central banks on the behaviour of currency markets. For this purpose, the TVP-VAR model was applied to estimate the impact of the volatility of the CBDC attention index on the volatility of currency markets.

Analytical review revealed several main points. First, the relationship and mutual influence between the CBDC and currency markets was established. Second, the CBDC market usually operates quite independently from other currency markets. A third observation shows that the CBDCAI is exposed to the volatility of other currencies, but has a limited effect on them. Finally, while the CBDC market is capable of buffering volatility, it may change its role in the context of CBDC debates or widespread adoption.

The resulting data can be useful for investors and analysts to assess the risks and potential of interaction between the CBDC market and traditional currency markets. These findings can serve to improve risk management and investment strategies. For regulators and policymakers, this analysis can also provide a toolkit to better understand the impact of CBDCs on currency markets.

However, the study has limitations. It focuses on the impact of CBDC announcements on currency markets only and is based on a limited data set due to the novelty of the CBDC topic. Over time, once CBDC is more widely implemented, we can expect more accurate data to analyze. Most of the existing CBDC studies are theoretical in nature, making it difficult to compare results. In the future, with the wider adoption of CBDCs, there will be an opportunity to investigate their impact on monetary policy and various financial markets, leaving this topic open for further research. It is also possible to study the relationship between the volatility of CBDCAI and the volatility of other assets, such as cryptocurrencies, or to apply various econometric models for analysis.

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19. DIGITALIZATION IMPACT ON THE LABOUR MARKET AND SOCIAL AND LABOUR RELATIONS

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Introduction. Globalization is expanding the scope of employment forms in the labour market. The digital transformation of production affects both the Economy and Employment. The production processes automation requires constant updating of knowledge and increasing the competence of employees, high readiness to adapt to new conditions and mechanisms for the formation of Social and Labour relations. Such changes affect the functioning of society, contribute to the establishment of a new level of quality of life, when people's priorities are changed, the needs for self-realization and intellectual development become a priority by increasing the educational level, qualifications, and improving their own skills and competencies.

Technological changes, on the one hand, can lead to job displacement and technological unemployment, and on the other hand, increase worker efficiency and increase their wages. These two trends are not necessarily mutually exclusive. With the advent of the digital platforms, some professions are being automated and others are being reorganized. This has led to the emergence of alternative operating mechanisms, in particular the "Gig economy" or Concert economy. Gig economy is a labour relations model based on the short-term contracts or informal agreements (Uber, Lyft, TaskRabbit, GrubHub, Postmates).

Literature review. Estimates of different representatives of the Scientific community on the impact of the economy digitalization on the labour market differ. Leading researcher of the Institute for Global Development (UK) Rumana Bukht and Director of the Center for Development Informatics (University of Manchester) Professor, Richard Hicks, believe that the digital economy does not contribute to unemployment. In contrast, efficiency in the digital economy is typically higher than in the overall economy. Between 2009 and 2011, digitalization created 17 million workplaces in countries with economies in shift [1]. Employees of the Institute of Industrial Economics of the National Academy of Sciences of Ukraine Pankova O., Novikova O., Kasperovich O. [2, 3, 4], Bliznyuk V., Yatsenko L. [5, 6], Goremykina Yu. [7] note the need to take measures on the government agencies to prevent the growth of unemployment as a result of the economy digitalization.

Results. The rapid development of technology is increasing the interest in the digital economy, as well as its impact on the transformation of the labour market (Fig. 1).

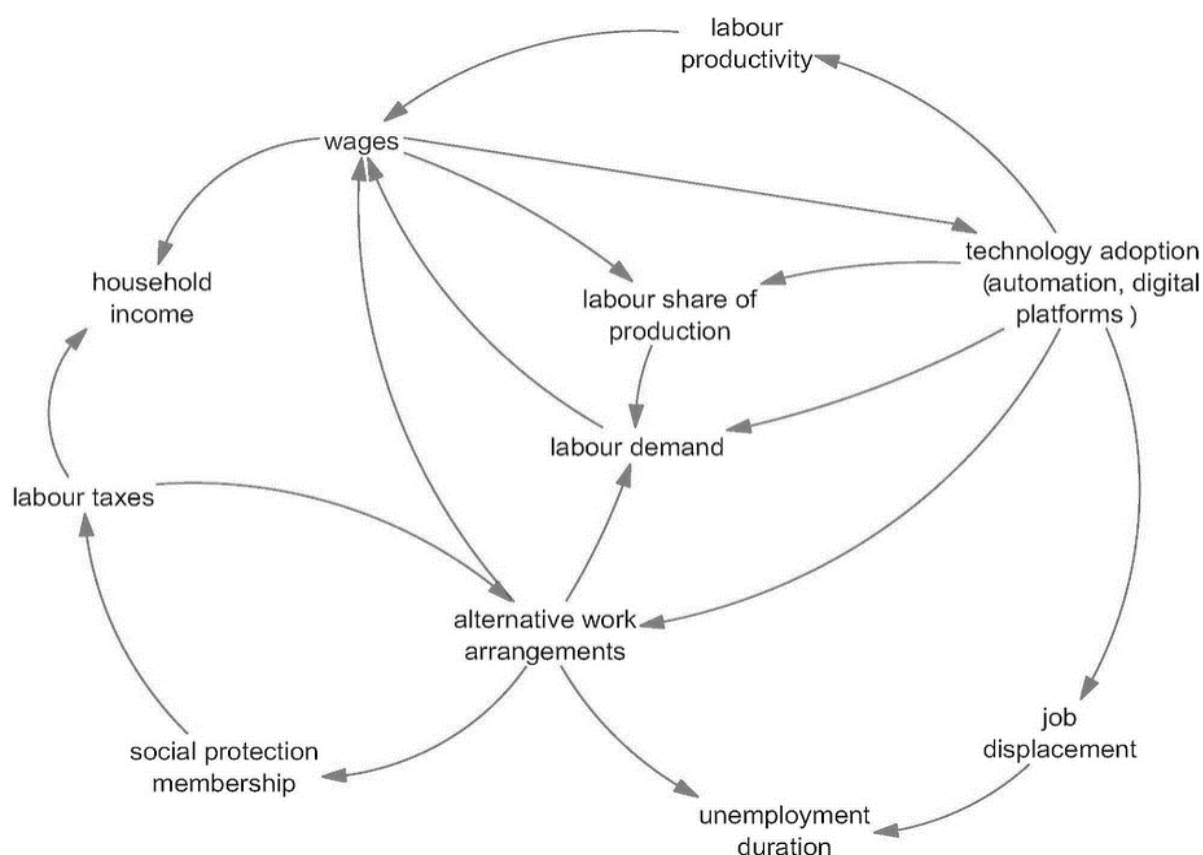


Figure 1. Preliminary qualitative systems map of Technology, Work, and Social protection

Source: Developed by the authors based on OECD (2022) data

As specified in the system map, increased technology implementation can increase labour efficiency, which subsequently leads to higher wages for employees. Raising wages creates incentives to substitute capital for labour and thus encourages investment in technology. However, it is necessary to make a reservation. Implementation of technology increases efficiency only for those employees who have compatible skills and displaces employees with replaceable (i.e., automated) skills. This displacement can be observed in a balanced cycle connecting technology implementation, labour share of production, labour demand and wages. When technology implementation reduces the amount of labour required, total wages are reduced, which in turn reduces the incentive to automate production processes.

Another cycle links technology implementation, alternative work arrangements and wages. There, new technologies encourage alternative work arrangements, which can lead to lower wages, which in turn discourages further technology implementation. The final cycle example in this systems map concerns the interaction between alternative work arrangements, social safety nets, and taxes.

As alternative work (Gig economy) becomes more common, the associated voluntary social contribution provision could undermine membership in the social safety net and lead to increased tax pressure on standard employment employees to cover funding shortfalls. All this encourages more employees to use alternative working arrangements. This work cycle has a negative impact on overall wages and household income, regardless of the type of work arrangement, standard or non-standard.

The economy digitalization involves the use of artificial intelligence (AI), robotics, cloud computing in the production process, and increases the demand for employees with digital skills. However, the public administration system is not ready for such challenges. Lack of coordination of decisions and actions of authorities at the legislative and executive levels leads to their isolation in the formation of strategies for digital, socio-economic and educational and professional development. The rapid pace of implementation of digital technologies in management and production processes exacerbates the imbalance between the development of the national labour market and the digital economy [10].

The formation of a global digital segment of the labour market is accompanied by economic and social contradictions, which are especially acute in institutionally underdeveloped countries. This situation requires strengthening the state socio-economic development policy in the direction of balancing the processes of transformation of the national labour market and the formation of the digital economy[11].

Digital technologies require countries to shift to the post-industrial development, where knowledge and information are the main drivers of transformation. The international network of companies offering professional services in the field of consulting and auditing PwC (PricewaterhouseCoopers) has identified three periods for the introduction of automation until 2030.

Period 1. Transformation algorithm (before the early 2020s): automation of basic calculations and analysis of structured data. Transforms data-driven sectors.

Period 2. Penetration algorithm (by the end of the 2020s): dynamic interaction with technology in organizing administrative office work and making decisions. Using robotics to perform tasks in a semi-controlled environment, such as moving objects in warehouses.

Period 3. Autonomy algorithm (until the mid-2030s): automation of physical labour and processes that require a response, in particular in transport and construction.

The shift to a digital economy is a natural process and requires modernization of the employment sector. The new Covid-19 pandemic has accelerated the processes of transformation of the labour market and acted as a catalyst.

Due to the fact that most enterprises and government organizations switched to a remote format, employees had to master computer and digital technologies.

According to the World Economic Forum (WEF), published in *The Future of Workplaces Report 2020*, by 2025, automation associated with technological development will lead to the loss of approximately 85 million workplaces, which is 10 million more than in the 2018 report [12]. At the same time, 97 million new workplaces could be created, which is 36 million less than the 2018 report. These trends quite fully reflect the new division of labour between people and machines.

At the country level, there are different opinions regarding the dynamics of workplace creation/destruction under the influence of the digital revolution. According to WEF analysis, the share of workplaces in the United States that are at risk of automation ranges from 9 to 47%. At the same time, in similar scientific studies concerning EU member states, the gap is even greater: from 7 to 60%. By 2025, almost half of all new workplaces created as a result of digital transformation will require highly skilled employees. Thus, about 40% of employees with lower education will face the risk of automation of their work, compared to 5% of employees with higher education. Increased use of technology will lead to greater demand for digital skills. There will be an increase in demand for positions such as robotics engineers, artificial intelligence specialists and digital marketing specialists.

Technological change and digitization are also increasing the importance of skills as a geopolitical tool. The lack of qualified skills among employees in the local labour market is one of the main barriers to the introduction of new technologies. Therefore, countries whose education and labour systems effectively combat this problem can benefit most from digital transformation while reducing its negative consequences. In this context, according to the World Economic Forum's Global Competitiveness Index, the United States of America, after the United Arab Emirates and Switzerland, has the highest potential for attracting and retaining talented people. The first EU member state in this ranking (Germany) is ten positions lower. The EU is ahead of the US as a study destination for international students, with 45% of all international students in the EU versus 25% in the US. However, most of them do not stay in Europe after graduation. Academic experts estimate that only three in ten highly educated third-country migrants live in the EU, compared with six migrants living in North America. China ranks only 34th, although it is the world's largest source of international students, accounting for about 10% of the total number of international students worldwide.

The consequences of the new Covid-19 pandemic have proven that in conditions of isolation of employees from each other, it is possible to produce goods and provide services. Computerization, robotization, and new technologies bring to the fore not people as the basis of labour potential, but other components. Works and modern machines are better able to cope with responsibilities. They get the job done faster and better. This is beneficial for the employer or manufacturer, because there is no need to establish contact with the machines and discuss different aspects of the work.

The demographic situation in the world demonstrates that the population is constantly growing and by 2030 its number will reach 8.5 billion people. The population needs to be employed to avoid problems of unemployment and increased crime. In the case when machines replace most of human work, it will not be profitable for the employer to pay wages to employees; human labour will be replaced by the work of machines.

Since the beginning of the Industrial Revolution, employees such as the Luddites (manufacturing employees who opposed the introduction of machines and capitalist exploitation in 19th-century Britain) have feared that they would be replaced by machines and forever out of work. Until now, these fears have been largely wrong. On the one hand, employees who know how to operate machines are more productive than those who do not; automated production reduces both costs and prices of goods and services; consumers spend less money on goods and services; consumption levels increase, which leads to the creation of new workplaces. On the other hand, there are employees who have been displaced by machines and are now forced to look for a new job or improve their skills. In general, automation has a positive impact on business owners, earning higher profits with less labour required. Economic analysts predict new automation with more advanced robotics and artificial intelligence (AI), which will expand the range of tasks and workplaces that machines can perform [12, 13].

The impact of automation on employment is greater in manufacturing than in service industries due to more routine tasks and less dependence on communication and customer service. In some service sectors, such as logistics and transport, the impact of automation on employment is quite noticeable, and it is also beginning to appear in banking and financial services.

The specialists from the European Center for the Development of Vocational Education and Training (Cedefop) have identified categories of employees with a high risk of automation: operators and assemblers, craft and printing employees, construction employees (all > 15%). The lowest proportion (<5%) is found among street service employees, managers and care employees (Fig. 2).

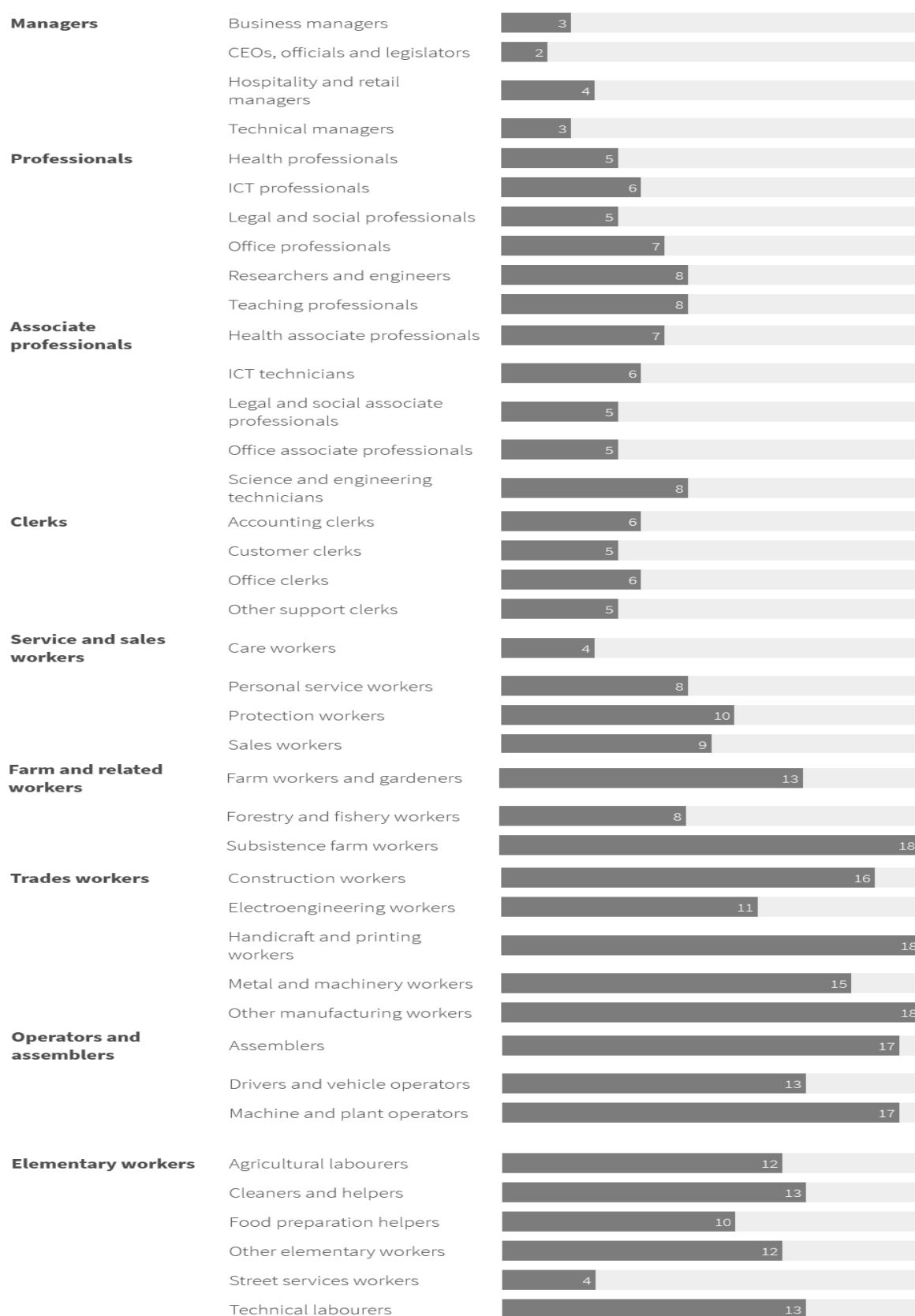


Figure 2. Shares of employees with high automation risk by occupation, EU27, 2020 (%)

Source: Developed by the authors based on Cedefop (2017) report; Eurofound (2018) data

The report by the International Labour Organization (ILO) found that employed young people (under 24) face the risk of losing their workplaces due to automation. All over the world, young people are expressing fears that new technologies, artificial intelligence and robotization will deprive them of their workplaces. One of many examples is the automation of the cashier's workplace in a supermarket.

In its analytical report, McKinsey found that from 400 to 800 thousand employees around the world could lose their workplaces by 2030. Professions such as salespeople, security guards, and receptionists are at risk [15, 16]. McKinsey has projected future scenarios of worker displacement by automation through 2030 (Fig. 3), including global trends such as rising health care costs for an aging population; increased investment in technology, infrastructure, buildings and energy; marketization of domestic work that is not yet paid, such as childcare and cooking.

To maintain their comparable advantages, people need to learn how to manage, consult, decide, think, communicate and interact. The process of digitalization and automation of production requires employees to improve their skills, forcing leading companies to implement *reskilling* and *upskilling* programs aimed at retraining and acquiring new knowledge and skills by employees.

According to the analytical data from the International Labour Organization (ILO, International Labour Organization), by 2025, 85 million workplaces could be displaced due to changes in the division of labour between machines and people. According to the expert estimates from the World Economic Forum (WEF), by 2025, half of all employees will require retraining due to the technological progress. Employees can remain in the same positions, but will be forced to update their skills by 40% [17].

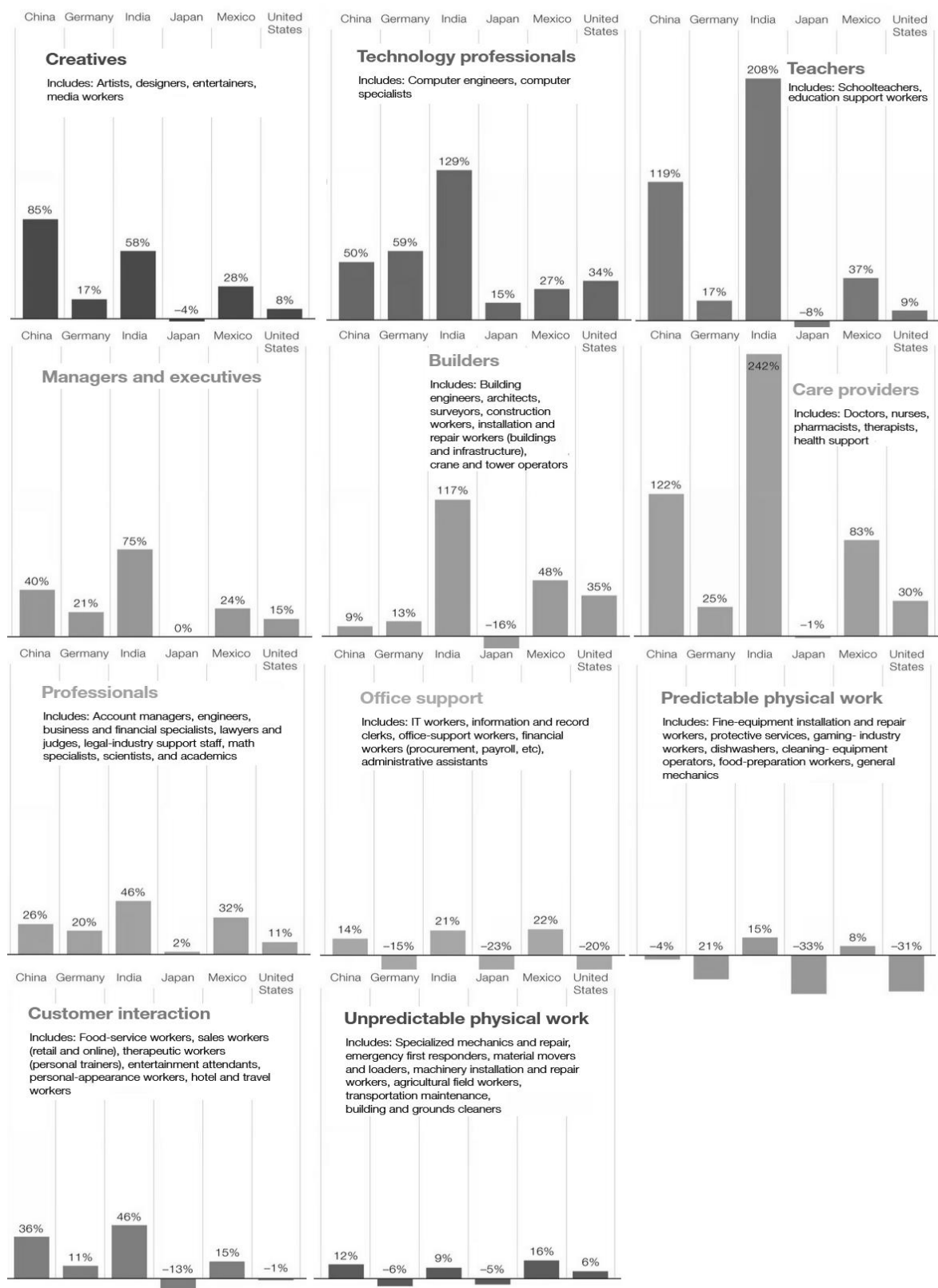


Figure 3. Employment growth and decline by occupation, % change labour demand, midpoint automation

Source: Developed by the authors based on McKinsey Global Institute (2018) report

The impact of automation and artificial intelligence (AI) on future employment is the subject of research by scientists at Boston University (USA) and analysts at the School of Economics at Utrecht University (Netherlands). In 2019, they published the scientific work “Automation: A Guide for Policymakers.” Scientists are convinced that the introduction of automation in the manufacturing sector entails unemployment, and in industries related to the provision of services, it creates new workplaces . The study is based on a complementary assessment based on data from businesses (36,000 firms) in the Netherlands that have automated their production or are planning to do so due to the impact of this process on employment (Fig. 4).

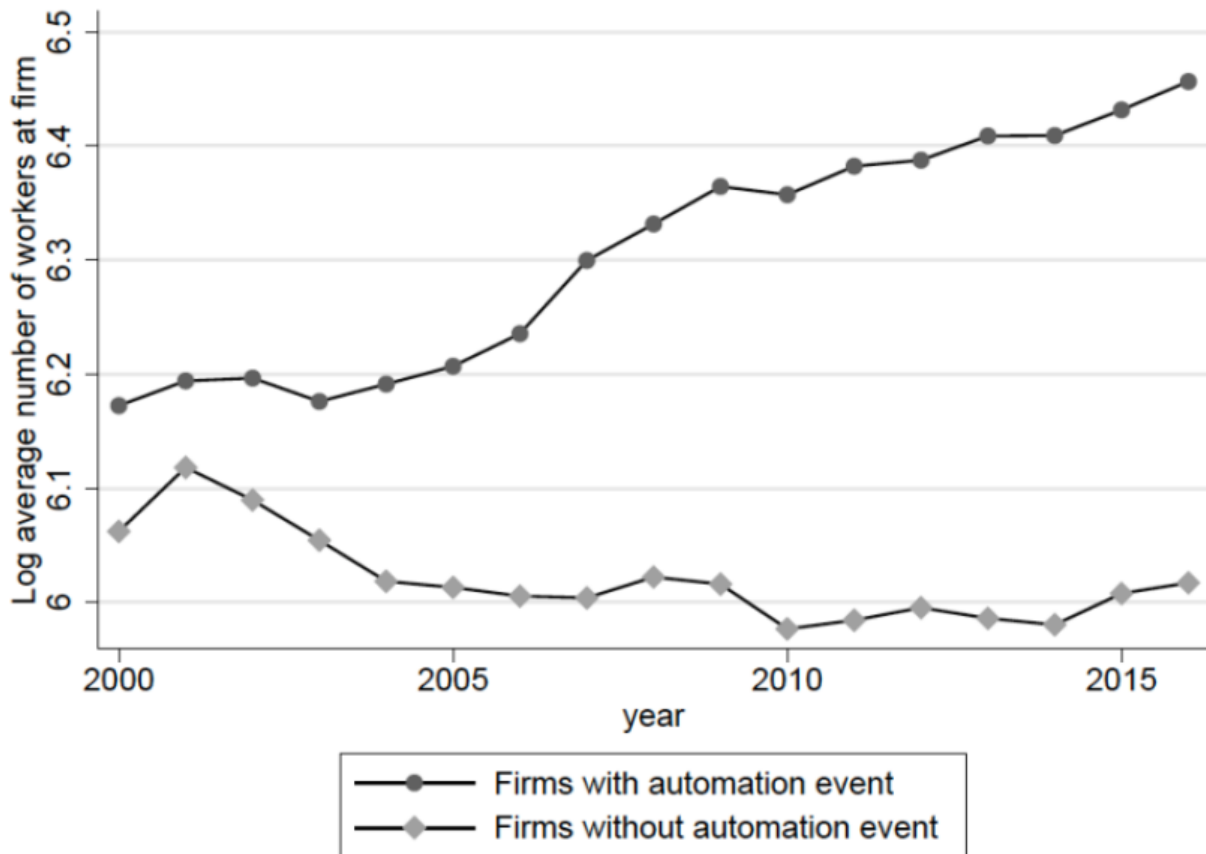


Figure 4. Employment at firms making major automation investments and not, Netherlands

Source: Developed by the authors based on Casey M. article (2020) data; Bessen J., Goos M., Salomons A., Berge W. article (2020) data

Firms that have implemented automation demonstrate dynamic quantitative growth in personnel, and conversely, firms that have not automated their production are stagnating. Summarizing, we can draw the following conclusions:

Firstly, there is no direct evidence that employees in firms lose their workplaces after production automation;

Secondly, however, we observe higher rates of job switching among employees during automation;

Thirdly, older employees in automated companies may change the scope of their work or become self-employed, retiring early after leaving the automated enterprise.

While these short-term measures may not reflect long-term employment outcomes as technology continues to improve, they provide evidence that firm owners need to pursue strategies to reduce the risks to employees as they move from one job to another. Examples of successful strategies include unemployment insurance, expanding access to education and training, and providing relocation benefits.

Specialists from the Hungarian Loránd Eötvös Research Network analyzed the distribution of employees by probability of automation (Fig. 5).

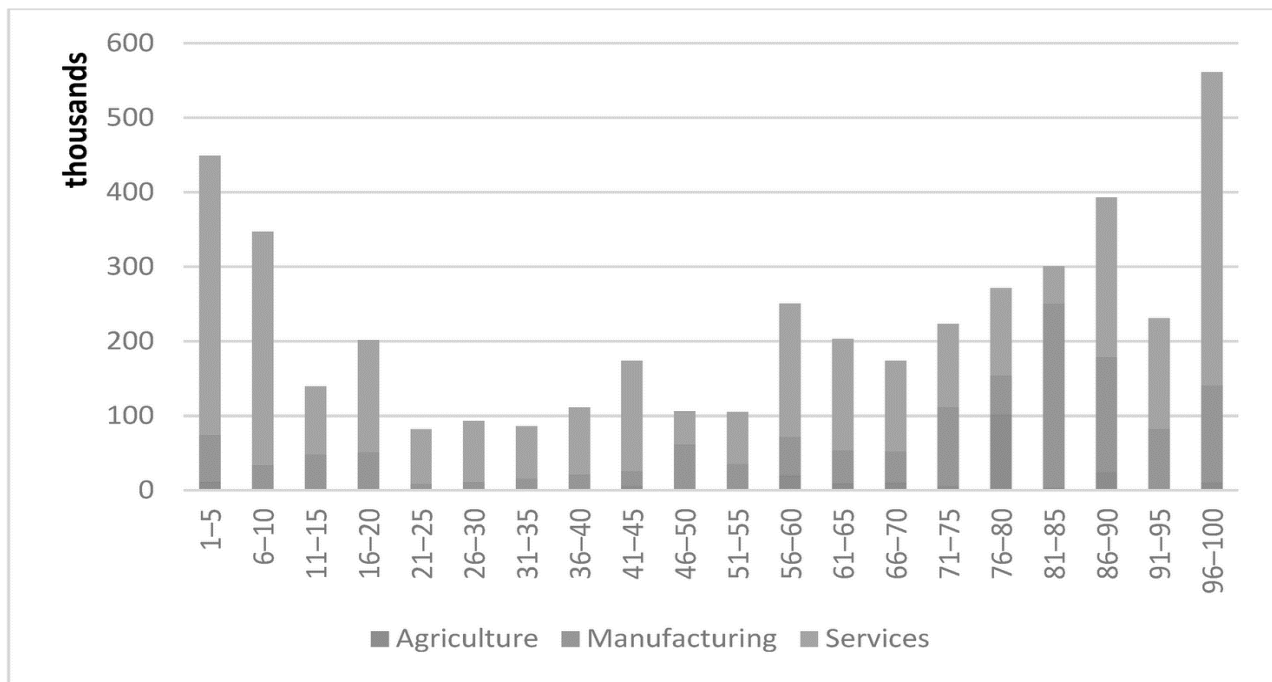


Figure 5. Breakdown of employees by susceptibility to automation and industry per person

Source: Developed by the authors based on Illessy M., Huszar A., Mako C. article (2021) data

As shown in Figure 6, employees in agriculture (69%) and industry (61%) are most vulnerable to automation, while employees in the service sector (31%) are less vulnerable. Let us take into account that the service sector has a high proportion of administrative and intellectual professions that require a high level of qualifications and responsibility, as well as professions that require the personal presence of an employee or individual service. A similar distribution of susceptibility to automation is shown in the labour markets of Finland and Norway.

Let us examine the distribution of Hungarian employees according to their propensity to automate by gender (Fig. 6).

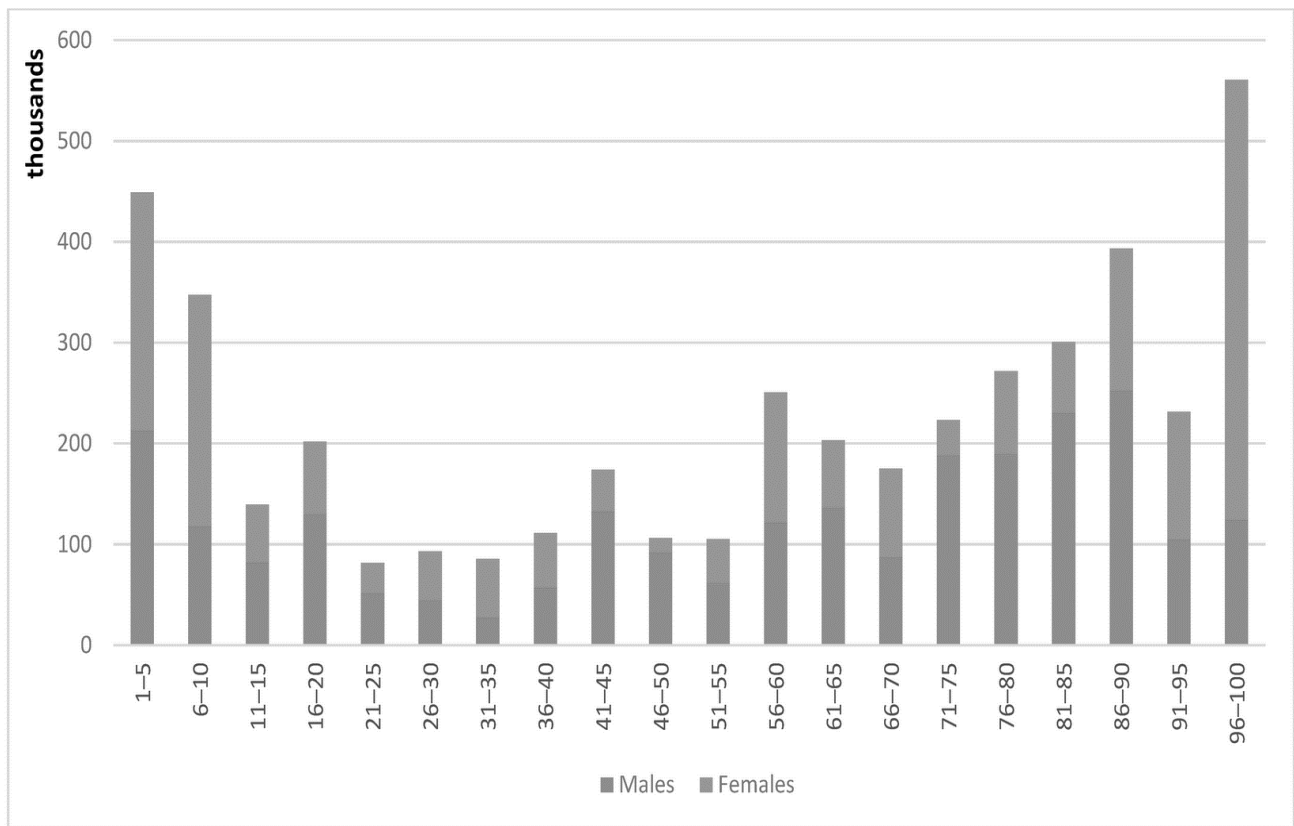


Figure 6. Breakdown of employees by susceptibility to automation and gender per person

Source: Developed by the authors based on Illessy M., Huszar A., Mako C. article (2021) data

In Hungary, the propensity for automation by gender is almost the same (a little higher for men - 45%, for women - 43%). Finland and Norway show the same results. However, Hungarian experts say that many professions traditionally performed by women in Hungary and elsewhere are difficult to automate, especially in the fields of education, vocational training, nursing and care.

Professor of economics, Nir Jaimovich, from the University of Zurich, Itai Saporta-Eksten from Tel Aviv University, Yaniv Edith-Levi from the University of British Columbia (Vancouver, Canada) and academician Henry Xu from the University of California (USA) in the article "Macroeconomics of Automation : data analysis, theories and policy" investigated the impact of automation on the labour market [21]. The authors emphasize the need to:

- Implement the program for retraining low-skilled employees and raising taxes on highly-skilled employees, which will ensure overall economic growth and labour efficiency;

- Increase the unemployment insurance, which redistributes more income towards low-skilled employees and thus reduces inequality and leads to higher wages for low-skilled employees employed;

- Implement the universal basic income scheme, which is based on the redistribution of higher income towards low-skilled employees, will help reduce inequality; employed low-skilled employees will receive higher wages;

- Reduce the labour tax rates for low-skilled employees, which activates their participation in the labour market and reduces transfers; reduced transfers do not lead to loss of tax revenues.

In the conclusion of this study, it is important to identify strategies for adapting social and labour relations to the technological challenges of today. To prevent the risks of digital transformations, it is advisable to focus on such strategic areas of labour market development.

- ✓ Implementation of state incentive programs by using administrative and financial levers to create new types of workplaces. The possible solution should be to support areas of the economy where the human factor is almost impossible to replace with a robot or neural system.

- ✓ Legislative slowdown of the spread of technologies. This strategy is far from forever involving the implementation of new laws against technology, but many existing laws can be used to inhibit automation processes. For example, laws prohibiting fully autonomous vehicles from operating on public roads hinder the development of self-driving taxis and trucks and protect drivers from losing their workplaces for a while.

- ✓ Preservation of the structure of the social and labour sphere in state and regional medium-term and long-term strategies of socio-economic, industrial, innovative, digital development. To compensate for short-term risks, it is necessary to use institutional mechanisms of state regulation, in particular, to carry out budgetary financing of retraining programs for employees who are most susceptible to digitalization; to expand the mechanisms of social protection, including employees of non-standard (non-standardized) employment forms; to stimulate social responsibility of business in the digital segment.

- ✓ Reforming the education system in accordance with the requirements of the digital working environment, wider use of digital media in education.

- ✓ Acceleration of the social adaptation of the population to the challenges of the digital economy, which consists in the mandatory constant improvement of the qualification level and promotion of new skills in the interactive space of the digital ecosystem. Active policy on the labour market, continuous training.

Conclusion. Thus, with the advent of digital platforms, some professions are being automated and others are being reorganized. New alternative employment forms are used, in particular flexibilization - flexible remote or unstable employment; innovative models of labour relations are established, such as the gig economy, which is based on short-term contracts or informal agreements. The Covid-19 pandemic acted as a catalyst for the modern transformation processes of the labour market, in the conditions of which the remote work format forced employees to master computer and digital technologies. The impact of digitalization on the labour market prompts the world's leading companies to support proactive training of personnel at risk of dismissal, to stimulate intra-company mobility of employees with additional payment for the development of additional specialties, and to conclude inter-company agreements on the joint use of labour force in case of changing labour market conditions. In the long term, a fundamentally important tool for unemployment insurance and expanding access to education should be the mutual recognition of educational diplomas and comparability of qualifications by EU countries, as well as the diversification of the educational process using franchise programs, dual education.

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20. PROSPECTS FOR THE DEVELOPMENT OF THE FINANCIAL MARKET OF UKRAINE IN THE CONDITIONS OF DIGITALIZATION

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In Ukraine, under the conditions of the functioning of the market economy, an effectively organized financial market is of particular importance, which is necessary for the normal and successful functioning of the country and the development of the social sphere. The financial market is a barometer of the economy, which operates under low inflation rates, a favorable political climate, and stable legislation. The financial market of Ukraine has been functioning for a relatively short period compared to the markets of economically developed countries and has certain shortcomings that need to be eliminated. However, first of all, it is necessary to agree on a strategy for the development of an efficient financial market.

It is appropriate to consider the financial market as a combination of the capital market and the money market, which also have their own structure. Characterizing the economic essence of the financial market, it is important to consider the main functions it performs. The main functions of the financial market in the political sphere are: speeding up the integration processes of Ukraine's entry into the world community; exit of national capital to the world market through the stock exchange by distributing shares and other securities of domestic enterprises to foreign investors.

Functions of the financial market in the economic sphere:

- regulation of the process of bringing financial assets to the consumer by creating a network of various institutes for the sale of financial assets (in particular, stock exchanges, credit unions, banks, investment funds, as well as brokerage offices, insurance companies, etc.);
- formation of market prices for certain types of financial assets;
- financial support of investment processes, which consists in the formation by the financial market of conditions for economic entities to attract financial resources necessary for the development of the production and sales process;
- redistribution of funds of business entities on mutually beneficial terms for their effective use;
- impact on money circulation, acceleration of capital turnover, which leads to activation of economic processes on the market;
- insurance activity and creation of conditions for minimizing commercial and financial risks;
- transactions related to export and import activities of financial assets and other transactions that are also related to foreign economic activity;
- lending to the government, as well as local self-government bodies through the placement of government and municipal securities;

– placement of state credit resources and their division among participants in the economic cycle, as well as between spheres of market activity, etc.

In the social sphere, among the main functions of the financial market, it is appropriate to highlight the following: mobilization of savings of individuals and businesses, as well as state bodies, foreign investors for investment in the production and social spheres; the creation of new jobs thanks to the movement of capital and investment, etc. In the moral and psychological sphere, it is appropriate to highlight the following functions of the financial market: formation of the appropriate moral and psychological atmosphere among citizens, creation of trust in financial services, as well as in financial intermediaries, in securities and in carrying out transactions with them; reducing the likelihood of fraud, abuse, and a criminal environment in the financial market.

In the conditions of rapid technological progress and globalization, innovation is becoming a key criterion for the successful operation of financial startups and companies. Opening up new opportunities and solving complex tasks require not only financial resources, but also a systematic and comprehensive approach to innovation support. Supporting innovative financial start-ups and companies becomes a priority task for states, businesses and investors, as it determines not only their competitiveness in the market, but also contributes to the creation of new economic and social opportunities.

In a world where technology is rapidly changing the way business functions and interacts, there is a real need for effective mechanisms to support and stimulate innovation. The financial sector, as a key player in the economy, has the potential to become a catalyst for the development of innovative approaches and technologies that will contribute to the creation of a sustainable system of financial services.

In today's world, where technology is developing rapidly, the banking sector is also experiencing the impact of innovation. One of the examples of such interaction with technologies and innovations is "PayPal". One of the most prominent players in the field of electronic payments, PayPal was founded in December 1998 by three entrepreneurs: Max Levchin, Peter Thiel and Luke Nozick. From the very beginning, the company was called "Confinity" and specialized in developing software for fingerprint-based mobile devices. In 1999, Confinity merged with another technology company, X.com, headed by Elon Musk, which, unlike Confinity, specialized in financial services, particularly electronic payments. Competition and tension between developers and management led to an explosion of personnel conflicts. The confrontation between Levchin and Musk was resolved by Musk's resignation. After that, the company reinvented itself again by merging with another company and became known as PayPal in 2001. From that moment, the company began its path to becoming a leader in electronic payments.

In 2002, PayPal went public on the NASDAQ in partnership with eBay, which marked its financial success. Since becoming part of eBay, PayPal has grown and improved its services. In 2015, the company split from eBay and became an

independent financial instrument. PayPal has been actively acquiring and integrating a number of fintech and startups in recent years. Acquisitions of such companies as Braintree, Venmo, and Xoom allowed to expand the range of services and made the company even more competitive. The first step to using PayPal is an easy registration process. Users only need to enter an email address and create a password, and they are ready to use the system.

Ease of registration makes PayPal accessible to a wide range of users, regardless of their level of technical awareness. After registration, users are given the opportunity to use the electronic wallet to make payments and transfer money. Thanks to the simple interface and intuitive design, the process of electronic payments is reduced to a few clicks, which makes it efficient and fast. One of the key benefits of PayPal is the ability to make transactions using email addresses. Users do not need to remember complex bank details or card numbers - it is enough to know only the recipient's email address. It seems extremely convenient for quick and secure money transfers.

PayPal has become an integral part of e-commerce, providing safe and convenient payments in online stores. PayPal's cross-platform integration allows users to seamlessly shop and pay for services without leaving their account. PayPal uses advanced encryption technologies to protect the privacy of user data when it is transmitted over the Internet.

The principle of operation is based on the application of cryptographic algorithms that transform data into an unreadable form during transmission. All transactions through PayPal are protected by SSL/TLS (Secure Sockets Layer/Transport Layer Security) protocols. These protocols guarantee encryption and authentication, ensuring the security of electronic communications between the user and the server.

To ensure a higher level of security, PayPal has implemented a two-step authentication system. In addition to a regular password, users can configure an additional verification step, such as entering a one-time code received on a mobile device or other authorization mechanism. Early notification and monitoring is also an important part of security. PayPal actively uses monitoring systems to detect abnormal or suspicious patterns in user behavior. This allows the system to respond to possible threats in a timely manner. Users receive immediate notifications of any unusual or suspicious activity on their accounts. Additionally, they can set their own account security restrictions and settings. One of the key features of PayPal is that users' bank details are not disclosed during transactions. This ensures the confidentiality of financial data and prevents the possibility of unauthorized use of this data. Using PayPal, users can make payments without revealing their personal information or credit card numbers. This is important to protect against possible attacks and fraudsters.

However, it is worth noting that all financial instruments go through their own path of formation and development, functioning and extinction. The current monetary system began with the metal equivalent of the value of the commodity, changed to focus solely on the price of gold, then moved to paper currency, and eventually separated from the formal gold reserve of the countries that printed paper money. Nowadays, money ceases to have a physical equivalent, passing into a digital state, the

so-called cryptocurrency, despite the fact that in modern social discourse this word is not used in relation to money on bank cards.

The latest step in the development of financial instruments today was the creation of currencies based on blockchain technology. Blockchain is a form of data storage technology that is a chain of blocks, each containing information. These blocks are linked to each other using cryptography, forming a continuous chain where each new block contains the hash (unique identifier) of the previous block, ensuring the integrity and security of the system. However, it greatly limits the speed of transactions and establishes additional costs in the form of maintenance of the blockchain chains themselves.

Blockchain technology was first introduced with the introduction of Bitcoin on January 3, 2009. The creation and popularization of Bitcoin served as a starting point for many other cryptocurrencies, each with its own characteristics, applications and technological solutions, such as:

1. Ethereum (ETH): This is a platform for creating decentralized applications that uses smart contracts. It allows developers to build various applications based on the blockchain.

2. Ripple (XRP): Ripple's primary purpose is to provide instant and cheap global money transfers for banks and financial institutions.

3. Litecoin (LTC): This cryptocurrency is based on the open source code of Bitcoin. The main difference is faster blockchain transactions and mining algorithm.

4. Cardano (ADA): Is a smart contract platform that focuses on blockchain security and stability.

5. Polkadot (DOT): Designed for interoperability of blockchains, ensuring their interaction and exchange of information between different blockchains.

6. Chainlink (LINK): This is a project designed to connect the blockchain with external data, making it available for smart contracts.

The main difference between cryptocurrency blockchains is their independence from central banks and state regulators. They operate within decentralized networks, allowing users to make direct financial transactions without intermediaries. This results in reduced fees and time for transactions, often ignoring government jurisdictions, and often increases the level of privacy of currency holders and users.

There are various models of cryptocurrencies, including those focused on privacy, asset management, smart contracts, and ecosystems for developing decentralized applications. This diverse landscape creates many opportunities for financial innovation and experimentation.

Despite the potential benefits, cryptocurrencies also face challenges and obstacles. Issues related to regulation, security, volatility and stability of cryptocurrency markets require attention and further research. Certainly, there is potential for the integration of cryptocurrencies into existing financial structures, but this also requires the development of effective regulatory mechanisms and ensuring stability for their widespread adoption by states and their institutions.

The most significant step in introducing cryptocurrencies to the traditional banking system was the creation of USDT, or Tether. This currency is a stable cryptocurrency pegged to the value of the US dollar at a ratio of 1:1. It belongs to the category of stablecoins, cryptocurrencies that are created to maintain price stability and are linked to fiat currencies or other assets.

The history of Tether began in 2014 with Tether Limited. The idea was to create a digital counterpart to the dollar, providing users with a stable asset in the cryptocurrency world. Each unit of USDT was claimed to be equivalent to one dollar held in bank accounts. USDT has become popular among traders and investors as it offers relative price stability, allowing for the ability to switch between cryptocurrencies without having to buy/sell in fiat currency.

However, Tether has also been the subject of debate and some controversy. The topic under discussion is about backing up each unit of USDT with actual dollars in Tether Limited's bank accounts. Despite the promises, the authenticity and completeness of the dollar reserve in the accounts have been questioned, raising concerns about the stability of USDT and the safety of investing in it. Despite the fact that the USA itself as a state does not have a direct relationship with this currency, the government bodies that regulate the financial system interact quite closely with the creators of this stablecoin.

The Securities and Exchange Commission (SEC) regulates cryptocurrencies and ICOs (Initial Coin Offerings). They conduct checks to determine whether certain tokens or sales qualify as securities and should be registered as securities. The Commodity Futures Trading Commission (CFTC) regulates cryptocurrency futures and derivatives.

Many countries seek to occupy the cryptocurrency niche themselves, creating their own digital coins. Such currencies are called central bank digital currencies or digital national currencies. These currencies are digital forms of traditional currencies, issued and maintained by central banks or government institutions. For example, China is actively developing the electronic yuan, a digital version of the national currency. It envisions using this digital currency for day-to-day transactions as well as reducing the use of cash. This allows the state to more closely control money circulation and facilitate the monitoring of financial transactions.

Estonia is also researching a state-owned cryptocurrency, with plans to launch Estcoin, which will be linked to the country's electronic identification system. This proposal can facilitate the use of digital currency for online transactions and simplify various financial transactions within the country.

Venezuela has also created a digital currency called the Petro, the value of which is supported by the price of oil. However, this project has become the object of debate and criticism, as it is an attempt to circumvent international sanctions through the creation and use of a digital currency. Saudi Arabia is also currently exploring the creation of its own digital currency. This is a country that is showing interest in cryptocurrencies and their potential benefits in the field of fintech.

In 2019, Saudi Arabia announced plans to create its own digital currency in collaboration with the United Arab Emirates. This partnership aims to develop a cryptocurrency that will allow banks to issue their digital rial-based tokens for interbank transactions.

Similar to other initiatives, such a digital currency can facilitate more efficient execution of financial transactions, reduce costs and speed up the transfer of funds between banks. It is also expected to improve the transparency and reliability of financial transactions in the region.

Such initiatives allow governments and central banks to explore the potential benefits of digital currencies, such as increasing the efficiency of financial transactions, improving transparency and control over money circulation. However, they also face a number of challenges, including security, regulation and protecting user privacy.

The development of an effectively functioning financial market capable of mobilizing and redistributing investment resources is the main task of regulating the national economy. The domestic financial market is at the stage of formation and is quite easily affected by crisis phenomena. Today, the creation of an effective mechanism of state regulation of the domestic financial market, which is designed to ensure the stability and development of this sphere, is an important task, because the development of the domestic financial market has recently been gaining momentum, and there is a need for clear regulation and control of the activities of its subjects.

Today, all subjects of the economy are primarily faced with the financial market, where they look for the necessary funds or make investments of temporarily free funds and receive additional income as a result. In this way, capital circulation occurs on the financial market, and as a result, some business entities have savings, while others feel the need for financial resources to expand their own activities. In addition, the financial market optimizes the growth of production volumes, contributes to the accumulation of financial resources, and also contributes to the emergence and development of positive social changes in society [4]. Accordingly, the state should carry out the development of the financial market in such main sectors of the economy as: the banking industry, the stock market, as well as the insurance market.

The analysis of the financial condition of the domestic banking sector showed that today the problematic elements of the banking system are the quality of the credit portfolio of domestic banks, low lending activity, as well as a low level of economic activity of economic entities. Note that at the same time, the main crisis-forming factors in the country are currency and political risk, as well as the risk of a global recession. Accordingly, the domestic market of banking services needs to increase the level of reliability and financial stability of domestic banks on the domestic and international markets. To realize this goal, the state should implement a number of measures:

1. Optimization of banks' capital:

- to optimize the structure of capital, assets and liabilities, based on the tasks of ensuring the financial stability of banks and their positive impact on the development of the real sector of the economy;

- ensure proportional growth of regulatory capital and its constituent volumes of active-passive operations;

- to improve the efficiency of asset and liability management in order to prevent an unreasonable increase in deductions from regulatory capital, in particular related to accrued but unpaid income;

2. Support of financial stability of banks:

- to expand the possibilities of maintaining banks' liquidity on the basis of financial recovery programs;

- to strengthen the requirements regarding the transparency of the corporate management of banks, in particular the determination of the real owners of banks, and their responsibility for maintaining the financial stability of banks;

- develop strategic goals depending on the situation in the country and abroad;

- more actively apply the procedure of bank reorganization through merger or merger, as well as bank restructuring through the closure of unprofitable branches;

- increasing the level of trust of the population in the national currency - the hryvnia and in domestic banking institutions;

3. The general economic effect of the growth of public trust in banks can be implemented in the following directions:

- by increasing the resource base of banks due to a more intensive inflow of deposits, increasing credit and investment deductions in the economy, as a result of which the provision of financial resources of economic entities improves, and, in turn, improves the financial condition of the latter;

- by reducing the price of bank resources, and therefore loans, since, trusting banks, the population will increase deposits even in the event of a decrease in interest payments on them.

Implementation by the state, as a regulator of the market of banking services, of the above measures will contribute to the achievement of financial stability not only of the banking market, but also, through it, of the real sector in general with further development of its activity to a new level. Among a number of factors that determine the effectiveness of the functioning of the banking services market, an important role today belongs to the psychological factor of public trust. It has two main components: public trust in the national currency - hryvnias, as well as public trust in banks. The state needs to create conditions in which the population will trust the banks operating in the market and will be confident in the national currency, because in the conditions of intense competition, only those banks that have the highest public trust remain on the market. Accordingly, in order to increase trust in banking institutions, it is necessary to create a socially positive image around domestic banks and the entire banking system in general. In order to strengthen public trust in banks, it is important to reduce political risks in their activities, because political risks are the most obvious for customers, and also the first to warn them against investing money in banking institutions.

The next rather important structural element of the financial market is the stock market, because with its help the state can attract significant amounts of investments,

as well as mobilize the necessary financial resources through the issue of securities. It should be noted that the main approaches to state regulation of the stock market and the domestic financial market as a whole are covered in the program for the development of the financial sector of Ukraine until 2020, which was approved by the decision of the National Securities and Stock Market Commission. The goal of this program was to create a financial system capable of ensuring stable economic development through the effective redistribution of financial resources in the economy, based on the development of a full-fledged competitive market environment in accordance with EU standards, but this goal was not realized due to a number of factors: the COVID-19 pandemic and the crisis phenomena caused by it, the quarantine, which significantly weakened the financial capabilities of both individual citizens and the private sector, as well as the unstable socio-political situation in the state and the world. Today, the country needs a new strategy for the development of the domestic stock market. Based on the conducted analysis, we can note that the strategy of state regulation of the domestic stock market should primarily take into account:

- strengthening of the speculative and short-term nature of the main transactions carried out on domestic stock exchanges;
- underdevelopment and disproportionality in the structure of the domestic stock market;
- increasing the role of negative external influence on the country's stock market.

It is also an important task for the country to ensure the transparent operation of all financial market entities. The transparency of the stock market is the main concept that is often found today in the program documents of various states and international institutions. Today, compliance with the principle of stock market transparency in developed countries is moving from an abstract concept to a real practice. It should be noted that in Ukraine there is an opposite trend, there are such negative phenomena as violations of the rights of citizens and business entities to access information about the state of the stock market development, as well as numerous conspiracies of market professionals, and the spread of negative phenomena of information asymmetry.

It is important to note that in order for Ukrainians to seek to invest their savings and profits in securities, they must be confident in the preservation of their funds and the protection of their rights. For this, the capital markets must be fair and transparent, the interests of all investors must be respected, and not only representatives of certain large financial and industrial groups, as was the case in the country. To solve this problem, the markets must have a strong regulator that will act efficiently and transparently, so that its actions have confidence among investors and other market subjects. The financial market and its intermediaries must function in accordance with European standards, prioritizing the interests of investors, and refrain from the practice of adjusting the market to one's own interests and needs.

Accordingly, today it is urgent for the state to develop its own strategy for the development of the stock market, which will allow Ukraine to integrate into the international stock market, as well as to solve the issue of attracting resources and increase the competitiveness of the domestic stock market in the long term, involving

not only the state in trading, but also and enterprises, as well as non-state financial institutions. It is effective and necessary to create favorable conditions for attracting investors to the most promising and the most depressed sectors of the domestic economy, which include the pharmaceutical industry, the medical industry, and the agricultural sector.

The development and formation of the insurance market should be considered a necessary element of the financial market. The insurance market of Ukraine is at the stage of integration and development. Important factors affecting the insurance market in Ukraine are: devaluation of the national currency; limitation of solvent demand on the part of end users of services (insurers) due to a decrease in the level of discretionary income of the population and business entities; loss of deposits of individual insurers due to the liquidation of a large number of banking institutions; decrease in stock market liquidity, etc.

Although the trends in the development of the insurance market in Ukraine are positive, it is still at the stage of formation and is characterized by the existence of a number of problems, the solution of which must take place through the active participation of the state. State regulation of insurance activity in Ukraine should be based on planning, systematicity, competence and openness. At the first stages of the development of the insurance market, state regulators should consider the need to coordinate strategic and short-term goals in the course of making management decisions, the choice of methods and forms of state influence, as well as the need to create specific mechanisms for implementing decisions. Today, legal and organizational foundations have already been created for the formation of market relations in the development and insurance of the markets of individual insurance products. However, it is necessary to improve in the direction of a clearer definition of the financial results of the work of insurers and the regulation of organizational and management issues of the development of insurance.

To improve the situation and effective development in the Ukrainian market of insurance services, the necessary factors are the coordination and coherence of the work of both insurance companies and the state. However, it should be remembered that the state must provide the market with a stable regulatory framework, and on the other hand, insurance companies must be as honest and conscientious as possible in cooperation with their clients. However, the effective functioning of the insurance market of Ukraine is currently significantly hampered due to the lack of a unified state strategy for the development of the insurance services market in the country, which would take into account the problems and the basic directions for their solution.

In the course of improving the quality of services on the insurance market, reforming the insurance market, as well as increasing its investment potential, it is also necessary to implement the following organizational, methodological, regulatory, and informational measures [2-4]:

- implementation and development of incentive measures for insurers that voluntarily comply with the standards of increased requirements and transparency for solvency and implementation of international financial reporting standards in their activities;

- introduction of capital adequacy standards in such a way that it makes pseudo-insurance more difficult;

- introduction of a stimulating tax policy with the aim of developing long-term life insurance, personal insurance, including investment insurance, participation of insurers in the system of non-state pension provision, as well as mandatory medical insurance by allocating a share of contributions from these types of insurance to the gross expenses of legal entities as well , as improvement of taxation of income of individuals;

- improvement of the regulatory and legal regulation of actuaries, completion of the creation of a system of training and certification of actuaries in Ukraine with the gradual transfer of these functions to a self-regulatory organization;

- to ensure the implementation and development of additional legislation that will help prevent the use of the insurance market for dubious and illegal transactions and fraud, taking into account the laundering of criminal proceeds.

At the same time, mass types of insurance can be a priority direction for the state: property insurance of citizens, auto insurance, pension insurance and life insurance, travel insurance, medical insurance and others [2]. In the conditions of a market economy, voluntary insurance becomes a priority, due to which there is a significant problem of reviving public trust in insurance as one of the most effective forms of social protection of citizens, as well as increasing the attention of insurers to the public as the main partner. Today in Ukraine it is important to create appropriate economic conditions for the development of the insurance market by improving the socio-economic situation in the country. The tasks of state regulation of insurance activity should be considered both the protection of consumer rights and the provision of proper conditions for the functioning of policyholders. Only if state regulation is carried out on the basis of the most optimal combination of state, commercial and public interests, it will become more possible to build a developed insurance market in Ukraine.

Summarizing the above, we can conclude that the state needs to take the following measures: create a universal national stock exchange that will operate on the principles of regulated EU markets and will be able to integrate into the global financial space; to develop an effective system of state regulation of the capital market to monitor compliance with legal requirements and prevent fraud; to improve the institutional structure of the capital market in order to attract the savings of the population and diversify the resource base, etc. Currently, the state should contribute to the improvement of the legal framework, the development of market self-regulation, the creation of favorable conditions for the development of investment activities, the implementation of information campaigns among the population, primarily with the aim of stimulating the development of voluntary insurance, as well as to increase the level of stability and liquidity of insurance companies, to strengthen competition in market boundaries and diversification of insurance products, ensuring high standards of protection of the rights of consumers of insurance services, creating high transparency of the functioning of the insurance market.

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21. SYSTEMATIZATION OF METHODS FOR DETECTING INSIDERS' CYBER THREATS IN BANKS

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Introduction. Industries 4.0 and 5.0 have ushered in a transformative era for the financial sector, particularly within the realm of banking. This evolution revolves around the integration of intelligent technologies, automation, and data-driven decision-making. While these advancements offer considerable benefits, they also expose the financial sector, including banks, to an elevated risk of cyber threats. The increasing interconnectivity of banking systems, driven by the integration of devices and the adoption of the Industrial Internet of Things (IIoT), broadens the avenues through which cyber threats can infiltrate. This connectivity extends to IoT devices and sensors utilized for real-time data collection, which, despite their advantages, often lack robust security measures, rendering them susceptible to exploitation.

Data analytics and machine learning play a pivotal role in Industry 4.0 and 5.0, shaping the financial sector's ability to make informed decisions. However, the extensive data generated and processed in this context becomes an attractive target for cyber threats, ranging from data breaches to manipulation. Automation stands out as a key feature, empowering banks with streamlined processes and improved efficiency. Yet, this reliance on automated systems introduces vulnerabilities that malicious actors may exploit to manipulate or disrupt banking operations. Cloud computing is integral to modern banking practices, offering scalability and flexibility. However, the migration of financial data to the cloud introduces new security challenges, such as the potential for unauthorized access to sensitive information. Smart infrastructure in the financial sector encompasses smart banking applications, interconnected banking networks, and global supply chains. The complexity of these systems amplifies the risk of cyber threats, including disruptions, theft of intellectual property, and compromises to the integrity of financial products.

Emerging technologies like artificial intelligence and blockchain have found application in banking services. While these innovations enhance operational capabilities, they also bring forth new attack vectors that cyber adversaries may exploit. Human-machine interaction within banking, coupled with the integration of intelligent machines, introduces the risk of social engineering attacks. Cybercriminals may manipulate individuals to gain access to sensitive financial information or compromise

banking systems. Moreover, the rapid evolution of technology in Industry 4.0 and 5.0 poses a challenge for banks, as the pace of technological advancement can outstrip the development of robust cybersecurity measures. This dynamic creates a scenario where new technologies may be embraced without sufficient security considerations, leaving banking systems vulnerable to cyber threats. The characteristics of Industries 4.0 and 5.0 pose distinct challenges for the financial sector, especially within the domain of banking. The convergence of interconnectivity, IoT devices, data-driven decision-making, automation, cloud computing, smart infrastructure, emerging technologies, human-machine interaction, and rapid technological evolution collectively heightens the susceptibility of banks to cyber threats. In navigating this landscape, it becomes imperative for the financial sector to continually prioritize and enhance cybersecurity measures to mitigate the potential consequences of cyberattacks.

Literature review. The problem of detecting and countering insider cyber threats is practically significant. However, its relevance is only beginning to grow in scientific circles since it is narrowly focused and very specific. It confirms the analysis result based on the query made in the Scopus database. Only 86 publications devoted to this topic were found, which indicates insufficient study of this topic. A bibliometric analysis was conducted using keywords using the analytical package VOSviewer and the obtained data (Fig. 1).

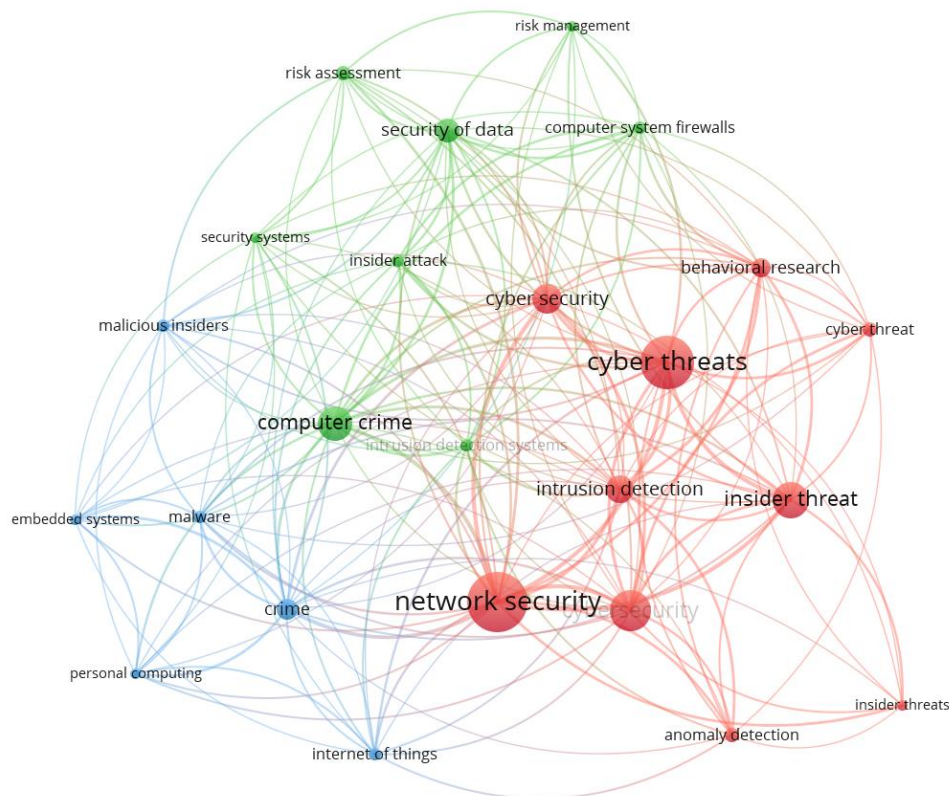


Figure 1. Results of bibliometric analysis of publications identified the subject area of "cyber threats" and "insiders"

Source: Developed by the author based on Scopus Data Base

Three clusters of scientific research were established based on the results of the analysis. The publications of the red cluster (Fig. 1) concern the issues of cyber threats, insider threats, behavioural aspects, cyber security, anomaly detection, and intrusion detection. For example, the scientists of this group developed the "User Behavior Analysis" tool for continuous analysis of insiders' use of their organisation's IT networks, which allows visualisation of the organisation's cyber security risks [1]. The authors of the study [2] also consider the behavioural aspects of insider cybercriminals and propose a scientific approach based on analysing the system logs of endpoint events in the IT environment of the enterprise and detecting anomalous subgraphs of causality. Some scientists are focusing on developing models based on machine learning for detecting anomalies and intrusions. Deep neural network models are proposed to counter insider cyber threats based on assumptions about processing zero-day attacks and low computing power and resources [3]. Scientists from Turkey and the USA presented a multi-class classifier for classifying attacks with safe traffic, which is built based on machine learning and allows for determining the network addresses of attackers [4].

The scientists from the green cluster of publications (Fig. 1) studied issues related to risk assessment, risk management, computer crimes, insider attacks, data security and security systems. A group of American scientists is investigating the problem of cyber sabotage by employees of the organization and its impact on the company's security risks as a whole [5]. A team of authors from Sweden surveyed the perception of cyber threats by employees of companies in the financial sector [6]. As a result, it was determined that the risk management system should also consider cyber risk. Australian experts investigated the company's vulnerabilities related to a deliberate internal threat [7]. They identified critical risks to an organization's security as those spanning personnel, process, technology, and strategy. Scientists from France and Greece proposed a methodology for assessing cyber security risks for maritime transport enterprises, but they focused more on external attackers than internal ones [8].

Studies of the blue cluster (Fig. 1) relate to the problems of embedded systems, the Internet of Things, malicious insiders, malware, and personal computing. A group of scientists conducted a theoretical study on the issue of detecting cyber threats by insiders in the Internet of Things, as the massive connection of mobile devices to common platforms is predicted in the future [9]. Researchers at the University of Bradford (Bradford, United Kingdom) focused on cyber threat models. They proposed a framework for integrating blockchain technology with peripheral devices, which allows for checking the integrity of incoming information [10]. The next group of authors proposed their model of the cyber threat chain for multimedia security, which is used to identify cyber threats [11]. Experts from the USA investigated the concepts and methods of cyber security related to IoT systems [12].

An analysis of research published in journals and conference proceedings indexed in the Scopus database has shown that countering cyber threats initiated by insiders in banks is under-researched. Most research is devoted to studying this issue for the

Internet of Things. There is also no systematisation of methods that can be applied in the banking sector. Therefore, this study will be devoted to systematising methods for detecting cyber threats due to the actions of bank insiders.

Results. Cyber threats in banks encompass a range of malicious activities and security vulnerabilities that pose risks to the confidentiality, integrity, and availability of financial systems and data. These threats include:

- **Data Breaches.** Unauthorized access to sensitive customer information, including personal and financial data, can lead to identity theft, financial fraud, and reputational damage for the bank.
 - **Phishing Attacks.** Attempts to trick bank employees or customers into providing sensitive information, such as login credentials or account details, by posing as a trustworthy entity.
 - **Ransomware.** Malicious software that encrypts a bank's data, rendering it inaccessible until a ransom is paid. Ransomware attacks can lead to financial losses, operational disruptions, and reputational harm.
 - **Insider Threats.** Malicious activities or negligence by employees, contractors, or other trusted individuals within the bank, leading to unauthorized access, data leaks, or sabotage.
 - **Distributed Denial of Service (DDoS) Attacks.** Overloading a bank's systems with excessive traffic to disrupt services, leading to downtime, financial losses, and potential reputational damage.
 - **ATM Skimming.** Installing devices on ATMs to capture card information, enabling criminals to clone cards and make unauthorized transactions.
 - **Malware and Trojans.** Software designed to infiltrate bank systems, compromise security, and steal sensitive information or conduct fraudulent transactions.
 - **Supply Chain Attacks.** Exploiting vulnerabilities in the bank's supply chain, such as compromising third-party vendors, to gain unauthorized access or disrupt operations.
 - **Social Engineering Attacks.** Manipulating individuals within the bank through deceptive tactics to obtain sensitive information or gain unauthorized access.
- Detecting cyber threats in banks is crucial for several reasons.
- **Protecting Customer Data.** Banks handle vast amounts of sensitive customer information. Detecting cyber threats helps prevent unauthorized access and protects customers from identity theft and financial fraud.
 - **Preserving Trust and Reputation.** A successful cyberattack can erode trust in the bank's ability to safeguard customer data. Detecting threats and responding effectively helps preserve trust and maintain a positive reputation.
 - **Preventing Financial Losses.** Cyber threats can lead to financial losses through fraud, ransom payments, and operational disruptions. Detection is essential for preventing or minimizing these financial impacts.
 - **Maintaining Regulatory Compliance.** Banks are subject to strict regulations regarding the protection of customer data and financial transactions.

Detecting and mitigating cyber threats is necessary to comply with these regulations and avoid legal consequences.

- **Ensuring Operational Continuity.** Cyberattacks can disrupt banking operations, leading to downtime and service interruptions. Detecting threats in real-time allows for prompt response, minimizing the impact on operational continuity.
- **Mitigating Insider Threats.** Detecting unusual or suspicious behaviour among employees helps identify potential insider threats and prevents unauthorized access or data breaches.
- **Adapting to Evolving Cyber Threats.** The cybersecurity landscape is dynamic, with new threats emerging regularly. Detecting cyber threats allows banks to stay ahead of evolving attack techniques and implement proactive measures to counter emerging risks.

In summary, detecting cyber threats in banks is essential for protecting customer data, preserving trust and reputation, preventing financial losses, ensuring regulatory compliance, maintaining operational continuity, mitigating insider threats, and adapting to the constantly evolving cybersecurity landscape.

A cyber threat initiated by an insider, such as a bank employee, is commonly referred to as an insider threat. This type of threat involves individuals within an organization exploiting their privileged access, knowledge, or position to compromise the confidentiality, integrity, or availability of information systems. Insider threats in the context of a bank can take various forms, including:

1. **Unauthorized Access.** An insider may misuse their legitimate access to banking systems or databases to gain unauthorized access to sensitive customer information, financial data, or proprietary systems.
2. **Data Theft or Leakage.** A bank employee might intentionally or unintentionally steal sensitive data, including customer account information, credit card details, or other proprietary data, and leak it to external entities.
3. **Fraudulent Transactions.** Insiders with access to transactional systems may engage in fraudulent activities, such as unauthorized fund transfers, creating fictitious accounts, or manipulating financial records for personal gain.
4. **Abuse of Privileges.** Employees with elevated privileges may abuse their access to perform actions beyond their authorized scope, potentially altering system configurations, deleting critical data, or disrupting services.
5. **Sabotage.** An insider threat may involve an employee intentionally sabotaging the bank's operations, networks, or systems, causing disruptions, financial losses, or reputational damage.
6. **Disclosure of Sensitive Information.** Insiders may disclose confidential information to external parties, such as competitors or threat actors, for financial gain, revenge, or other motivations.
7. **Social Engineering.** Insider threats can also involve manipulation through social engineering tactics, where employees are tricked into divulging sensitive information or facilitating unauthorized access.

8. Compromising Security Measures. Insiders might intentionally weaken or bypass security measures within the bank's systems, making it easier for external attackers to gain access or conduct malicious activities.

9. Insider Trading. In the context of a financial institution, insider threats may extend to insider trading, where employees leverage privileged information for personal financial gain in the stock market.

Detecting insider threats is challenging because insiders often have legitimate access to systems and data. However, it is essential for banks to implement robust security measures and monitoring mechanisms to identify unusual or suspicious behaviour. This may involve monitoring employee activities, conducting regular audits, implementing access controls, and utilizing behavioural analytics to identify patterns indicative of insider threats.

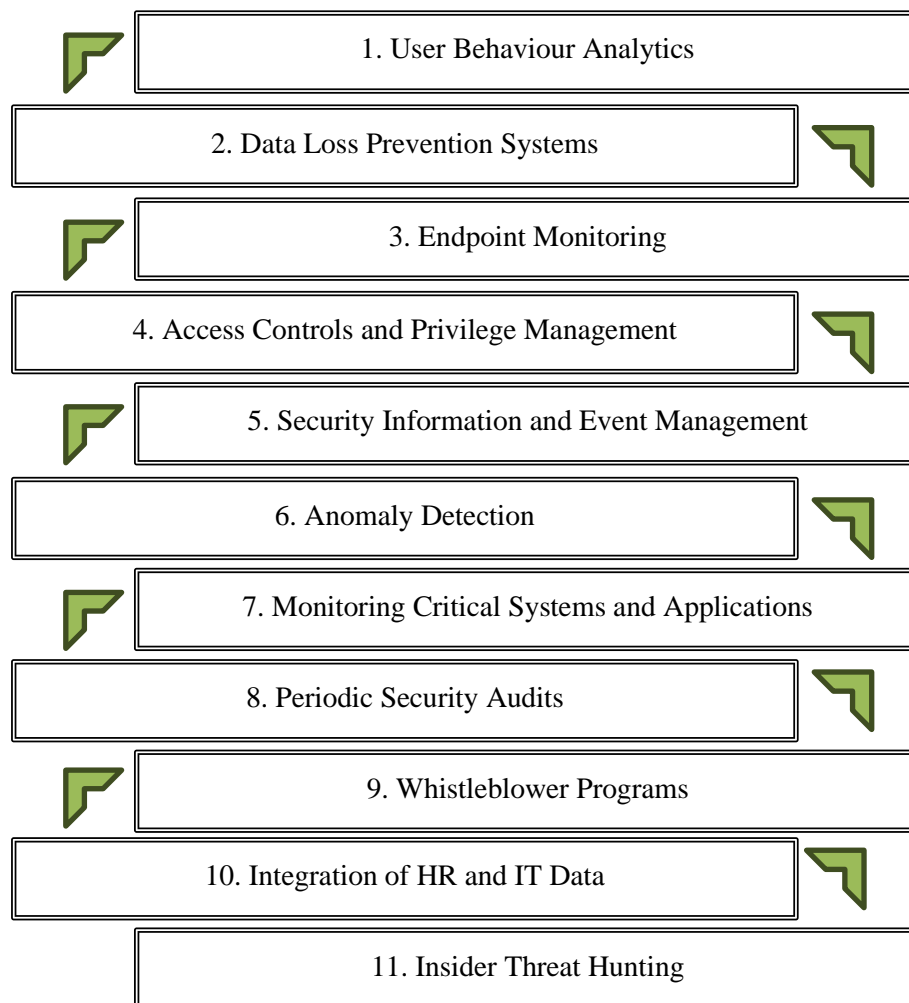


Figure 2. Systematization of methods for detecting insiders' cyber threats in banks

Source: Developed by the author

Effective cybersecurity strategies also involve educating employees about security best practices, fostering a culture of awareness, and implementing measures to prevent, detect, and respond to insider threats, thereby minimizing the potential risks posed by individuals within the organization. Detecting cyber threats from insider

threats, including bank employees, requires a combination of technological solutions, monitoring processes, and employee awareness programs. Some methods commonly employed for detecting insider threats are presented in Figure 2.

User Behaviour Analytics (UBA) is a cybersecurity approach that involves monitoring and analysing patterns of user behaviour within an organization's network to identify anomalies and potential security threats. The goal is to detect and respond to abnormal activities that may indicate insider threats, compromised accounts, or other malicious activities. Here's an overview of how User Behaviour Analytics is carried out:

1. **Data Collection.** UBA relies on the collection of data from various sources within the organization's IT infrastructure. This includes log files, network traffic, system events, application logs, and other relevant data sources.
2. **Data Normalization.** The collected data is normalized to create a standardized format, allowing for consistent analysis. Normalization involves cleaning and organizing data to eliminate inconsistencies and make it suitable for analysis.
3. **Baseline Establishment.** A baseline of normal user behaviour is established by analysing historical data. This baseline represents the typical patterns of behaviour for users, systems, and applications within the organization.
4. **Behavioural Analytics.** Behavioural analytics algorithms are applied to the normalized data to identify patterns and establish a baseline for what constitutes normal behaviour. Machine learning techniques may be used to adapt to evolving patterns over time.
5. **Anomaly Detection.** UBA tools continuously monitor user behaviour in real-time and compare it against the established baseline. Any deviations or anomalies from the expected behaviour are flagged as potential security incidents.
6. **Risk Scoring.** Detected anomalies are assigned a risk score based on the severity and context of the behaviour. High-risk activities, such as unauthorized access or unusual data transfers, may receive higher scores, indicating a higher level of concern.
7. **Contextual Analysis.** The context of user behaviour is considered during analysis. For example, accessing sensitive financial data may be normal behaviour for someone in the finance department but could be suspicious for an employee in a different role.
8. **Correlation with External Threat Intelligence.** UBA tools may correlate internal behavioural anomalies with external threat intelligence feeds to identify patterns associated with known threats, attack campaigns, or malicious actors.
9. **Incident Response and Investigation.** When a significant anomaly or high-risk behaviour is detected, UBA tools generate alerts for security teams. Analysts can then investigate the incidents, determine the scope of the threat, and take appropriate remedial actions.
10. **Continuous Learning and Adaptation.** UBA solutions often include machine learning capabilities to continuously learn from new data and adapt to changes in user behaviour. This helps in reducing false positives and improving the accuracy of threat detection over time.

11. Integration with Other Security Systems. UBA tools may integrate with other security systems, such as Security Information and Event Management (SIEM) platforms, endpoint protection, and identity and access management solutions, to enhance overall security posture.

12. Compliance Monitoring. UBA can also be used to monitor user behaviour for compliance with industry regulations and internal policies. This includes ensuring that users are not accessing unauthorized data or performing actions that violate security policies.

In summary, User Behaviour Analytics involves collecting and analysing data, establishing baselines of normal behaviour, detecting anomalies, assigning risk scores, considering contextual factors, correlating with threat intelligence, generating alerts, and supporting incident response efforts. The continuous learning aspect is crucial for UBA to adapt to changing user behaviours and evolving security threats. The next important method to prevent cyber threats from insiders is the use of Data Loss Prevention (DLP) Systems. They are designed to identify, monitor, and protect sensitive data to prevent unauthorized access, sharing, or leakage. These systems use a combination of technologies and policies to ensure that sensitive information remains secure. DLP systems allow banks to solve the following tasks in the process of countering cyber threats:

1. Data Discovery and Classification. DLP systems begin by identifying and classifying sensitive data within an organization. This involves locating data repositories, such as databases, file servers, and endpoints, and then classifying the data based on predefined policies.

2. Policy Definition. Organizations define policies that dictate how sensitive data should be handled. These policies specify rules and conditions for data protection, such as who can access certain types of data, what actions can be performed on it, and under what circumstances data can be shared or transmitted.

3. Endpoint Protection. DLP solutions are often deployed on endpoints (computers, laptops, mobile devices) to monitor and control data interactions. Endpoint DLP may involve monitoring data in use, such as when it's being accessed or modified on a device.

4. Network Monitoring. DLP systems monitor data as it moves across the network. This involves inspecting network traffic for sensitive information and applying policies to prevent unauthorized data transfers.

5. Content Inspection. DLP solutions use content inspection techniques, including regular expressions, keyword matching, and advanced data fingerprinting, to analyse the content of files and communications. This helps identify sensitive information and enforce policies based on the content.

6. Contextual Analysis. DLP systems consider the context in which data is being used. For example, they may analyse user behaviour, the location of data access, and the devices being used to determine if an action is consistent with the organization's policies.

7. Encryption and Tokenization. DLP solutions may incorporate encryption or tokenization to protect sensitive data. Encryption ensures that even if data is intercepted, it remains unreadable without the appropriate decryption key. Tokenization replaces sensitive data with non-sensitive placeholders (tokens) while maintaining referential integrity.
8. Incident Response. DLP systems generate alerts and reports when policy violations occur. Incident response capabilities allow organizations to investigate and remediate incidents promptly. This may involve blocking data transmission, quarantining affected files, or notifying administrators.
9. User Education and Training. User awareness is a crucial aspect of DLP. Organizations often provide training to users on data security best practices, the importance of handling sensitive information responsibly, and how to use DLP tools effectively.
10. Regular Auditing and Reporting. Continuous monitoring and auditing help organizations assess the effectiveness of their DLP policies. Regular reports provide insights into incidents, policy compliance, and areas that may require additional attention.

By combining these elements, DLP systems play a crucial role in safeguarding sensitive data and preventing data breaches within an organization. Endpoint monitoring involves the continuous observation and analysis of activities on individual devices, such as computers, laptops, and mobile devices, within a network. The goal is to ensure the security and integrity of these endpoints by detecting and responding to potential security threats. Here's an overview of how endpoint monitoring is carried out:

1. Agent Deployment. Endpoint monitoring typically begins with the deployment of monitoring agents on individual devices. These agents collect data about system and user activities and transmit this information to a centralized monitoring system.
2. Data Collection. The monitoring agents collect a wide range of data, including system logs, application logs, network traffic, and user activities. This data is then analysed to identify patterns, anomalies, and potential security incidents.
3. Behavioural Analysis. Endpoint monitoring systems use behavioural analysis to establish a baseline of normal behaviour for each endpoint. Deviations from this baseline can indicate potential security threats. For example, sudden changes in user behaviour, a spike in network activity, or unusual system processes may trigger alerts.
4. Malware Detection. Endpoint monitoring solutions often include antivirus and anti-malware capabilities. These features scan files and processes on endpoints to identify and eliminate malicious software. Signature-based detection and heuristic analysis are common techniques used for malware detection.
5. Vulnerability Assessment. Endpoint monitoring may include vulnerability assessments to identify and address potential security weaknesses on individual devices. This involves scanning for outdated software, missing patches, and configuration issues that could be exploited by attackers.

6. **User Activity Monitoring.** Monitoring user activities is a critical aspect of endpoint security. This includes tracking login and logout events, file access and modification, application usage, and other user interactions. Unusual or unauthorized activities can trigger alerts for further investigation.
7. **Data Loss Prevention (DLP).** Endpoint monitoring often integrates with DLP systems to prevent sensitive data from being accessed or transmitted inappropriately. This includes monitoring and controlling data transfers, removable storage devices, and communication channels.
8. **Endpoint Firewall and Network Connection Monitoring.** Monitoring network connections and firewall activities on endpoints helps detect and block unauthorized network traffic. This includes monitoring inbound and outbound connections to identify potentially malicious behaviour.
9. **Alerting and Incident Response.** When the endpoint monitoring system identifies suspicious activities or potential security incidents, it generates alerts. Security teams can then investigate these alerts and, if necessary, initiate incident response procedures to contain and mitigate the threat.
10. **Integration with Security Information and Event Management (SIEM).** Endpoint monitoring solutions often integrate with SIEM systems to provide a centralized platform for managing and analysing security events. This integration facilitates correlation of endpoint data with information from other parts of the network, enhancing overall threat detection and response capabilities.
11. **Policy Enforcement.** Endpoint monitoring enforces security policies by controlling access, detecting policy violations, and responding to incidents based on predefined rules and configurations.

Overall, effective endpoint monitoring is a crucial component of a comprehensive cybersecurity strategy, providing real-time visibility into the security status of individual devices and helping organizations proactively address potential threats.

Access controls and privilege management are critical components of cybersecurity in banks to prevent cyber threats from both external attackers and insiders. Insiders, including employees, contractors, or third-party service providers, pose a significant risk as they already have some level of access to the bank's systems and sensitive information. Here's an overview of how access controls and privilege management are carried out in banks to mitigate the risk of insider threats:

1. **User Authentication.** Banks implement strong user authentication mechanisms to ensure that only authorized individuals can access the network and systems. This often includes the use of multi-factor authentication (MFA), requiring users to provide multiple forms of identification, such as passwords, smart cards, or biometrics.
2. **Role-Based Access Control (RBAC).** RBAC is a fundamental principle in access controls. It involves assigning specific roles to users based on their job responsibilities. Each role has a predefined set of permissions, and users are granted access only to the resources necessary for their roles. This minimizes the risk of unauthorized access.

3. **Least Privilege Principle.** The principle of least privilege is applied to limit user access rights and permissions to the minimum necessary for the performance of their job functions. This reduces the potential impact of insider threats by restricting the ability of individuals to access sensitive information or critical systems.
 4. **Access Reviews and Auditing.** Regular access reviews and audits are conducted to ensure that user access privileges align with their job responsibilities. This involves periodically reviewing user accounts, permissions, and activity logs to identify and remediate any discrepancies or anomalies.
 5. **Monitoring User Activities.** Banks deploy advanced monitoring systems to track and log user activities. This includes monitoring login attempts, file accesses, system changes, and other actions taken by users. Anomalies or suspicious activities trigger alerts for further investigation.
 6. **Privilege Elevation and Delegation.** Privilege management involves controlling access to privileged accounts and ensuring that users only have elevated privileges when necessary. Privilege elevation requires additional approval or authentication, reducing the risk of unauthorized access to critical systems.
 7. **Encryption of Sensitive Data.** Encrypting sensitive data both in transit and at rest is a crucial aspect of access controls. Even if an insider gains access to data, encryption ensures that the information remains unreadable without the appropriate decryption keys.
 8. **Incident Response and Forensics.** Banks have incident response plans in place to address security incidents promptly. This includes forensics capabilities to investigate and analyse security events, especially those related to potential insider threats. Rapid response can help contain and mitigate the impact of a security incident.
 9. **Training and Awareness Programs.** Banks conduct regular training and awareness programs to educate employees about the importance of cybersecurity and the risks associated with insider threats. This helps foster a security-conscious culture and encourages employees to report any suspicious activities.
 10. **Vendor and Third-Party Access Controls.** If banks collaborate with external vendors or third-party service providers, access controls are extended to these entities. This involves implementing stringent controls, monitoring their activities, and ensuring that they adhere to security standards.
 11. **Regular Security Assessments.** Banks conduct regular security assessments, including penetration testing and vulnerability assessments, to identify and address potential weaknesses in access controls and privilege management systems.
- By implementing a robust combination of these measures, banks can significantly reduce the risk of insider threats and enhance their overall cybersecurity posture. It's crucial to have a holistic approach that combines technical controls, policies, and user awareness to address the multifaceted challenges posed by insider threats.

Security Information and Event Management (SIEM) is a crucial component of cybersecurity in banks, helping to prevent and detect cyber threats, including those posed by insiders. SIEM systems collect and analyse log data from various sources

within the IT infrastructure, providing a comprehensive view of security events. Here's an overview of how SIEM is implemented in banks to address insider threats:

1. Log Collection and Aggregation. SIEM systems collect logs and event data from a wide range of sources, including servers, network devices, firewalls, endpoints, and applications. This aggregated data provides a holistic view of the bank's IT environment.

2. Normalization and Parsing. The collected logs often come in different formats. SIEM systems normalize and parse this data, converting it into a standardized format. This process enables easier correlation and analysis of events from diverse sources.

3. Correlation and Analysis. SIEM tools correlate events from various sources to identify patterns or anomalies that may indicate a security threat. For insider threat detection, this involves analysing user activities, login patterns, file access, and other behaviour to identify deviations from the norm.

4. Threat Intelligence Integration. SIEM solutions integrate with threat intelligence feeds to enhance their ability to recognize known malicious indicators. This includes IP addresses, domains, and file hashes associated with cyber threats. By incorporating threat intelligence, SIEM systems can identify and respond to potential insider threats more effectively.

5. User Behaviour Analytics (UBA). UBA is a feature in SIEM systems that focuses on analysing user behaviour to detect unusual patterns or activities. This is particularly important for identifying insider threats, as it can flag behaviours that deviate from normal user activities.

6. Alerting and Notification. When SIEM systems detect suspicious activities or potential security incidents, they generate alerts. These alerts are sent to security analysts or administrators, triggering an investigation into the nature and severity of the event.

7. Incident Response Automation. SIEM platforms often include incident response capabilities, allowing security teams to automate certain response actions. For example, an automated response might involve blocking a user account, isolating a compromised system, or adjusting access controls in real-time.

8. Forensic Analysis. In the event of a security incident, SIEM systems support forensic analysis by providing detailed logs and timelines of events. This aids in understanding the scope of the incident, how it occurred, and the impact on the organization.

9. Compliance Reporting. Banks are subject to various regulatory requirements and compliance standards. SIEM systems assist in compliance management by generating reports that demonstrate adherence to security policies and regulations.

10. Continuous Monitoring. SIEM provides continuous monitoring of the IT environment, allowing banks to detect and respond to insider threats in real-time. This proactive approach is crucial for minimizing the impact of security incidents.

11. Integration with Other Security Tools. SIEM solutions integrate with other security tools, such as antivirus systems, firewalls, and endpoint protection solutions. This integration enhances the overall security posture by combining insights from multiple sources.

12. **Training and Skill Development.** Security analysts responsible for monitoring SIEM alerts and responding to incidents undergo training to enhance their skills. This ensures that the security team is well-equipped to handle insider threats effectively. Implementing SIEM effectively in a banking environment requires a combination of technology, processes, and skilled personnel. Regular updates to threat intelligence, continuous refinement of correlation rules, and adapting to evolving threat landscapes are essential for maintaining the effectiveness of SIEM in preventing and mitigating insider threats.

Anomaly detection in banks is a crucial mechanism for preventing and detecting cyber threats, including those posed by insiders. It involves the identification of unusual patterns or behaviours within the bank's IT environment that may indicate a security threat. Here's an overview of how anomaly detection is carried out in banks:

1. **Baseline Establishment.** Anomaly detection starts with the establishment of a baseline or a normal behaviour profile for various entities within the IT environment. This includes users, applications, devices, and network traffic. The baseline represents typical patterns of behaviour under normal circumstances.
2. **Behavioural Profiling.** Banks use behavioural profiling techniques to analyse historical data and understand the typical behaviour of users and systems. This involves considering factors such as login times, access patterns, data transfer volumes, and application usage to create a profile of normal activities.
3. **Machine Learning and AI Algorithms.** Advanced anomaly detection relies on machine learning (ML) and artificial intelligence (AI) algorithms. These algorithms analyse large datasets and learn to recognize patterns that deviate from the established baseline. ML models can adapt over time, improving their accuracy in identifying anomalies.
4. **User Behaviour Analytics (UBA).** UBA focuses specifically on analysing user activities to identify abnormal behaviour. This includes monitoring login patterns, access to sensitive data, file transfers, and other actions taken by users. UBA systems often integrate with anomaly detection to enhance the identification of insider threats.
5. **Network Anomaly Detection.** Anomaly detection extends to network activities, where abnormal patterns in data traffic, communication between systems, or network usage can be indicative of a security threat. Unusual spikes in data transfer or communication with suspicious external entities may trigger alerts.
6. **Endpoint Anomaly Detection.** Anomaly detection is applied to endpoints, such as computers and servers, to monitor activities on individual devices. This includes identifying abnormal processes, unauthorized software installations, or unusual system behaviour that may indicate a compromise.
7. **Real-Time Monitoring.** Anomaly detection systems operate in real-time, continuously monitoring activities and comparing them against the established baselines. This enables prompt identification and response to security incidents, reducing the impact of potential threats.
8. **Alerting and Notification.** When anomalies are detected, the system generates alerts and notifications. Security teams are then notified to investigate the potential threat

further. These alerts can be based on predefined thresholds or deviations from learned behaviour.

9. Contextual Analysis. Anomaly detection systems consider contextual information when analysing deviations from normal behaviour. Context may include factors such as time of day, user roles, and the specific tasks being performed. This helps reduce false positives and enhances the accuracy of threat detection.

10. Integration with Other Security Tools. Anomaly detection systems often integrate with other security tools, such as SIEM, endpoint protection, and identity management solutions. This integration provides a comprehensive security posture and allows for a coordinated response to security incidents.

11. Continuous Improvement. Anomaly detection systems undergo continuous improvement through feedback loops. Security analysts review and validate alerts, providing feedback that helps refine algorithms and improve the accuracy of anomaly detection over time.

12. Insider Threat Indicators. Anomaly detection specifically focuses on identifying indicators of insider threats, such as unusual access to sensitive data, multiple failed login attempts, or attempts to bypass access controls. This targeted approach helps banks address the unique challenges posed by insider threats.

Implementing anomaly detection in a bank's cybersecurity strategy enhances the organization's ability to proactively identify and mitigate security threats, including those originating from within. Regularly updating baselines, refining algorithms, and staying abreast of evolving threat landscapes are essential for the continued effectiveness of anomaly detection systems.

Monitoring critical systems and applications in banks is a fundamental aspect of cybersecurity to prevent and detect cyber threats, including those that may arise from insider activities. Here's an overview of how monitoring of critical systems and applications is carried out in banks:

1. Inventory and Classification. Banks start by creating an inventory of critical systems and applications. This involves identifying and classifying the systems and applications based on their importance to the bank's operations and the sensitivity of the data they handle.

2. Continuous Monitoring. Critical systems and applications undergo continuous monitoring to ensure their normal functioning. Monitoring involves the real-time observation of system performance, network traffic, and user activities to identify any deviations from expected behaviour.

3. Logging and Auditing. Logging and auditing mechanisms are implemented on critical systems and applications to capture detailed information about user activities, system changes, and other relevant events. These logs are invaluable for forensic analysis and investigating security incidents.

4. Security Information and Event Management (SIEM). SIEM systems play a crucial role in aggregating and analysing log data from critical systems and applications. SIEM tools correlate events, detect anomalies, and generate alerts for security incidents. This centralized approach enhances visibility and streamlines the monitoring process.

5. **User Behaviour Monitoring.** Monitoring user behaviour on critical systems is essential for detecting insider threats. This involves tracking login activities, file access, changes to system configurations, and other user actions. Anomalous behaviour, such as unauthorized access or unusual data transfers, can be indicative of a potential insider threat.
 6. **Vulnerability Scanning.** Regular vulnerability scans are conducted on critical systems and applications to identify and address potential security weaknesses. This proactive approach helps prevent exploitation by insiders or external attackers.
 7. **Patch Management.** Critical systems and applications are kept up-to-date through patch management processes. This ensures that known vulnerabilities are addressed promptly, reducing the risk of exploitation.
 8. **Endpoint Protection.** Endpoint protection solutions are deployed on devices accessing critical systems. These solutions include antivirus software, firewalls, and other security measures to prevent malware infections and secure endpoints against unauthorized access.
 9. **Access Controls and Privilege Management.** Access controls are enforced to restrict user access to critical systems based on the principle of least privilege. Privilege management ensures that users have only the necessary permissions to perform their job functions, minimizing the risk of insider threats.
 10. **Encryption of Data in Transit and at Rest.** Encryption is applied to data transmitted between critical systems and applications and data stored on these systems. This safeguards sensitive information, even if an unauthorized user gains access to the data.
 11. **Incident Response Planning.** Banks develop and maintain incident response plans specific to critical systems and applications. These plans outline procedures for identifying, responding to, and recovering from security incidents, including those involving insider threats.
 12. **Training and Awareness Programs.** Employees with access to critical systems undergo security training to raise awareness about the importance of cybersecurity, the risks associated with insider threats, and the need to adhere to security policies and procedures.
 13. **Continuous Improvement.** The monitoring strategy for critical systems is subject to continuous improvement. This involves regular reviews of monitoring tools and processes, adjustments to detection rules, and the integration of new technologies to enhance the effectiveness of monitoring efforts.
 14. **Third-Party Security Assessments.** If critical systems and applications are managed or hosted by third-party vendors, banks conduct security assessments to ensure that these vendors adhere to security standards and practices.
- By implementing a comprehensive monitoring strategy for critical systems and applications, banks can enhance their cybersecurity posture, reduce the risk of insider threats, and respond effectively to security incidents. This multi-layered approach involves a combination of technology, processes, and personnel to safeguard the integrity and security of critical assets.

Periodic security audits in banks play a crucial role in identifying vulnerabilities, ensuring compliance with security policies, and preventing insider cyber threats. These audits are systematic evaluations of the bank's information security controls, processes, and technologies. Here's an overview of how periodic security audits are carried out in banks to address insider threats:

1. **Audit Planning and Scope Definition.** The audit process begins with planning, where the scope of the audit is defined. This includes identifying the systems, applications, and processes to be assessed. The scope may cover areas such as access controls, data protection, incident response, and employee training.
2. **Regulatory Compliance Review.** Banks are subject to various regulations and industry standards. Security audits include a review of compliance with these regulatory requirements, such as PCI DSS (Payment Card Industry Data Security Standard) or GDPR (General Data Protection Regulation), to ensure that the bank is meeting its legal obligations.
3. **Access Controls Assessment.** Auditors evaluate the effectiveness of access controls to critical systems and data. This involves reviewing user permissions, authentication mechanisms, and adherence to the principle of least privilege. The goal is to prevent unauthorized access, especially from insiders.
4. **User Account Management.** The audit assesses how user accounts are created, modified, and deactivated. It ensures that account provisioning and de-provisioning processes are well-managed, reducing the risk of former employees retaining access.
5. **Data Protection and Encryption.** The security of sensitive data is a priority. Auditors assess whether encryption is appropriately applied to data in transit and at rest. This includes evaluating encryption mechanisms, key management, and data protection practices.
6. **Incident Response Testing.** The bank's incident response capabilities are tested during security audits. This involves simulating security incidents to assess the bank's ability to detect, respond, and recover. The effectiveness of communication, coordination, and documentation is also evaluated.
7. **Endpoint Security.** Auditors assess the security measures in place for endpoints, including workstations, laptops, and mobile devices. This includes antivirus software, endpoint protection, and the implementation of security patches and updates.
8. **Physical Security Checks.** Physical security is an essential aspect of overall security. Auditors evaluate physical access controls to data centres, server rooms, and other critical infrastructure. This helps prevent unauthorized access to sensitive hardware.
9. **Network Security Assessment.** The security of the bank's network is examined, including firewalls, intrusion detection and prevention systems, and network segmentation. Auditors assess the effectiveness of these measures in preventing unauthorized access and protecting against insider threats.
10. **Security Awareness and Training.** Employee training and awareness programs are reviewed to ensure that staff is educated about security policies, the risks of insider threats, and best practices. This helps create a security-conscious culture within the organization.

11. **Third-Party Vendor Assessment.** If the bank relies on third-party vendors for services, auditors assess the security measures implemented by these vendors. This ensures that the bank's ecosystem remains secure, even when relying on external partners.
12. **Documentation and Policies Review.** Auditors review security documentation, policies, and procedures to ensure that they are up-to-date and align with industry best practices. This includes policies related to access controls, incident response, data protection, and more.
13. **Penetration Testing and Vulnerability Assessment.** Security audits may include penetration testing and vulnerability assessments to identify weaknesses that could be exploited by insiders or external attackers. This proactive approach helps address potential security gaps.
14. **Audit Report and Remediation.** At the conclusion of the audit, a detailed report is generated, highlighting findings, recommendations, and areas for improvement. The bank's management uses this report to prioritize and implement remediation measures to enhance security.
15. **Follow-Up Audits.** To ensure continuous improvement, follow-up audits may be conducted to verify that identified issues have been addressed and that the bank's security posture has improved over time.

Regular, thorough security audits are essential for banks to maintain a robust cybersecurity posture, prevent insider threats, and demonstrate their commitment to security and compliance. These audits provide insights that help banks proactively address vulnerabilities and continually enhance their security measures.

Whistleblower programs in banks are designed to encourage employees, customers, and other stakeholders to report concerns about unethical behaviour, fraud, or potential insider cyber threats. Establishing a confidential and secure channel for reporting is crucial for detecting and addressing issues early. Here's an overview of how whistleblower programs are carried out in banks to prevent insider cyber threats:

1. **Policy Development.** Banks develop clear and comprehensive whistleblower policies that outline the purpose, scope, and procedures of the program. These policies emphasize the importance of reporting potential insider cyber threats and other misconduct while assuring confidentiality and protection against retaliation.
2. **Anonymous Reporting Channels.** Whistleblower programs typically offer multiple channels for reporting concerns, including anonymous reporting options. This may include dedicated hotlines, online reporting systems, and other secure communication methods to protect the identity of the whistleblower.
3. **Third-Party Reporting Mechanisms.** Some banks opt to use third-party services to manage their whistleblower programs. Third-party providers can offer an additional layer of confidentiality, ensuring that reports are handled independently and impartially.
4. **Education and Awareness.** Banks conduct awareness campaigns to educate employees and stakeholders about the whistleblower program. Training sessions and

informational materials emphasize the importance of reporting potential insider threats, fraud, or unethical behaviour to protect the organization and its stakeholders.

5. **Non-Retaliation Policies.** Whistleblower programs include explicit non-retaliation policies to protect individuals who come forward with reports. These policies communicate that the bank is committed to preventing any adverse actions or discrimination against whistleblowers.

6. **Confidential Investigation Process.** Whistleblower reports trigger a confidential investigation process. Banks typically have dedicated teams or individuals responsible for conducting thorough and impartial investigations into the reported concerns. The investigation process adheres to legal and ethical standards.

7. **Documentation and Reporting.** The investigation process involves meticulous documentation of findings and actions taken. A formal report is compiled, summarizing the investigation results and any corrective measures implemented. This report may be shared with relevant regulatory authorities if required.

8. **Communication with Whistleblowers.** Whistleblower programs prioritize communication with individuals who make reports. Banks acknowledge receipt of reports promptly and provide updates on the status of investigations, ensuring whistleblowers are kept informed about the resolution of their concerns.

9. **Escalation Procedures.** Whistleblower programs define escalation procedures for cases where internal investigations do not resolve the reported issues. This may involve reporting to regulatory bodies or law enforcement agencies depending on the severity and nature of the concerns.

10. **Continuous Improvement.** Banks regularly assess and refine their whistleblower programs to ensure effectiveness. This includes evaluating the responsiveness of the reporting channels, addressing any identified weaknesses, and implementing improvements based on feedback and experience.

11. **Integration with Security and Compliance Programs.** Whistleblower programs are integrated with broader security and compliance initiatives within the bank. This ensures that reports related to potential insider cyber threats are effectively routed to the appropriate security teams for investigation and resolution.

12. **Legal Protections.** Whistleblower programs are designed to align with legal frameworks that protect individuals who report misconduct. Banks adhere to relevant laws and regulations that provide protections against retaliation for whistleblowers.

13. **Metrics and Reporting.** Banks track and analyse metrics related to whistleblower reports, investigations, and outcomes. These metrics help evaluate the program's effectiveness and identify areas for improvement.

By implementing and promoting a robust whistleblower program, banks can create a culture of accountability, transparency, and early detection of potential insider cyber threats. The effectiveness of such programs is contingent on the trustworthiness of reporting channels, the commitment to confidentiality, and a proactive approach to addressing reported concerns.

The integration of Human Resources (HR) and Information Technology (IT) data is crucial for preventing insider cyber threats in banks. By combining HR and IT

data, organizations can enhance their ability to monitor, detect, and respond to potential security risks associated with employees. Here's an overview of how the integration of HR and IT data is carried out in banks:

1. **Data Mapping and Classification.** Banks start by mapping and classifying HR and IT data. This involves identifying the types of data held by HR (e.g., employee profiles, roles, responsibilities) and IT (e.g., system access logs, device usage, network activity). The classification helps determine how the data can be integrated and utilized.
2. **Common Identifiers and Data Linkage.** Establishing common identifiers, such as employee IDs, enables the linkage of HR and IT data. This linkage is critical for associating HR information, such as employee roles and status, with IT data, such as system access and usage patterns.
3. **Identity and Access Management (IAM) Integration.** Integration involves linking HR systems with IAM solutions. This ensures that changes in employee status, such as onboarding, offboarding, or role changes, are reflected in access controls. IAM systems use HR data to automatically provision or deprovision access rights based on employees' roles and responsibilities.
4. **User Activity Monitoring.** Integrating HR and IT data facilitates user activity monitoring. This involves tracking and analysing employee behaviour within IT systems. For instance, monitoring may include tracking login times, file access, data transfers, and other activities associated with user accounts.
5. **Role-Based Access Control (RBAC) Integration.** HR data is integrated with RBAC systems to align IT permissions with employees' roles and responsibilities. This integration ensures that employees have the necessary access rights based on their job functions, reducing the risk of excessive or inappropriate access.
6. **Automated Onboarding and Offboarding Processes.** Integration streamlines onboarding and offboarding processes by automating the provisioning and deprovisioning of IT resources based on HR data. This minimizes the time gap during which employees may have unauthorized access, especially during transitions.
7. **Alerting Based on HR Events.** Integration allows for the creation of alerts triggered by HR events. For example, if an employee is terminated or changes roles, the system can generate alerts to IT security teams to review and adjust access accordingly.
8. **Insider Threat Analytics.** Integrating HR and IT data enables the development of insider threat analytics. This involves using machine learning algorithms to analyse patterns of behaviour that may indicate insider threats. By considering HR data alongside IT data, organizations can identify anomalies and potential risks.
9. **Behavioural Analytics and User Profiling.** Behavioural analytics, incorporating HR data, helps create user profiles that reflect normal behaviour. Deviations from these profiles can be flagged as potential risks. This includes changes in working hours, access patterns, or data usage that may indicate insider threats.
10. **Employee Training and Awareness Programs.** Integration enables targeted employee training programs. By analysing HR and IT data, organizations can identify high-risk roles or departments and tailor cybersecurity training to address specific insider threat concerns.

11. **Data Loss Prevention (DLP) Integration.** Integrating HR and IT data with DLP solutions allows organizations to enforce policies on sensitive data access and usage. For example, DLP systems can be configured to monitor and control the movement of sensitive data based on employee roles and permissions.

12. **Audit Trails and Forensic Analysis.** Integrated data provides comprehensive audit trails that are valuable for forensic analysis. In the event of a security incident, organizations can trace back and reconstruct activities by combining HR and IT data to understand the context of the event.

13. **Privacy and Compliance Considerations.** Integration efforts must consider privacy and compliance regulations. Ensuring that the integration process adheres to data protection laws and internal privacy policies is essential.

The successful integration of HR and IT data in banks enhances overall security posture by aligning access controls with employees' roles, enabling proactive monitoring, and facilitating a more comprehensive understanding of user behaviour. This integrated approach contributes significantly to the prevention and mitigation of insider cyber threats.

Insider threat hunting in banks involves proactively seeking out signs of potential malicious activities or security risks originating from within the organization. This process aims to detect and prevent insider cyber threats before they can cause significant harm. Here's an overview of how insider threat hunting is carried out in banks:

1. **Define Threat Profiles.** Insider threat hunting begins by defining threat profiles based on known indicators of potential malicious insider activities. These profiles may include abnormal user behaviour, unauthorized access to sensitive data, or patterns associated with data exfiltration.

2. **Establish Baselines.** Creating baselines for normal behaviour is crucial. Banks analyse historical data and establish baseline patterns for user activities, system access, data transfers, and other relevant behaviours. Deviations from these baselines can be indicative of insider threats.

3. **Leverage Threat Intelligence.** Threat intelligence sources, both external and internal, provide valuable information about known tactics, techniques, and procedures (TTPs) associated with insider threats. Integrating threat intelligence into the hunting process helps identify patterns aligned with these TTPs.

4. **Data Collection and Aggregation.** Insider threat hunting involves collecting and aggregating data from various sources within the bank's IT infrastructure. This includes logs from security systems, user activity records, network traffic, and other relevant data points.

5. **User Behaviour Analytics.** UBA tools play a significant role in insider threat hunting by analysing patterns of user behaviour. These tools use machine learning and behavioural analytics to identify anomalies that may indicate insider threats, such as unusual login times, data access, or transfer patterns.

6. **Endpoint Monitoring.** Monitoring activities on endpoints, such as computers and servers, is a key aspect of insider threat hunting. Endpoint detection and response

(EDR) solutions help identify suspicious activities, unauthorized software installations, or attempts to bypass security controls.

7. **Network Traffic Analysis.** Analysing network traffic for unusual patterns or anomalies is essential. Insider threat hunters examine communication patterns, data flows, and connections to identify potential indicators of malicious activities, including data exfiltration.

8. **Correlation and Contextual Analysis.** Correlating data from different sources and analysing it in context is critical. Understanding the context of user activities, such as job roles, responsibilities, and access requirements, helps distinguish between normal and suspicious behaviour.

9. **Threat Hunting Tools and Platforms.** Insider threat hunters utilize specialized tools and platforms designed for threat hunting. These tools automate data analysis, facilitate correlation, and generate alerts for further investigation.

10. **Alerting and Incident Response.** Insider threat hunting generates alerts based on identified anomalies or suspicious activities. Security teams then initiate incident response procedures to investigate, contain, and mitigate potential insider threats.

11. **Employee Interviews and Collaboration.** In addition to technical analysis, insider threat hunting may involve collaboration with HR and employee interviews. Interviews can provide additional context and help validate or refute findings from technical analysis.

12. **Continuous Monitoring.** Insider threat hunting is an ongoing, continuous process. Security teams continuously monitor for new indicators of insider threats, adjust baselines, and refine threat profiles based on evolving risks and emerging threat intelligence.

13. **Documentation and Reporting.** Thorough documentation of the threat hunting process, findings, and actions taken is essential. Reports generated during the threat hunting process contribute to a bank's incident response documentation and may be used for post-incident analysis.

14. **Training and Skill Development.** Security teams involved in insider threat hunting undergo continuous training and skill development. This ensures that they stay abreast of the latest threat intelligence, tools, and techniques relevant to identifying insider threats.

By implementing a proactive and systematic approach to insider threat hunting, banks can significantly enhance their ability to detect and prevent malicious activities originating from within the organization. Combining advanced technologies with human expertise and collaboration across departments contributes to a robust insider threat prevention strategy.

Conclusion. In conclusion, the research of methods for detecting cyber threats arising from insider actions in banks is an imperative undertaking in the ever-evolving landscape of cybersecurity. As financial institutions continue to embrace digital transformation, the risks associated with insider threats have become more sophisticated and potentially devastating. This comprehensive exploration has shed light on various strategies and technologies aimed at preventing, identifying, and

mitigating the insider cyber threats that pose a significant challenge to the integrity and security of banks.

One of the overarching themes that emerge from this research is the multifaceted nature of combating insider threats. The amalgamation of technological solutions, robust policies, and a vigilant human element is crucial for constructing a resilient defence against potential breaches originating from within the organization. Understanding that insider threats can manifest through inadvertent actions, negligence, or malicious intent necessitates a layered and adaptive approach to cybersecurity.

The implementation of Data Loss Prevention systems stands out as a pivotal component in safeguarding sensitive information. By monitoring and controlling data transfers, these systems act as a formidable defence against unauthorized access and data exfiltration. Additionally, Endpoint Monitoring plays a crucial role in tracking and analysing user activities on individual devices, contributing to the early detection of anomalous behaviour. Access controls and privilege management emerge as fundamental pillars in mitigating insider threats, emphasizing the principle of least privilege and stringent user authentication. Access Controls and Privilege Management ensure that individuals only have the necessary permissions for their roles, reducing the risk of unauthorized access.

Security Information and Event Management systems offer a centralized and proactive approach to monitoring and responding to security events. Integration with threat intelligence feeds enhances the ability to recognize known malicious indicators, fortifying the defence against both external and insider threats. Anomaly detection, powered by machine learning and artificial intelligence algorithms, serves as a dynamic tool in identifying deviations from normal behaviour. User Behaviour Analytics further refines the detection process by specifically focusing on user activities, aiding in the early identification of potential insider threats. The integration of HR and IT data emerges as a strategic imperative, aligning access controls with employees' roles and responsibilities. This integration streamlines processes such as onboarding and offboarding, reducing the window of vulnerability during personnel transitions. Whistleblower programs and insider threat hunting further empower organizations to foster a culture of transparency, accountability, and early detection.

As the financial sector navigates an era of increasing digitization and interconnectedness, the research conducted on methods for detecting insider cyber threats in banks underscores the need for continuous innovation and adaptation. The threat landscape is dynamic, requiring a proactive and collaborative approach from banks, regulatory bodies, and the broader cybersecurity community.

In conclusion, the insights gleaned from this research are not only pertinent for the immediate enhancement of cybersecurity measures in banks but also offer a foundation for ongoing exploration and refinement. As technology evolves, so too must the strategies employed to safeguard the sensitive information entrusted to financial institutions. The collective efforts to fortify defences against insider threats are

essential in preserving the trust and integrity of the banking sector in the face of an ever-changing digital landscape.

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22. THE RELATIONSHIP BETWEEN TRENDS IN GLOCALIZATION AND GLOBALIZATION

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Introduction. The relationship between the trends of glocalization and globalization has become a subject of significant interest in today's interconnected world. Glocalization, the adaptation of global ideas and practices to local contexts, and globalization, the worldwide integration of economies and cultures, are two powerful forces shaping our contemporary landscape. This article explores the intricate interplay between these two phenomena, examining how they influence each other and the broader implications for societies, economies, and cultures around the globe. As we delve into this dynamic relationship, we will uncover the evolving nature of glocalization and globalization and the impact they have on our rapidly changing world.

Literature review. Glocalization, a term coined by sociologist Roland Robertson, refers to the adaptation of global elements into local contexts. It emphasizes the coexistence of local and global forces, resulting in hybridized practices and cultural expressions (Robertson, 1992). [1] In contrast, globalization encompasses the interconnectedness and interdependence of societies and economies on a global scale, driven by technological advancements, economic integration, and cultural exchange (Giddens, 1990). [2] Scholars have explored various dimensions of the interaction between glocalization and globalization. In his seminal work, Featherstone (1995) argued that glocalization represents a cultural response to the homogenizing effects of globalization. [3] He posited that as global forces disseminate standardized products and practices, local communities respond by reasserting their cultural identity through glocalization processes. The economic dimension of glocalization and globalization is a central focus of research. Ohmae (1990) introduced the concept of a "borderless world," suggesting that globalization erodes national boundaries and encourages businesses to operate on a global scale. [4] However, scholars like Sklair (1991) contend that globalization's benefits are unevenly distributed, with multinational corporations often dominating local markets. [5] Glocalization is closely linked to cultural hybridity and identity formation. Scholars like Appadurai (1996) emphasize the role of media and migration in shaping global cultural flows. [6] They argue that glocalization allows individuals to negotiate their identities within the context of global cultural influences, resulting in complex hybrid identities. The impact of glocalization and globalization extends to environmental and social dimensions. Globalization's

environmental consequences have been a subject of debate, with concerns about resource depletion, pollution, and climate change (Beck, 2000).[7]

Results. When examining the phenomenon of globalization, it becomes evident that the world has evolved into an interconnected network where no local society can exist in isolation from the global community. This fundamental shift in our socio-economic landscape not only impacts smaller nations or societies deeply rooted in traditional values but also presents challenges for even the most dominant players on the global stage, such as the United States.

The hallmark of globalization lies in the fact that no country, regardless of its size or economic strength, can afford to operate in isolation. The interdependence of nations in today's globalized world has transformed the dynamics of international relations, economics, and culture. This interdependence extends far beyond trade and economics; it encompasses political cooperation, environmental concerns, and the exchange of ideas and cultures. The global community, in essence, has become an intricate web where actions and events in one part of the world can ripple across borders, affecting distant societies and economies.

For the United States, often seen as a symbol of economic self-sufficiency and independence, the challenges posed by globalization are both intriguing and demanding. While the U.S. boasts a highly developed and diversified economy, it is not immune to the effects of a globalized world. The country's economic and political decisions resonate on a global scale, impacting not only its citizens but also nations and regions worldwide. As such, the United States must navigate the delicate balance between preserving its economic interests and contributing positively to global stability.

One of the fundamental features of the globalized world is the absence of a single normative social model or blueprint applicable universally. This highlights the remarkable diversity among societies coexisting in today's global community. Each society retains its unique values, traditions, and cultural identities while participating in global interactions. This rich tapestry of diversity underscores the complexity of the global landscape and emphasizes the need for flexibility and understanding when engaging with different cultures and societies. [8]

Global society, in essence, is not a distinct and homogenous social order. Instead, it is a planetary system of collaboration and coexistence among a myriad of diverse societies and cultures. This diversity is a source of strength and resilience, allowing societies to learn from one another, adapt to changing circumstances, and collectively address global challenges, such as climate change, pandemics, and economic inequality.

Moreover, when considering the concept of localization within globalization, it becomes apparent that the boundaries of localization, more often than not, align with national borders. The notion of the nation-state remains deeply ingrained in the consciousness of Western civilization and retains its significance despite the profound forces of globalization and the movement of people across borders. This emphasis on

national identity and sovereignty creates a dynamic tension within the global landscape, where local interests intersect with global imperatives. [9]

The intricate relationship between globalization and localization is an ongoing, multidimensional process that shapes our world today. The coexistence of global and local influences, the constant exchange of ideas and goods, and the diverse cultural expressions are at the heart of this complex interplay. To navigate the challenges and opportunities presented by this evolving global landscape, nations and societies must strike a delicate balance between preserving their unique identities and engaging constructively within the global community.

Glocalization entails the coexistence of parallel trends towards globalization and localization in the world. Globalization, in this context, refers to the process where individuals from all nations and cultures adopt similar consumption patterns for goods and services, leading to a standardized demand for products. On the other hand, localization involves the preservation of cultural distinctions, reinforcement of national identities, and the economic consequences of these cultural differentiations. Transnational companies must, in response to these dynamics, adapt their strategies not only to global consumption patterns but also to the local cultural specifics of consumers.

This concept of glocalization gives rise to both "vertical" hierarchical globalization and "horizontal" networked transregionalism. The interplay between these two dimensions reflects the complex nature of our globalized world. Brands have recognized the global nature of consumers. Previously, when referring to global companies, it often meant having a presence worldwide but offering the same product everywhere. However, technology has facilitated a more profound understanding of global consumers, going beyond products to providing consistent services tailored to the mentalities of diverse consumers.

The support of Big Data and artificial intelligence has become instrumental for giants like Uber and WeWork. These technologies empower companies to understand and adapt to the mentalities of various consumers. They utilize billions of data points, which encapsulate our lives, to gain insights into consumers. [10]

Uber, for instance, launched "Uber Travel" in China to serve Chinese travelers worldwide. From cars and motorcycles to boats and even hot air balloons, Uber adapts to the purpose of the trip and the needs, and preferences of users across the globe. This adaptability and localization have been pivotal to Uber's success in China and many other countries. It exemplifies the idea that "Localization must be global," where companies adjust their products, operations, and services to resonate with each new market. [11]

Airbnb is one of Silicon Valley's most globally successful unicorns. With accommodations available in 34,000 cities and 190 countries, Airbnb operates in more than twice as many countries as Uber. Unlike companies like Snapchat or Pinterest, which primarily grew in the United States, Europe is Airbnb's largest market. However, being a truly international startup comes with its own set of challenges. Joe Zadeh,

Airbnb's Vice President of Product, describes it as a product they need to build both globally and locally because to function, Airbnb needs to be everywhere. One fundamental issue Airbnb must address is bridging the global-local divide. On the one hand, there are aspects of the travel experience that must be consistent everywhere, such as cleanliness standards. [12]

The dynamics of glocalization represent a multifaceted process wherein global and local forces intersect, shaping the strategies of companies and the experiences of consumers worldwide. This interplay emphasizes the importance of adaptability and a nuanced understanding of cultural differences in the global marketplace.

Airbnb tailors its offerings based on local payment methods and currencies. Brazil is a key growth market for Airbnb. However, last year, the platform supported only US dollars as a payment method in the country, covering only 22% of Brazilian payments. Since then, the company has made significant additions, including accepting national credit cards that can charge the local currency, a cash payment system managed by local banks, and installment payments. [13]

Another notable feature of Airbnb is its approach to localized registration methods. While in the United States, Airbnb allows users to register using email addresses or social media accounts such as Facebook or Google, the company recognizes that these methods may not be suitable worldwide. In countries like China, Airbnb has adapted its registration process to accept user data from platforms like Weibo or WeChat. This strategic change played a pivotal role in expanding the company's Chinese traveler customer base by an astonishing 700% in 2015. [14,15]

Furthermore, Airbnb underwent a significant redesign of its platform, introducing new features like neighborhood reviews and personalized recommendations for users. These innovations substantially contributed to the growth of Airbnb's user base.

In contrast, Apple follows a distinct strategy when it comes to adapting its products for different regions. Apple does not modify the functionality and appearance of its phones extensively. Therefore, Apple might employ a "global" concept, employing a "one-size-fits-all" approach characterized by standardized design elements across regions, a consistent product lineup available worldwide, and minimal customization. Localization efforts mainly focus on power sources, pricing structures, and carrier-specific features. [16]

Standardization offers specific advantages, including the establishment of a globally recognized brand with a strong and consistent identity, a strategy that has proven highly effective for Apple. The standardized nature of Apple's products allows them to meet the needs and preferences of a wide range of cultures effectively.

Crucially, the key to the success of a global brand lies in understanding and embracing cultural diversity. Apple has excelled in recognizing the common elements shared by people across different cultures, eliminating the need for extensive regional customization or the development of a common language to bridge cultural gaps. [64]

However, Apple does make concessions to personalization at various levels. Apple operates retail stores worldwide, and each of these stores adheres to a strict customer service protocol customized for the local region. This personalized approach

fosters strong customer loyalty and affinity as local staff engage with customers on a personal level.

Even the architectural design of Apple stores reflects an awareness of local culture. For example, the Apple store in Paris is situated in a Haussmann-style building, harmonizing with the architectural preferences of Parisians.

Bob Bridger, Vice President of Apple Retail Development, sheds light on what makes Apple Stores so popular. Beyond choosing strategic locations, Apple focuses on creating an in-store atmosphere that resonates with the local culture and surroundings. [67]

Moreover, the Apple e-commerce website remains consistent across all 125 regions worldwide where the sites are localized, serving as a reflection of the brand. The website maintains a uniform appearance regardless of the user's location, but the content is meticulously tailored to the local language, crafted, or reviewed by native copywriters. This commitment to high-quality translation extends to all manuals and documentation produced by Apple.

In essence, Apple's decision not to extensively adapt its products to local cultures is rooted in the understanding that it has created a culture so compelling that customers worldwide naturally embrace it. Apple customers become brand advocates themselves, even without direct involvement from Apple. Waiting in line at an Apple Store becomes more than a transaction; it is an opportunity for people to feel like an integral part of Apple's unique culture and to embody that culture themselves.

Glocalization is a replacement for the broader (and correct) term "globalization" because the latter implies top-down corporate policies aimed at entering and dominating external markets. The new term represents a bottom-up approach that starts with the needs of the local market. [16]

When a company tries to sell a product on an external market solely through translation and a few local peculiarities, the product often fails. The bottom-up approach is almost always more effective. If a company starts with the culture and language of the market it's trying to sell to and designs the product around that, it results in an effective advertising and marketing campaign that survives and extends the product's lifecycle.

This means that culture can now shape ideas, rather than the other way around, because foreign ideas often won't hold weight against a culture that has developed over centuries.

Global branding, message exchange, corporate values, and marketing must be localized - that's how the term "glocalization" emerged. Communication channels, both internal and external, should be set up to be culturally sensitive, not just linguistically free. The value proposition may be entirely correct, but if it is presented in a way that does not violate cultural norms or expectations. [17]

There is a significant difference between a multinational company and one that is truly global. The difference lies in the fact that a multinational company simply operates in multiple countries, while a global company is committed to systematically updating its policies, procedures, and systems in different cultures. Most critical issues

are often related to IT. Even with incredible advances in modern technology, global companies still suffer from program and platform inconsistencies. Where technological feasibility or budget realities do not allow full integration, this gap needs to be assessed and addressed. [18]

From an economic perspective, glocalization also occurs when global firms open branches in regions where there are specific labor skills that are relatively hard to find. In this case, global firms become locally territorial through their employees or specific local conditions (such as their proximity to a prestigious university or good relations with their suppliers), in the sense that they depend on these specific local goods or services. For example, Silicon Valley and some other industrial areas that were initially only exporters of labor resources later became the most desirable markets in the world.

The globalization of culture is associated with the destruction of cultural identities under the influence of Western consumer culture. There is an opinion that global capitalism imposes its cultural production on the entire world, standardizing and unifying society. Many would agree with this statement. Nowadays, it is possible to live the same day in Paris and London, watching the same movies, reading the same newspapers, magazines, and books, and eating the same sandwiches for breakfast. However, in our view, it is necessary to take a closer look at modern processes because all of them are mediated by people, based on the cultural baggage inherent in different cultures. [17]

It can be agreed that in our time, globalization has effectively erased cultural boundaries between countries, but it has not standardized the lives of people in different regions of the world, as clear cultural differences can be observed. Some researchers, including M. Castells, believe that identity is not a victim of globalization, but rather its product. Globalization has provoked the emergence of protest movements to protect the ethnocultural identity, which, against the background of global processes, have begun to manifest themselves more and represent themselves to resist the common.

Cultural globalization today is not simply Westernization. Globalization is associated not only with integration but also with the interpenetration of cultures and their constant interaction and mutual exchange. For example, the effectiveness of transnational corporations depends on their flexibility and ability to adapt to the cultures of different countries. Global culture is embraced but with significant local modifications, a process known as glocalization. [18]

Alongside glocalization and localization, there is a phenomenon called alter-globalization or alternative globalization, referring to global cultural movements that emerge outside the West and strongly influence it. Examples of alternative globalization include religious movements originating in India, Buddhist movements from Japan, and the significant impact of "New Age" culture from Asia. "New Age" culture, with its ideas of transformation, karma, and mystical connections between the individual and nature, as well as practices like meditation, yoga, Tai Chi, and martial arts, exerts a latent influence on the cultures of various countries while attracting the attention of an increasing number of people.

Cultural globalization does not mean that groups and individuals become identical in cultural terms; instead, it leads to the emergence of new cultural differences and

accentuation within the context of local-global interactions. Thus, global changes in culture are not associated with the loss of a nation's unique identity, the imposition of specific standards worldwide, or total uniformity. It is precisely during periods of global and transformative change in all aspects of society that a sense of national identity is strengthened, and processes of localization and glocalization occur. [17]

Thanks to globalization, there is a structural complexity and enrichment of identities, and their hybridization, resulting in multi-layered identities that combine ethnocultural and global elements within a unified structure. Thus, globalization effectively multiplies identities rather than destroying them. It is important to note that cultural globalization is a complex and profound process. It is not simply cultural colonization by the West or the United States of the rest of the world but rather a cultural exchange between human societies.

Table 1

Key points in the relationship between glocalization and globalization

Key Points	Description
Mutual Influence	Glocalization and globalization mutually influence each other, with globalization driving the need for glocalization to cater to diverse local markets.
Market Adaptation	Glocalization is a response to the demands of specific local markets, requiring companies to adapt products and services to local cultural, linguistic, and regulatory nuances.
Cultural Impact	Both glocalization and globalization have a significant impact on culture, with globalization potentially spreading Western culture and values, while glocalization allows local cultures to maintain their unique identities with global influences.
Economic Implications	The balance between glocalization and globalization varies across industries, with some sectors heavily employing glocalization for local taste adaptation, while others lean toward globalization due to standardized products.
Technological Advances	Advances in technology and communication play a crucial role in the relationship between glocalization and globalization, facilitating global business operations and enabling tailored marketing and localization efforts.
Environmental Considerations	Globalization can lead to increased production and transportation with potential negative environmental consequences, while glocalization can address this by promoting sustainable practices at the local level.

Source: Developed by the author

Table 1 provides a comprehensive overview of the key points to consider in the intricate relationship between glocalization and globalization. Glocalization refers to the process of adapting global products and services to meet the unique demands and preferences of local markets. In contrast, globalization signifies the ever-increasing interconnectedness and interdependence of countries, economies, and cultures on a global scale.

Understanding the interplay between these two concepts is of paramount importance in today's globalized world. The table highlights critical aspects such as

mutual influence, market adaptation, cultural impact, economic implications, technological advances, and environmental considerations, shedding light on the complexities and nuances of how glocalization and globalization coexist and shape various facets of our interconnected world. These key points serve as a foundation for further exploration and analysis of the dynamic interrelationship between glocalization and globalization.

Conclusion:

The relationship between glocalization and globalization is multifaceted and continually evolving. While some scholars highlight the tension between global homogenization and local distinctiveness, others emphasize the adaptability of glocalization as a response to globalization's forces. As the world becomes increasingly interconnected, understanding the intricate interplay between these two phenomena is essential for addressing the challenges and opportunities they present in various domains, from economics to culture and the environment. Further research is needed to explore emerging trends and their implications for our rapidly changing global landscape.

Glocalization refers to the adaptation of global products or services to meet the specific needs and preferences of local markets. It involves the fusion of global and local elements, resulting in a tailored approach. Globalization, on the other hand, is the process of increased interconnectedness and interdependence among countries, economies, and cultures on a global scale.

Glocalization and globalization are interconnected and often coexist in the business and cultural landscape. The extent to which they influence one another can vary based on industry, market, and regional factors. Striking the right balance between these two trends is crucial for businesses and societies seeking to thrive in an increasingly interconnected world.

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23. OF THE DIGITAL ECONOMY: STATE INSTITUTIONS AND BUDGET ALLOCATIONS IN CONDITIONS MARTIAL LAW

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Under the conditions of martial law in Ukraine, introduced by the Decree of the President of Ukraine of 24 February 2022 No. 64/2022 "On the Imposition of Martial Law in Ukraine", approved by the Law of Ukraine "On Approval of the Decree of the President of Ukraine "On the Imposition of Martial Law in Ukraine" of 24 February 2022 No. 2102-IX [1], and extended by the relevant Decrees of the President of Ukraine and Laws of Ukraine, ensuring the sustainable development of Ukraine's digital economy is becoming a guarantee of socio-economic security at both regional and national levels. An important factor in this development is the adequate financial support of state institutions that formulate and implement state policy in the field of digitalization, digital development and digital transformation.

Various aspects of the development of the digital economy in public institutions have been studied by many scholars. In particular, the interdependence between digital transformation and institutional changes in public administration to overcome threats to the existence of the state of Ukraine is considered in a scientific article [2]. Some authors in their scientific publications pay attention to the peculiarities of institutional transformations in certain sectors of the economy, for example, authors of the article called "Institutional Transformations of the Financial System of Ukraine in the Context of the Digital Economy Development", "substantiate changes in the main institutions of the financial system in the process of influence of digital technologies on the formation and development of financial relations; describe the role of institutions and institutions in shaping the financial behavior of economic agents, modern transformation processes in the functioning of financial institutions, and the role of the financial system in the development of the digital economy". In the publication "Innovative Development in the Context of Digitalization: Assessment and Priorities",

the authors "summarize the dynamics of the main rating goals of digitalization of the Ukrainian economy" [5]. The article "Budgetary Support for Digitalization within the Framework of E-Governance in Ukraine" assesses "the degree of priority and transparency of budgetary funding for e-governance implementation in Ukraine at different levels and directions (national, regional, sectoral) and gaps in the state's organizational and institutional support for e-governance implementation at the national and regional levels and develops proposals for their elimination" [6].

Therefore, there is a presence of a significant number of publications on the one hand, and the lack of research on the peculiarities of the functioning and especially the financial support of state institutions on the other, which makes it important to study the conceptual foundations of the digital transformation of Ukraine's economy based on the results of the structural and functional analysis of the powers of public authorities in this area and monitoring of budget allocations for their maintenance under martial law.

According to Article 6 of the Constitution of Ukraine, "state power in Ukraine is exercised on the principles of its division into legislative, executive and judicial power" [7]. Article 75 of the Constitution of Ukraine states that "the sole body of legislative power in Ukraine is the Parliament — the Verkhovna Rada of Ukraine", which "for the purpose of drafting legislation, preparation and preliminary consideration of issues within its powers, and performing control functions in accordance with the Constitution of Ukraine, shall establish committees of the Verkhovna Rada of Ukraine from among the people's deputies of Ukraine" (Article 89 of the Constitution of Ukraine). The Verkhovna Rada of Ukraine of the IX convocation has 23 committees [8], including the Committee on Digital Transformation, which is directly responsible for the development of Ukraine's digital transformation.

At the same time, a number of powers in the field of digitalization are vested in the Verkhovna Rada Committees on Humanitarian and Information Policy, Freedom of Speech and Human Rights, De-occupation and Reintegration of the Temporarily Occupied Territories in Donetsk and Luhansk Regions and the Autonomous Republic of Crimea, the City of Sevastopol, National Minorities and Interethnic Relations.

According to Article 102 of the Constitution of Ukraine, "the President of Ukraine is the guarantor of state sovereignty and territorial indivisibility of Ukraine, the observance of the Constitution of Ukraine and human and citizens' rights and freedoms." [7]. It is worth emphasizing that the President of Ukraine is the Chairman of the National Security and Defense Council of Ukraine, which makes decisions, in particular, on "measures of a political, economic, social, military, scientific, technological, environmental, informational and other nature in accordance with the scale of potential and real threats to the national interests of Ukraine; ensuring and controlling the receipt and processing of necessary information, its preservation, confidentiality and use in the interests of the national security of Ukraine..." [12].

According to Article 113 of the Constitution of Ukraine, "The Cabinet of Ministers of Ukraine is the highest body in the system of bodies of executive power" [7]. According to the unified web portal, the list of executive bodies of Ukraine shows that 16 executive bodies are directly subordinated to the Cabinet of Ministers of Ukraine, while 19 ministries are subordinated to 42 executive bodies. The system of executive authorities of Ukraine includes 25 services, 15 agencies, 4 inspectorates, 11 CEBs with special status, 3 collegial bodies, 5 other central bodies of executive power, and 27 local authorities [13].

A structural analysis of the powers of the executive authorities of Ukraine leads to the conclusion that all executive authorities are tasked with the digital transformation of Ukraine. At the same time, it is possible to distinguish the executive authorities that are entrusted with the main tasks in this area. "The main body in the system of central executive authorities that ensures the formation and implementation of state policy: in the areas of digitalization, digital development, digital economy, digital innovations and technologies, robotics and robotics, e-government and e-democracy, development of the information society, informatization; introduction of electronic document management, development of digital skills and digital rights of citizens; open data, public electronic registers, development of national electronic information systems, etc.

The Ministry of Digital Transformation of Ukraine is subordinated to the Administration of the State Service for Special Communications and Information Protection, which is "a state body designed to ensure the functioning and development of the state system of government communications, the National System of Confidential Communications, the formation and implementation of state policy in the areas of cryptographic and technical information protection, cyber defense, special-purpose postal services, government paramedic communications, and active counteraction to aggression in cyberspace" [10].

In our opinion, the National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and the Provision of Postal Services deserves special attention in this scientific context, as it is "a central executive body with a special status established by the Cabinet of Ministers of Ukraine" [11].

The main tasks of the Ministry of Digital Transformation of Ukraine, the Administration of the State Service for Special Communications and Information Protection, as well as the National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and the Provision of Postal Services are presented in Table 1 [9-11].

Table 1.

Digitalization tasks of some executive authorities of Ukraine

Body of power	Main tasks
1	2
Ministry of Digital Transformation of Ukraine	<p>Formation and implementation of state policy:</p> <p>in the areas of digitalization, digital development, digital economy, digital innovations and technologies, robotics and robotization, e-government and e-democracy, and development of the information society;</p> <p>in the field of electronic document management;</p> <p>in the area of digital skills development and digital rights of citizens;</p> <p>in the areas of open data, public electronic registers, development of national electronic information resources and interoperability, electronic communications and radio frequency spectrum, development of broadband Internet access infrastructure, e-commerce and business;</p> <p>in the field of electronic and administrative services;</p> <p>in the areas of electronic trust services and electronic identification and investments in the IT industry;</p> <p>in the development of the IT industry; in the development and functioning of the legal regime of Diia City</p>
State Service for Special Communications and Information Protection of Ukraine	<p>formulation and implementation of the state policy in the areas of cryptographic and technical protection of information, cyber defense, special-purpose postal services, governmental paramedic services, protection of state information resources and information, the requirement for protection of which is established by law, in information, electronic communication and information and communication systems (hereinafter - information and communication systems) and the information activity objects, as well as in the areas of using state information resources in terms of information protection, countering technical intelligence, functioning, security and development of the state system of governmental communication, the National System of Confidential Communication, and active counteraction to aggression in cyberspace;</p> <p>participation in the formation and implementation of the state policy in the areas of electronic document management (in terms of protection of information of state bodies and local self-government bodies), electronic identification (using electronic trust services, protection of critical information infrastructure), electronic trust services, protection of critical information infrastructure (in terms of establishing requirements for security and protection of information during the provision and use of electronic trust services, protection of critical</p>

	<p>information infrastructure, conensuring, in accordance with the established procedure and within the competence of the entities directly involved in the fight against terrorism;</p> <p>implementing the state policy on the protection of critical technological information, cyber defense of critical information infrastructure facilities, and exercising state control in these areas;</p> <p>defining requirements for the protection of critical technological information, formulating general requirements for the cyber defense of critical infrastructure, maintaining a list of critical information infrastructure, taking measures to update and actualize it;</p> <p>creating and ensuring the functioning of the system of active counteraction to aggression in cyberspace;</p> <p>establishing and ensuring the functioning of the Centre for Active Counteraction to Aggression in Cyberspace;</p> <p>performing other tasks envisaged by the legislation in the field of cybersecurity and cyber defense</p>
<p>National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and Postal Services</p>	<p>creating conditions for the effective functioning and development of electronic communications, radio frequency spectrum and postal services;</p> <p>facilitating the opening of markets in the areas of electronic communications, radio frequency spectrum and postal services for all consumers and suppliers and ensuring non-discriminatory access of users to electronic communications and postal services;</p> <p>promoting mutually beneficial integration of the electronic communications and postal services markets of Ukraine with the relevant markets of other states, in particular within the framework of the Association Agreement between Ukraine, on the one hand, and the European Union, the European Atomic Energy Community and their member states, on the other hand;</p> <p>ensuring the protection of consumer rights to receive services of appropriate quality in accordance with the requirements of the law;</p> <p>ensuring investment attractiveness of infrastructure development, markets in the areas of electronic communications and postal services;</p> <p>promoting competition in the electronic communications and postal services markets;</p> <p>ensuring compliance with the principles of radio frequency spectrum management;</p> <p>other tasks stipulated by the Laws of Ukraine "On Electronic Communications", "On Postal Service", "On Access to Construction, Transport, Electricity Facilities for the Purpose of Developing Electronic Communication Networks", "On the Basic Principles of State Supervision (Control) in the Field of Economic Activity", etc.</p>

In our view, a special place in ensuring digital development, in particular, is occupied by the Ministry of Culture and Information Policy of Ukraine, which is subordinated to the State Agency of Ukraine for Arts and Art Education; the State Committee for Television and Radio Broadcasting of Ukraine; and the Ukrainian Institute of National Memory (UINM).

Given that digital development of the economy, especially in times of war, is impossible without ensuring cybersecurity, it is worth noting that according to Article 8 of the Law of Ukraine "On the Basic Principles of Ensuring Cybersecurity of Ukraine", "the main subjects of the national cybersecurity system are the State Service for Special Communications and Information Protection of Ukraine, the National Police of Ukraine, the Security Service of Ukraine, the Ministry of Defense of Ukraine and the General Staff of the Armed Forces of Ukraine, intelligence agencies, and the National Bank of Ukraine" [14].

It should be noted that according to Article 2 of the Law of Ukraine "On Sources of Financing of Public Authorities" of 05 October 2016 No. 783-XIV, "public authorities shall carry out their activities exclusively at the expense of budgetary funding within the limits provided for by the Law of Ukraine on the State Budget of Ukraine for the relevant year" [15]. However, the problem of ensuring efficient spending of budget funds is one of the most difficult in budget regulation [16].

According to the current legislation of Ukraine on the State Budget of Ukraine, Annexes 3, 4, 5 and 8 approve: expenditures to the main spending units of the State Budget of Ukraine for 2021-2023 in the context of responsible executors by budget programs, distribution of expenditures for centralized activities between administrative and territorial units, distribution of expenditures to ensure the administration of justice by local and appellate courts and the functioning of bodies and institutions of the justice system.

In our opinion, it is important to note that 87.2 percent of the expenditures for 2023 according to the State Budget of Ukraine (as amended on 06.10.2023) are planned to finance 5 state institutions, the list of which is given in Table 2 [17].

Table 2.

Main expenditure items according to the State Budget of Ukraine for 2023

No	Expenditure items	Amount of expenses, billion UAH	Percent of total
1	2	3	4
	In total	3094.50	100
	includes:		
1	Ministry of Defense of Ukraine	1342.8	43.39
2	Ministry of Social Policy of Ukraine	460.52	14.88
3	Ministry of Internal Affairs of Ukraine	373.32	12.06
4	Ministry of Finance Affairs of Ukraine (general government spending and lending)	356.70	11.53
5	Ministry of Health of Ukraine	164.69	5.32

Regarding the expenditures on financing state institutions in the field of digitalization, the largest expenditures both before the full-scale invasion in 2021 and according to the analysis of the final version of the Law of Ukraine "On the State Budget for 2022", the current version of the Law of Ukraine "On the State Budget for 2023" as amended on 06. 10.2023, as well as the first version of the Law of Ukraine "On the State Budget for 2024", the following amounts are envisaged for financing the Administration of the State Service for Special Communications and Information Protection of Ukraine: in 2021 – UAH 4.02 billion, in 2022 – UAH 6.30 billion, in 2023 – UAH 36.93 billion, in 2024 – UAH 50.63 billion (Table 3) [17-20]. This increase occurred in 2023 due to the addition of a new expenditure item, namely: "measures to provide special machinery and equipment". The expenditure item "implementation of measures to provide special machinery and equipment" in 2023 accounts for 81.2% of the total funding of the Administration of the State Service for Special Communications and Information Protection of Ukraine and 85.6% in 2024, respectively.

It should be noted that in 2024, no expenditures are envisaged to finance the Directorate General of the State Courier Communications of the State Service for Special Communications and Information Protection of Ukraine. Also, starting from 2024, there are no expenditures for "Training, retraining and advanced training of personnel in the field of communications by higher education institutions".

Table 3.

**Expenditures on the Administration of the State Service for Special Communications
and Information Protection of Ukraine according to the Laws of Ukraine
"On the State Budget of Ukraine" in 2021-2024**

No	Title	2021		2022		2023		2024		2022/2021, %	2023/2022, %	2024/2023, %	2024/2021, %
		billion, UAH	percent of total	billion, UAH	percent of total	billion, UAH	percent of total	billion, UAH	percent of total				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Administration of the State Service for Special Communications and Information Protection and Directorate General of the State Courier Communications of the State Service for Special Communications and Information Protection of Ukraine	4.02	100.0	6.30	100.0	36.93	100.0	50.63	100.0	156.6	585.9	137.1	1258.1
1.1	Administration of the State Service for Special Communications and Information Protection	3.81	94.7	5.72	90.8	36.3	98.3	50.6	100.0	150.1	634.6	139.4	1328.0
1.1.1	Ensuring the functioning of the state system of special communications and information protection	2.53	62.8	4.51	71.6	5.0	13.7	5.9	11.7	178.6	111.8	117.6	234.7
1.1.2	Development and modernization of the state system of special communication and information protection	1.12	27.9	0.87	13.8	1.0	2.7	1.3	2.6	77.6	114.2	131.3	116.5
1.1.3	Training, retraining and advanced training of personnel in the field of communications by higher education institutions	0.14	3.4	0.29	4.6	0.2	0.6		0.0	212.8	74.9	0.0	0.0
1.1.4	Construction (purchase) of housing for military personnel of the State Service for Special Communications and Information Protection	0.03	0.7	0.05	0.8	0.1	0.1	0.1	0.1	172.4	107.1	100.0	184.7
1.1.5	Measures to provide special machinery and equipment					30.0	81.2	43.3	85.6			144.4	

The amount of public expenditures from the State Budget of Ukraine to finance the Ministry of Digital Transformation has undergone significant changes during the study period, namely: in 2021 – UAH 1.71 billion, in 2022 – UAH 4.29 billion, in 2023 – UAH 0.60 billion, in 2024 - UAH 2.77 billion (Table 4). Thus, while in 2022, compared to 2021, there was a 2.5 – fold increase in expenditures, in 2023, compared to 2022, there was a 7.2 – fold decrease. This reduction is due to the exclusion of the items "expenditures for the national informatization programme", "subvention from the state budget to local budgets for the implementation of measures aimed at increasing the availability of broadband Internet access in rural areas", "subvention from the state budget to local budgets for the development of a network of administrative service center's", and a 93% reduction in expenditures for "development of priority projects in the field of information technology", "e-government" by 39%, and "management and administration in the field of digitalization". However, the increase in expenditures in 2024 is aimed at financing a new item of expenditures for "ensuring the functioning of the Innovation Development Fund", which is envisaged at 54.1% of the total funding. At the same time, in 2024, expenditures for the "national informatization programme" are expected to be returned, but at the level of 50.0% of the expenditures in 2021 and 13.6% of the expenditures in 2022. In addition, in 2024, an increase in spending on e-governance is envisaged, namely by 88.5% of the expenditures of 2023 and 31.3% of the expenditures on governance and management in the field of digital transformation.

Table 4.

Expenditures for the Ministry of Digital Transformation according to the
the Laws of Ukraine "On the State Budget of Ukraine" in 2021-2024

No	Title	2021		2022		2023		2024		2022/ 2021, %	2023/ 2022, %	2024/ 2023, %	2024/ 2021, %
		billion, UAH	percent of total	billion, UAH	percent of total	billion, UAH	percent of total	billion, UAH	percent of total				
1	2	3	4	5	6	7	8	9	10	11	12	13	14
In total		1.71	100	4.29	100	0.60	100	2.77	100	251.1	13.9	464.0	162.4
1	Office of the Ministry of Digital Transformation of Ukraine	0.46	26.7	1.35	31.5	0.60	100.0	2.47	89.2	296.0	44.2	413.8	541.9
1.1	Management and administration in the field of digitalization	0.14	8.1	0.25	5.8	0.17	28.5	0.22	8.1	180.1	68.2	131.3	161.3
1.2	E-government	0.32	18.6	0.65	15.2	0.40	66.5	0.75	27.0	205.0	61.0	188.5	235.8
1.3	Development of priority projects in the field of information technology		0.0	0.45	10.5	0.03	5.0		0.0		6.7	0.0	
1.4	Ensuring the functioning of the Innovation Development Fund							1.50	54.1				
2	Ministry of Digital Transformation (general government spending and lending)	1.25	73.3	2.94	68.5			0.30	10.8	234.7	0.0		24.0

2.1	National informatization programme	0.60	35.3	2.21	51.4			0.30	10.8	366.3	0.0		49.8
2.2	Subvention from the state budget to local budgets for the development of a network of administrative service center's	0.23	13.5	0.23	5.4					100.0	0.0		0.0
2.3	Subvention from the state budget to local budgets for the implementation of measures aimed at increasing the availability of broadband Internet access in rural areas	0.42	24.5	0.50	11.7					119.6	0.0		0.0

The amount of funding for the National Commission for the National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and Postal Services according to the State Budget of Ukraine in 2021-2024 also changed, namely: in 2021 it amounted to UAH 0.096 billion, in 2022 – UAH 0.153 billion, in 2023 – UAH 0.11 billion, in 2024 – UAH 0.182 billion (Table 5).

Table 5.

Expenditures on the National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and Postal Services according to the Laws of Ukraine "On the State Budget of Ukraine" in 2021-2024

No	Title	2021, UAH billion	2022, UAH billion	2023, UAH billion	2024, UAH billion	2022/ 2021, %	2023/ 2022, %	2024/ 2023, %	2024/ 2021, %
1	2	3	5	7	9	11	12	13	14
1	National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and Postal Services	0.096	0.153	0.110	0.182	160.1	72.0	164.7	189.8
1.1	Management in the field of regulation of communications and informatization	0.096	0.153	0.110	0.182	160.1	72.0	164.7	189.8

According to the above, the total expenditures from the State Budget of Ukraine to finance the Administration of the State Service for Special Communications and Information Protection of Ukraine, the Ministry of Digital Transformation of Ukraine and the National Commission for the State Regulation of Electronic Communications, Radio Frequency Spectrum and Postal Services in 2021-2024 are as follows UAH 5.83 billion, UAH 10.74 billion, UAH 37.64 billion, and UAH 53.58 billion respectively, which amounted to 0.40% of the total expenditures for financing public authorities according to the Law of Ukraine "On the State Budget" for 2021, 0.35% of the expenditures for 2022, 1.10% of the expenditures for 2023, and 1.62% of the expenditures for 2024.

It is important to note that in 2023, 79.7% of the total funding of the above-mentioned public authorities according to the Law of Ukraine "On the State Budget" and 80.9% in 2024 are allocated to "measures to provide special equipment and machinery" to the Administration of the State Service for Special Communications and Information Protection of Ukraine.

Therefore, we can conclude that under martial law, budget allocations for financing state institutions entrusted with the authority to formulate and implement state policy in the field of digital development of Ukraine have decreased, which, in our opinion, slows down the sustainable development of the digital economy; the need to restore the relevant budget allocations in full during the post-war reconstruction of Ukraine.

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24. TRANSFORMATION OF LOGISTICS SUPPLY CHAIN: SERVITIZATION, DIGITALIZATION, EVALUATION OF THE EFFICIENCY

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Introduction. Modern transport systems and logistics supply chains are developing rapidly in the process of globalization of the economy and internationalization of social relations. Economic integration and globalization of business contribute to the development of transport systems that ensure the movement of goods in the world market and are involved in value creation. Conversely, for the world markets, which is a system of exchange of goods and services between countries through export-import operations, the transport and logistics sector becomes a significant factor in development, which significantly affects the role of national economies, global competitiveness of participants, the overall level and scale of competition (Beysenbaev R., Dus Y., 2020).

In world markets, countries capable of producing higher quality products at a lower price or capable of being a convenient and cheap transport corridor have competitive advantages (Aigigner K., 1998). Countries with high logistics costs experience a serious deficit in international competitiveness (Devlin J., Yee P., 2005). Having a significant impact on the country's foreign trade balance, transport and logistics activities become the driving force of economic growth and sustainable development (Erkan B., 2014). At the same time, an extensive transport system, quality infrastructure and efficient supply chains are not only a strong prerequisite for economic growth. The transport and logistics sector plays a decisive role in the social context as well, contributing to the improvement of the quality of life, intercultural communication, the building of social ties and the general improvement of the well-being not only of the country but also of each person in particular.

Since globalization has increased the uncertainty of the economic environment and increased competitive pressure, business entities have been forced to change business models, introduce information and communication technologies, move to

offering system solutions that integrate products and services. As a result of the scale of the transformations, the specified local changes turned into global megatrends, the understanding of which provided the basis for the development of theoretical concepts of digitization and servitization (Zhou C., Song W., 2021, Baines T., et al., 2020). Under the influence of external factors, fundamental changes at the local level accelerated the dynamics of development, caused substantial transformations, and led to the emergence of new business models. In such conditions, the transport and logistics sector of the economy underwent and continues to undergo significant transformations. And it is precisely these facts that researchers mostly pay attention to, justifying the need to develop a toolkit for identifying the effectiveness of the development of transport and logistics supply chains.

Literature review. In order to develop logistics competitive advantages, countries should assess the national transport system and existing supply chains and determine which subsystems need to be optimized and/or created through transport policies and regional, national or international initiatives (Jhawar A., et al., 2017). The analysis can be carried out in the form of an internal or external comparative assessment of the country's transport system (Beysenbaev R., Dus Y., 2020). In any of these cases, logistics efficiency indicators are used as a benchmarking tool, which allows you to compare individual parameters and, based on the results of the comparison, focus on critical areas of the transport system. The limited number of tools for assessing logistics performance at the country level is partly due to the fact that research is usually conducted at the company level. Scientists emphasize that although effective micrologistics leads to the formation of a more efficient transport system as a whole, in order to find bottlenecks, it is important to make comparisons at the macroeconomic level as well (Beysenbaev R., Dus Y., 2020).

Currently, a number of ratings are used to measure logistics Connecting to Compete Logistics Performance Index "Connecting to Compete" (LPI), developed by the World Bank; (2) Agility Emerging Markets Logistics Index (AEMLI) from Agility Logistics; (3) the Global Competitiveness Index of the World Economic Forum, which contains an infrastructure sub-index. Micro-level efficiency indicators primarily focus on evaluating the efficiency of resource use (vehicles, infrastructure, human capital), system productivity as a whole (volume of transportation, cost of services provided), financial efficiency (profitability, costs, inventory and capital turnover).

The assessment of the efficiency of the transport and logistics sector has its own specificity at any level of statistical data and analytics. First of all, the features of the assessment are determined by the nature of economic activity in the industry, the organizational component of which takes on specific forms depending on the end users of transport and logistics services (cargo owners or passengers).

In order to determine priority directions for improving the efficiency of transport systems and logistics supply chains, this study was focused on solving several tasks. First, to improve our understanding of modern economic activity in the field of transport and logistics and to form a generalized view of its architecture, formed under the influence of

digitalization and service processes. Secondly, to analyze the efficiency of logistics in Ukraine in comparison with EU countries and to identify problems that prevent the Ukrainian transport and logistics system from functioning effectively and gradually integrating into the European economic space. Thirdly, to substantiate the directions of development of the transport and logistics sector and establish their priority.

Results. One of the approaches to dividing the industry market is proposed by Klaus P. and Kille C. (Klaus P., Kille C., 2007) and presented in the study (Meyer-Rühle O., et al., 2008). This approach describes a model that corresponds to the actual practice of dividing the market of transport and logistics services and provides for the separation of nine segments according to the criteria of the functional context (transport or logistics) and means of transportation (road, rail, water, air, pipeline transport). The sectors in the model are arranged in a sequence from mainly mass transport services to more logistically differentiated and smaller units: (1) bulk logistics, (2) full container load (FCL) with direct transportation from the point of departure to the destination using non-specialized equipment, (3) less than truck load (LTL), (4) specialized transportation, including road transportation, transportation in tanks, grain trucks, etc., (5) courier, express and parcel services (CEP), (6) contract logistics, including distribution of consumer goods, (7) general warehousing and terminal operations, (8) sea freight, forwarding and sea port operations, (9) air cargo operations. As the researchers emphasize, not only the activities of logistics service providers and transport companies are relevant, but also activities related to the logistics activities of all primary and secondary (production) sectors of the economy, as well as the trade sector (wholesale and retail) (Meyer-Rühle O., et al., 2008).

In the field of logistics contract logistics (PLs) and freight forwarding services are provided. Logistics companies offer logistics outsourcing support that includes warehousing operations (storage, supply chain management, picking, packing and order fulfilment), help with the transportation of goods and other activities necessary to complete the supply chain, and provide a range of additional services, including integration IT-systems, inventory management, reporting, reverse logistics, etc. (Barra C., 2023).

Depending on the model of supply chain management (SCM), logistics operators are divided into groups (xPL) from the simplest, basic configurations to the most modern solutions – from 1PL to 5PL. This evolution of the complexity of xPL operators is due to the growth of the spectrum of transport and logistics services. But, as the researchers note, under certain conditions, each form of the xPL-operator market has its own niche and successfully participates in business (Horzela A., et al., 2018). The first party logistics (1PL) represents companies (shippers: manufacturers or traders) that carry out their own logistics activities and do not receive logistics assistance from outsourcing companies. The second party logistics (2PL) are companies that specialize in one specific part of the supply chain, usually transporting goods from one point to another and owns the vehicles. The third party logistics (3PL) includes companies that provide logistics services, by carrying out transportation, warehousing, distribution of pools, management consulting, logistics optimization,

freight forwarding, tariff negotiations, cost estimation and contract management services. The fourth party logistics (4PL) is an integration of companies involved in the supply chain. According to this planning model, the organization and control of all logistics procedures with long-term strategic goals are ensured by a single service provider that comprehensively integrates the competencies of third-party logistics providers (3PL), advanced consulting organizations and technology providers. The logistics companies of the fifth party (5PL) focus on providing integrated logistics solutions within the supply chain (supervision of material, information and financial flows) with coordination and integration of processes both within and between companies (Ozovaci E., 2016).

Forwarding companies coordinate the transportation of goods using one or more carriers and combining delivery methods, act as intermediaries between shippers, transport companies and logistics service providers, influence tariffs through industry networks, provide services for customs documentation, drawing up bills of lading, invoices, import-export declarations, insurance forms and additional services, including warehouse storage (Barra C., 2023).

By delegating logistics operations to third-party logistics (TPL), shippers can save time and resources because it allows them to focus on their own priorities without the need to involve internal logistics experts (Barra C., 2023).

With the development of outsourcing of transport and logistics functions, in-house logistics activity is losing importance, but the volume of in-house logistics remains significant. Approximately 50% of all logistics costs are in-house or in-sourced operations performed within the operational infrastructure of the organization and include warehouse operations in industry, trade and other areas of the shipping economy, then as the other 50% are outsourced to third-party providers of transport and logistics services (Meyer-Rühle O., et al., 2008). According to the estimates of the European Commission, long-term contractual relations of cargo owners in the contract logistics segment make up 16% of total global logistics. And in general, logistics costs in EU countries average about 10–15% of the final cost of products.

This level of the share of logistics costs is equivalent to the data for Ukraine. According to the State Statistics Service of Ukraine, the share of transport, warehousing, postal and courier activities in the total output of goods and services ranges from 5,5% (according to 2020 data) to 6,6% (according to 2015 data), in GDP – from 5,4% (according to 2020 data) to 6,7% (according to 2019 data). Taking into account that, according to world studies, the cost distribution between in-house and outsourced logistics is 1:1, it can be assumed that the share of the cost of transport and logistics services, taking into account insourcing logistics operations, reaches the order of 11–14%.

Using the approach of Klaus P. and Kille C. (Klaus P., Kille C., 2007), the market of transport and logistics services in the field of passenger transportation can also be presented in the form of a model that provides for the division into segments based on the criteria of the functional context and means of transportation. In this case, the sectors of the transport and logistics market will be: (1) urban transportation of public transport

(urban logistics), (2) mass transportation of passengers by rail, (3) regional and international transportation by buses, (4) passenger service and terminal operations in airports, (5) air passenger transportation, (7) transportation of passengers by inland water and sea transport, (8) passenger mobility using private vehicles, (9) operations for the provision of shared mobility transport services (shared mobility), (10) ride hailing services, (11) services of implementation of travel documents, (12) services of routing and traffic monitoring in real-time, (13) comprehensive offer of mobility as a service (MaaS).

The traditional system of passenger transport has a logistics component integrated into the functionality of transport companies (transport operators (public transport companies and other types of transport (public transport), transport infrastructure companies). In this context, logistics is a set of organizational-management and production-technological processes related to the effective provision of the organization of the movement of means of public transport in accordance with the requests of consumers and in accordance with the transport policy. As a result, elements of logistics functions (in particular, in relation to transport design, planning and control) are delegated to state, regional and local government bodies.

Elements of logistics support can also be traced in the segment of mobility using private transport. On the one hand, direct consumers of transport services play a decisive role in the processes of private mobility as a result of the wide personal or individual use of their own car fleet and the active development of other types of private transport (utility cycling, mopeds, scooters, electric scooters, segways, unicycles). But, on the other hand, for the effective functioning of this segment, the state, regional and/or local government bodies create an effective infrastructure and create valid conditions for safe movement. In addition, with the breakthrough development of information and communication technologies (ICT), routing and traffic monitoring services appear and are widely used.

In recent decades, thanks to the emergence and rapid scaling of new models of transport services, including the logistics of sharing vehicles (sharing logistics) and services for ordering trips (hailing service), the logistics component of the market of transport and logistics services has been significantly transformed and becomes more visible.

Modern researchers emphasize that the increasing availability of location data and the ever-increasing number of solutions in the field of ICT, in particular smartphone-based applications, are changing the demand and supply of transport and, among other effects, creating opportunities for the introduction and deployment of a wide range of transport services, as well as reviewing vehicle ownership models (Circella G., Alemi F., 2018). Among the new technological options for transportation are shared-mobility services (shared-mobility services), which combine the advantages of mobile communication and instant booking with the principles of the sharing economy, which separates access to transport services from the constant costs of car ownership and offer several consumer

groups options that are mostly cheaper than owning their own vehicles (Davidson T., Webber M.E., 2017).

New transportation service models include: (1) car-sharing (CS), which involves sharing a fleet of vehicles, usually on an hourly basis (Zhou B., Kockelman K.M., 2011) and can be organized by groups of interested individuals, large employers, transport operators, groups of people or large enterprises (Shaheen S., et al., 1999); (2) ride-sharing (RS) or carpooling is the sharing of trips – a way for several passengers to get to their destination using one vehicle (car or minibus); (3) ride-hailing is a way of using services, not carpooling, where passengers hire a personal driver to take them to their destination; (4) mobility as a service (MaaS) provides simplified communication between users and mobility services through a technological platform and allows planning, booking and payment of a wide range of transport mobility services to meet the need for travel (Moodybianca J., Alves B., 2022).

Models of peer-to-peer system architecture (P2P), in particular, car-sharing, ride-sharing, ride-hailing, belonging to P2P shared mobility, offer basic opportunities according to the logic of the two-sided market (Jang S., et al., 2018). Individuals can use the models as car service providers, offering rides or renting out their own cars through a P2P online platform while retaining legal ownership. Also can access P2P sharing applications as car service users for ride-sharing and car rental (Prieto M., et al., 2022).

P2P shared mobility systems, like the sharing economy in general, are built on the digital economy, in which data unprecedentedly stimulates the exchange and creation of values (Chen Y., Wang L., 2019). The P2P platform, as a commercial company, matches or connects supply and demand and organizes the exchange process, as a result of which, thanks to the collection and analysis of data, it provides information to effectively meet the specific needs of suppliers and users (Prieto M., et al., 2022). In this way, the implementation of joint mobility takes place in the triangle of actors: the platform provider, the peer service provider and the client (Benoit S., et al., 2017).

A pan-European passenger mobility study found that in 2021, EU citizens drove 27 km per day with an average journey time of 80 minutes, with the car being the preferred vehicle for almost half of the journeys. The next most popular types of mobility include walking and cycling. The study also demonstrates a high level of attractiveness of new forms of mobility. Most consumers use ride-hailing (23%) and ride-sharing (12%) services, which indicates a significant potential for the further use and spread of sharing business models and the emergence of other types of P2P platforms, which is quite expected in the age of rapid development of the digital economy.

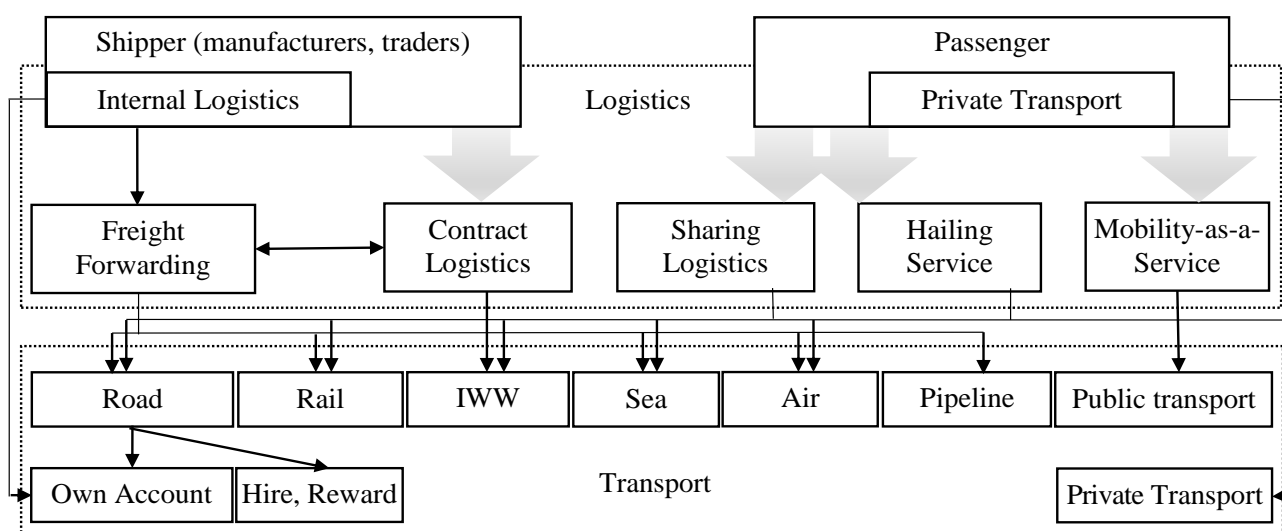


Figure 1. The landscape of the transport and logistics sector of the economy

Source: Developed by the authors based on Klaus P., Kille C. (2007), Meyer-Rühle O., et al. (2008)

As already noted, there are a number of approaches to measuring the efficiency of logistics and transport. At the micro level, it is possible to analyze the efficiency of an individual company, structural division, type of activity, route, vehicle, while at the macro level, the efficiency of the transport and logistics sector of the economy as a whole is measured. Over time, several methods have been proposed, ranging from the use of hard indicators such as trade flows and productivity to soft criteria such as customer satisfaction (Chow G., 1994).

In 2007, World Bank researchers created the Logistics Performance Index (LPI) "Connecting to Compete" as an interactive benchmarking tool that can be used to identify problems and opportunities related to transport and logistics activities. Updated versions were published in 2010, 2012, 2014, 2016, 2018, the latest in 2023, summarizing data for the period 2022–2023.

The methodology for determining LPI involves conducting a worldwide survey of international logistics operators, global freight forwarders and carriers, which provide feedback on the logistics friendliness of countries with which they have trade relations. The 2022–2023 survey covered 139 countries. The second component of LPI is based on quantification and involves the use of detailed high-frequency information on maritime transport and container tracking, postal and air freight. The identified supply chain tracking indicators are provided as supplementary material to the LPI survey and are not included in the country scores and rankings. Thus the LPI measures logistics performance in several dimensions and offers two different perspectives: one based on the perception of international logistics professionals evaluating their partner countries, the other measuring the actual speed of global trade using supply chain tracking information.

The methodology of conducting the survey envisages giving each country a score based on six components: (1) the effectiveness of customs and border control; (2) quality of trade and transport infrastructure; (3) ease of arranging delivery at competitive prices; (4) competence and quality of logistics services; (5) the ability to tracking and tracing; (6) the frequency with which shipments reach consignees within scheduled or expected

delivery times. For each of the components, countries are evaluated on a scale: from 1 point, which is equivalent to poor performance, to 5 points, which are given in case of identifying the performance of the logistics component as excellent. The overall LPI score is constructed using Principal Component Analysis, a standard statistical method used to reduce the dimensionality of a data set.

From the scores, normalized by subtracting the sample mean and dividing by the standard deviation, a single LPI indicator is formed as a weighted average of the component scores. Weighting factors are chosen to maximize the percentage of variation in the original six LPI indicators that are accounted for in the final indicator. The LPI 2023 weighting factors are: Customs – 0,4105, Infrastructure – 0,4133, International Shipments – 0,3931, Logistics Quality and Competence – 0,4168, Tracking and Tracing – 0,4133, Timeliness – 0,4021 and do not differ significantly (the average value of the weighting factor is 0,40772, the standard deviation is less than 1.0% – 0,00987), which means that all components of the indicator are equally important.

Table 1. Summary assessment of the Logistics Performance Index of the "Connecting to Compete" initiative for Ukraine and EU countries

Countries	Customs score		Infrastructure score		International shipments score		Logistics competence and quality score		Tracking and tracing score		Timeliness score		LPI score	
	2018	2023	2018	2023	2018	2023	2018	2023	2018	2023	2018	2023	2018	2023
Ukraine	2,49	2,4	2,22	2,4	2,83	2,8	2,84	2,6	3,11	3,1	3,42	2,6	2,83	2,7
EU countries	3,34	3,4	3,46	3,6	3,41	3,5	3,49	3,7	3,56	3,8	3,86	3,7	3,52	3,6
Finland	3,82	4,0	4,00	4,2	3,56	4,1	3,89	4,2	4,32	4,3	4,28	4,2	3,97	4,2
Denmark	3,92	4,1	3,96	4,1	3,53	3,6	4,01	4,1	4,18	4,1	4,41	4,3	3,99	4,1
Germany	4,09	3,9	4,37	4,3	3,86	3,7	4,31	4,2	4,24	4,1	4,39	4,2	4,20	4,1
Netherlands	3,92	3,9	4,21	4,2	3,68	3,7	4,09	4,2	4,02	4,0	4,25	4,2	4,02	4,1
Austria	3,71	3,7	4,18	3,9	3,88	3,8	4,08	4,0	4,09	4,3	4,25	4,2	4,03	4,0
Belgium	3,66	3,9	3,98	4,1	3,99	3,8	4,13	4,2	4,05	4,2	4,41	4,0	4,04	4,0
Sweden	4,05	4,0	4,24	4,2	3,92	3,4	3,98	4,2	3,88	4,2	4,28	4,1	4,05	4,0
France	3,59	3,7	4,00	3,8	3,55	3,7	3,84	3,8	4,00	4,1	4,15	4,0	3,84	3,9
Spain	3,62	3,6	3,84	3,8	3,83	3,7	3,80	3,9	3,83	4,2	4,06	4,1	3,83	3,9
Greece	2,84	3,2	3,17	3,7	3,30	3,8	3,06	3,8	3,18	3,9	3,66	3,9	3,20	3,7
Italy	3,47	3,4	3,85	3,8	3,51	3,4	3,66	3,8	3,85	3,9	4,13	3,9	3,74	3,7
Estonia	3,32	3,2	3,10	3,5	3,26	3,4	3,15	3,7	3,21	4,1	3,80	3,8	3,31	3,6
Ireland	3,36	3,4	3,29	3,5	3,42	3,6	3,60	3,6	3,62	3,7	3,76	3,7	3,51	3,6
Luxembourg	3,53	3,6	3,63	3,6	3,37	3,6	3,76	3,9	3,61	3,5	3,90	3,5	3,63	3,6
Poland	3,25	3,4	3,21	3,5	3,68	3,3	3,58	3,6	3,51	3,9	3,95	3,8	3,54	3,6
Latvia	2,8	3,3	2,98	3,3	2,74	3,2	2,69	3,7	2,79	4,0	2,88	3,6	2,81	3,5
Lithuania	2,85	3,2	2,73	3,5	2,79	3,4	2,96	3,6	3,12	3,6	3,65	3,1	3,02	3,4
Portugal	3,17	3,2	3,25	3,6	3,83	3,1	3,71	3,6	3,72	3,6	4,13	3,2	3,64	3,4
Croatia	2,98	3,0	3,01	3,0	2,93	3,6	3,10	3,4	3,01	3,2	3,59	3,4	3,10	3,3
Czechia	3,29	3,0	3,46	3,0	3,75	3,4	3,72	3,6	3,70	3,7	4,13	3,2	3,68	3,3
Malta	2,70	3,4	2,90	3,7	2,70	3,0	2,80	3,4	2,80	3,2	3,01	3,4	2,81	3,3
Slovak Republic	2,79	3,2	3,00	3,3	3,10	3,0	3,14	3,4	2,99	3,5	3,14	3,3	3,03	3,3
Slovenia	3,42	3,4	3,26	3,6	3,19	3,4	3,05	3,3	3,27	3,3	3,70	3,0	3,31	3,3
Bulgaria	2,94	3,1	2,76	3,1	3,23	3,0	2,88	3,3	3,02	3,5	3,31	3,3	3,03	3,2
Cyprus	3,05	2,9	2,89	2,8	3,15	3,1	3,00	3,2	3,15	3,5	3,62	3,4	3,15	3,2
Hungary	3,35	2,7	3,27	3,1	3,22	3,4	3,21	3,1	3,67	3,6	3,79	3,4	3,42	3,2
Romania	2,58	2,7	2,91	2,9	3,18	3,4	3,07	3,3	3,26	3,6	3,68	3,5	3,12	3,2

Source: Developed by the authors based on Connecting to Compete (2018, 2023)

In order to identify the most efficient transport systems from the point of view of logistics and establish the position of Ukraine compared to the EU countries, using the methodical approach described in the works (Chernyavska O., 2018, Yanovska V., 2020) and based on the logic of the distribution of countries on the ABCD category (A – the most advanced front of the level of the main indicators, B – average, closer to advanced, C – average, closer to the minimum, D – minimum) based on the data of the global Logistics Performance Index of 2018 and 2023, grouping intervals were determined, which, respectively constitute: $I_{2020} = (4,41 - 2,81)/4 = 0,3475$ and $I_{2023} = (4,3 - 3,2)/4 = 0,25$.

According to the results of the calculations, the interval values are equal to: for group D (the group of countries with the least advanced front of the Logistics Performance Index) – in 2018 $2,81 < k \leq 3,1575$ and in 2023 $3,2 < k \leq 3,45$, group C (groups of countries with an average front closer to the minimum) – $3,1575 < k \leq 3,505$ (2018) and $3,45 < k \leq 3,7$ (2023), group B (groups of countries with an average front closer to the maximum) – $3,505 < k \leq 3,8525$ (2018) and $3,7 < k \leq 3,95$ (2023), group A (groups of countries with the most advanced front of the Logistics Performance Index) – $k > 3,8525$ (2018) and $k > 3,95$ (2023).

Table 2. Grouping of EU countries according to the Logistics Performance Index (2023 data)

Group A	Group B	Group C	Group D
$k > 3,95$	$3,7 < k \leq 3,95$	$3,45 < k \leq 3,7$	$3,2 < k \leq 3,45$
Finland, Denmark, Germany, Netherlands, Austria, Belgium, Sweden	France, Spain	Greece, Italy (↓), Estonia, Ireland (↓), Luxembourg (↓), Poland (↓), Latvia (↑)	Lithuania, Portugal, Croatia, Czechia (↓), Malta, Slovak Republic, Slovenia (↓), Bulgaria, Cyprus, Hungary (↓), Romania
			Ukraine
A group of countries with the most advanced front of the Logistics Performance Index	A group of countries with an average front of the Logistics Performance Index closer to the maximum	A group of countries with an average front of the Logistics Performance Index closer to the minimum	A group of countries with the least advanced front of the Logistics Performance Index

Source: Developed by the author

Notes: "↓" and "↑" indicate group change compared to 2018 analytics.

The grouping of EU countries according to the Logistics Performance Index shows a distribution according to which four territorial clusters are formed. Finland, Denmark, Germany, the Netherlands, Austria, Belgium and Sweden belong to group A, which combines countries with the most advanced front of the Logistics Performance Index, which demonstrates constant high values of the parameters of the development of the transport system with exemplary practices of organizing logistics processes. Countries such as France and Spain also consistently belong to group B, which corresponds to the middle front of the Logistics Performance Index, which is closer to the maximum. Meanwhile, according to 2018 data, Group B was much larger and also included Italy, Ireland, Luxembourg and Poland. It should be noted that such a change in the countries' positions is not always caused by a deterioration in the value of experts'

assessments. In particular, Ireland's LPI score was increased from 3,51 to 3,6 points, as was Poland's LPI score, which increased from 3,54 to 3,6 points. Meanwhile, despite the absolute improvement of the combined value of the Logistics Performance Index of the specified countries, the rate of improvement of the indicators of the development of the transport and logistics sector of the economy (the growth rate of the index was 102,6% and 101,7%, respectively) was slower than that of the leaders of group A (in Finland – 105,8%, Denmark – 102,8%), on average caused the transition to a weaker cluster. Group C, which is a group of countries with an average Logistics Performance Index closer to the minimum, apart from the above-mentioned national transport systems, stably includes the transport systems of Greece and Estonia and in 2023 added Latvia – the only EU country that has so much increased logistics efficiency indicators (according to LPI score from 2,81 to 3,5 points or by 24,6%), which significantly improved its position in the distribution. According to 2018 data, Slovenia and Hungary also belonged to this cluster. Group D, as the least advanced in the Logistics Performance Index, is the largest and includes Lithuania, Portugal, Croatia, the Czech Republic, Malta, the Slovak Republic, Slovenia, Bulgaria, Cyprus, Hungary and Romania. Conditionally marking Ukraine as belonging to this group, it should be emphasized that the LPI score at the level of 2.7 points is not enough to be appropriate even according to the minimum criterion. The gap with the minimum value of the LPI score for EU countries is 0,5 points or 15,6%.

This lag with the additional deterioration of the level of the Logistics Performance Index over the past five years from 2,83 to 2,7 points or by 4,6%, on the one hand, is justified by objective reasons – extremely difficult and destructive socio-humanitarian and economic consequences caused by the war in Ukraine, which had lasted for a year by the time of the assessment by experts. On the other hand, the analysis of the indicators that make up the LPI score demonstrates trends that allow us to assert the potential for growth of the general parameter even in the existing conditions.

Infrastructure projects implemented in the period 2020–2023, primarily related to the Great Construction, led to the growth of the quality of trade and transport infrastructure and conditioned to an increase in the corresponding component from 2,22 points (according to 2018 estimates) to 2,4 points (according to 2023 estimates), that is, by 0,18 points or by 8,1%. But these are the only positive results of decisions implemented in the transport and logistics sector of the national economy. Other components show negative and quite significant dynamics: (1) the effectiveness of customs and border control decreased from 4,49 to 2,4 points or by 0,09 points (by 3,6%); (2) the ease of organizing delivery at competitive prices was estimated at 2,8 points in 2023 against 2,83 points in 2018, which shows, although not significantly, the worsening of the situation (decrease in the assessment by 0,03 points or by 1,1%); (3) the competence and quality of logistics services has deteriorated much more significantly with a drop in the score from 2,84 to 2,6 points or by 0,24 points (by 8,5%); (4) the ability to track and tracing was almost unchanged – the score was reduced by only 0,01 points or 0,3% (from 3,11 to 3,1 points), which may be due to the accuracy of the calculations; (5) the frequency with which goods reach recipients within the planned or expected delivery times has deteriorated significantly – from 3,42 to 2,6 points or by 0,82 points (by 24,0%). Meanwhile, it should be emphasized that despite the great shock that the Ukrainian transport and logistics

system experienced at the beginning of the war, it coped with the challenge and was able to ensure the transportation of necessary goods to and from Ukraine (Berestenko V., 2023), albeit with a loss of a certain level performance.

As noted by Chatterjee P. and Chakraborty S., the normalization process scales the criteria values (Chatterjee P., Chakraborty S., 2014). Accordingly, the normalized values of the components of the Logistics Performance Index make it possible to rank the components regarding the priority of overcoming problems from the positions of reducing the gap with optimal and average values for EU countries. For this purpose, the linear maximization method is used in the normalization process to compare the current values of the criteria with the normative (x_{in}), and therefore optimal, and with the average (Vafaei N., et al., 2018; Zhou P., et al., 2006; Jahan A., Edwards K.L., 2015): $n_{in} = x_{ij}/x_{in}, x_{ij} \rightarrow 5$. Next, taking into account the weighting coefficients of the logistics efficiency index using the Simple Additive Weighting (SAW) method, the set of criteria $C_{in}(i = 1, \dots, I)$ and their corresponding weights w_i determine the weighted average components. Research emphasizes that this kind of normalization is an integral part of the Multiple Criteria Decision Making (MCDM) process, as it allows for obtaining dimensionless units for calculating the final rating for each alternative (Vafaei N., et al., 2018). At the same time, the weighting coefficients of the criteria are considered as a measure of elasticity of the general Logistics Performance Index or a measure of its change (sensitivity) as a dependent variable to changes in independent variables, other things being equal.

Table 3. Normalized components of Ukraine's Logistics Performance Index relative to values of sample for EU countries

Indicator	Year	Customs score	Infrastructure score	International shipments score	Logistics competence and quality score	Tracking and tracing score	Timeliness score	LPI score
EU countries								
Maximum value	2018	4,09	4,37	3,99	4,31	4,32	4,41	4,2
	2023	4,1	4,3	4,1	4,2	4,3	4,3	4,2
Minimum value	2018	2,58	2,73	2,7	2,69	2,79	2,88	2,81
	2023	2,7	2,8	3,0	3,1	3,2	3,0	3,2
Average	2018	3,46	3,41	3,49	3,56	3,86	3,52	3,34
	2023	3,6	3,5	3,7	3,8	3,7	3,6	3,4
Ukraine	2018	2,49	2,22	2,83	2,84	3,11	3,42	2,83
	2023	2,4	2,4	2,8	2,6	3,1	2,6	2,7
Normalized								
relative to the criterion of optimality	2018	49,8	44,4	56,6	56,8	62,2	68,4	56,6
	2023	48,0	48,0	56,0	52,0	62,0	52,0	54,0
relative to the average	2018	72,0	65,1	81,1	79,8	80,6	97,2	84,7
	2023	66,7	68,6	75,7	68,4	83,8	72,2	79,4
Gap								
according to the criterion of optimality	2018	-50,2	-55,6	-43,4	-43,2	-37,8	-31,6	-43,4
	2023	-52,0	-52,0	-44,0	-48,0	-38,0	-48,0	-46,0
to the average	2018	-28,0	-34,9	-18,9	-20,2	-19,4	-2,8	-15,3
	2023	-33,3	-31,4	-24,3	-31,6	-16,2	-27,8	-20,6
Weighting factor		0,4105	0,4133	0,3931	0,4168	0,4133	0,4021	
Indicator rank by gap level [taking into account weighting factors]		1	2[3]	5	3[2]	6	4	

Source: Developed by the author

The group with a high level of gap (negative deviation from the criterion of optimality, which is 5 points, exceeds 50%) and, accordingly, the lowest performance of the transport and logistics system of Ukraine, includes such components as: the efficiency of customs and border control – deviation from the maximum assessment reaches 50,2(2018)–52,0(2023)%, from the average for the group of EU countries – 33,0(2023)–28,0(2018)%, and the indicator of the quality of trade and transport infrastructure – 71,1(2020)–72,4(2022)% and 35,4(2020)–36,0(2022)%. Competence and quality of logistics services belong to the group with a moderate gap level (negative deviation up to 50%) – 43,2(2018)–48,0(2023)%, exceeding the average value for EU countries by 20,2(2018)–31,6(2023)%, the frequency with which goods reach recipients within the planned or expected delivery times – 31,6(2018)–48,0(2023)% and 2,8(2018)–27,8(2023)%, ease of organizing delivery at competitive prices – the values of deviations from the optimal and from the average are 43,4(2018)–44,0(2023)% and 24,3(2023)–18,9(2018)%, the ability to tracking and tracing – 37,8(2018)–38,0(2023) % and 16,2(2023)–19,4(2023)%.

Conclusion. The ranking of components by the size of the gap with a focus on solving the problem of logistics performance according to the logic of prioritization in the direction from the maximum to the minimum deviation from the optimal and average values of the components for EU countries makes it possible to provide a number of well-founded recommendations for the development of the transport and logistics sector of the economy of Ukraine. First, the effectiveness of customs and border management, operational procedures – modernization of soft infrastructure thanks to political reforms and investments aimed at increasing the degree of ease of work in the direction of automation, risk management and compliance with integrity. Secondly, increasing the competence and quality of logistics services – developing the potential of the private sector, sustainable management of the quality of transport and logistics services, active search for innovative technological solutions, competitive differentiation of marketing offers, responding to customer satisfaction challenges, reviewing and improving the competencies of logistics specialists. Thirdly, the quality of trade and transport infrastructure – the modernization and construction of hard infrastructure as a critically important component of the supply chain, coordinated with reforms and investments in soft infrastructure and the development of the potential of transport and logistics service providers, with the implementation of investment projects, in particular within the framework of public-private partnership. Fourth, ensuring a high level of frequency with which shipments reach recipients within the planned or expected delivery time – constant monitoring of best practices and generation of new solutions to minimize delays in ports, airports, multimodal supply chains. Fifth, the ease of organizing international shipments at competitive prices – the development of modern transit systems and regionally integrated markets of authorized operators that meet quality requirements and care for the environment. Sixth, expansion of tracking and tracing capabilities – development and implementation of projects to create high-precision digital systems for tracking and routing shipments and monitoring the performance of key logistics hubs.

The creation of a modern management system for complex networks of supply chains, which meets international standards and applies the latest global practices,

should provide for the implementation of an integrated approach and the creation of a platform for dialogue and implementation of joint actions by representatives of state and regional administration and transport and logistics business.

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25. THE INFLUENCE OF GLOBAL TRENDS ON THE FORMATION OF EDUCATIONAL TRENDS

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Introduction. In an era characterized by rapid technological advancements, interconnected global economies, and evolving societal dynamics, the landscape of education is undergoing profound transformations. The impact of global trends on the formation of educational trends has become increasingly significant, shaping the way

we approach teaching and learning at all levels. This intersection between the global and the educational spheres has given rise to a complex web of influences that continuously mold the educational landscape.

The interconnectedness of our world, fueled by advancements in communication and transportation technologies, has created a global village where ideas, information, and innovations circulate at an unprecedented pace. This interconnectedness has not only blurred geographical boundaries but has also catalyzed the emergence of shared challenges and opportunities that transcend borders. As a result, the field of education finds itself at the nexus of various global trends, each contributing to the redefinition of educational paradigms.

One of the primary drivers of change is the digital revolution, which has revolutionized the way information is accessed, processed, and disseminated. The ubiquity of digital tools and online resources has not only democratized knowledge but has also redefined the skills and competencies needed for success in the 21st century. Educational institutions worldwide are grappling with the need to adapt their curricula and teaching methodologies to prepare students for an increasingly digital and interconnected future.

Furthermore, the global emphasis on sustainability and environmental consciousness is permeating educational discourse. As the world grapples with climate change and ecological challenges, educational institutions are under pressure to incorporate environmental education and sustainable practices into their core missions. This reflects a broader recognition that education is not only a means to personal advancement but also a crucial vehicle for fostering global citizenship and responsibility.

Economic shifts and the evolving nature of work are also influencing educational trends. The demand for a highly skilled and adaptable workforce is driving a reevaluation of traditional education models. The emphasis on lifelong learning and the need for a diverse skill set are challenging educators to rethink the structure and content of educational programs to ensure relevance in an ever-changing job market.

In this dynamic landscape, it is essential to explore how these global trends intersect and influence the formation of educational trends. This exploration will delve into the challenges and opportunities presented by these trends, as well as the strategies educators and policymakers can employ to navigate this rapidly evolving terrain. By understanding the impact of global trends on education, we can better prepare ourselves to meet the demands of the future and ensure that education remains a powerful catalyst for individual growth and societal progress.

Literature review. This literature review aims to explore and synthesize existing research on how global trends influence the development and transformation of educational trends. The review will delve into key areas such as technological advancements, cultural shifts, economic changes, and environmental considerations, examining their implications for educational practices worldwide.

In the digital age, technological advancements have revolutionized the way information is accessed, disseminated, and consumed. The integration of technology in education has become a pivotal global trend, affecting teaching methods, curriculum design, and student engagement. Research suggests that the adoption of digital tools, such as online learning platforms, virtual reality, and artificial intelligence, has reshaped educational landscapes, promoting personalized learning experiences and preparing students for the demands of the 21st century workforce.

Globalization has led to increased cultural interconnectedness, influencing educational trends by emphasizing the importance of cultural competence and diversity. Scholars argue that embracing diverse perspectives in education fosters a more inclusive and equitable learning environment. This cultural shift is reflected in curriculum changes, pedagogical approaches, and policies that aim to prepare students for a multicultural and globalized world.

Economic trends play a crucial role in shaping educational priorities and policies. Economic shifts, such as the rise of the knowledge-based economy, impact the skills and competencies emphasized in education. Research highlights the growing importance of STEM (science, technology, engineering, and mathematics) education in response to the demand for a highly skilled workforce. Additionally, the focus on entrepreneurship and vocational training has gained prominence as countries seek to align education with economic needs.

The escalating awareness of environmental challenges has led to a growing emphasis on sustainability and environmental education. Global trends related to climate change and ecological concerns have prompted educators to incorporate environmental concepts into curricula. Research indicates that fostering environmental literacy and sustainable practices in education not only addresses pressing global issues but also equips students with the knowledge and skills needed to contribute to a more sustainable future.

Results. Education is a dynamic field that continually evolves in response to societal changes and global trends. In recent years, the impact of various global trends on the formation of educational practices has become a subject of significant scholarly interest.

Technological Revolution

The development of technologies such as artificial intelligence, machine learning, and the Internet of Things is transforming the economy and requires new skills from workers. Educational systems must adapt to these changes by providing students with the necessary knowledge and skills for a successful career in the digital world. These technological innovations are not only revolutionizing industries but are also necessitating a paradigm shift in the skills and competencies demanded from the workforce. In light of this transformative era, educational systems must evolve to equip students with the essential knowledge and abilities crucial for thriving in the digital age.

Artificial intelligence, with its ability to process vast amounts of data and make complex decisions, is becoming increasingly integral to various sectors, ranging from healthcare and finance to manufacturing and customer service. Machine learning, a subset of artificial intelligence, further enhances systems' capabilities to learn and adapt without explicit programming, contributing to unprecedented levels of automation and efficiency. The Internet of Things, on the other hand, connects devices and enables seamless communication, fostering a network of interconnected devices that can collect and exchange data in real-time.

To navigate this digital landscape successfully, individuals entering the workforce need a multifaceted skill set. Traditional educational models must be reimagined to include a focus on digital literacy, data analysis, programming, and critical thinking. Moreover, fostering creativity, adaptability, and the ability to collaborate across disciplines are becoming increasingly crucial as industries continue to evolve.

Educational institutions should establish interdisciplinary programs that integrate technology into various subjects, ensuring that students develop a holistic understanding of how these innovations intersect with different domains. Offering courses on coding, data science, and cybersecurity is essential to cultivate a workforce that is not only technologically adept but also capable of addressing the ethical implications and challenges associated with these advancements.

In addition to technical skills, emphasis should be placed on soft skills such as communication, problem-solving, and teamwork. The ability to navigate and leverage technology effectively, coupled with strong interpersonal skills, will be the hallmark of a well-rounded professional in the digital era.

Furthermore, continuous learning and upskilling should be encouraged throughout one's career. The rapid pace of technological change means that professionals will need to adapt and acquire new skills regularly to stay relevant in their respective fields.

In conclusion, the ongoing technological revolution demands a fundamental rethinking of education. By aligning curricula with the demands of the digital age, educational systems can play a pivotal role in preparing a workforce that is not only capable of harnessing the full potential of emerging technologies but also equipped to address the challenges and ethical considerations that come with them. This adaptive approach will empower individuals to thrive in a dynamic and ever-evolving digital landscape, fostering innovation and driving economic growth.

Globalization

The growth of global economic and cultural interaction requires educational systems to prepare students to work in an international environment. Intercultural competence and knowledge of foreign languages become key factors for success. In the rapidly evolving landscape of our interconnected world, the expansion of global economic and cultural interactions has become an undeniable reality. This phenomenon necessitates a fundamental shift in educational paradigms to ensure that students are adequately equipped to thrive in an international environment. As borders

blur and communication barriers dissolve, the imperative for intercultural competence and proficiency in foreign languages becomes more pronounced than ever.

The traditional approach to education must adapt to the demands of a globalized society, where individuals are increasingly required to collaborate, negotiate, and navigate diverse cultural contexts. Interconnected economies and technological advancements have transformed the job market, making it imperative for educational systems to foster skills that transcend geographical and cultural boundaries.

At the heart of this educational evolution lies the importance of intercultural competence. Students must be equipped with the ability to understand, appreciate, and effectively engage with people from diverse cultural backgrounds. This includes developing an awareness of cultural nuances, communication styles, and social norms to foster meaningful connections in a globalized workforce.

Moreover, proficiency in foreign languages emerges as a cornerstone of success in a world where multilingualism is an asset. Language skills facilitate not only effective communication but also a deeper understanding of cultural contexts. Students proficient in multiple languages are better positioned to engage in international business, diplomacy, and cultural exchange, thereby contributing to the breakdown of language barriers that can impede collaboration.

The integration of intercultural competence and foreign language proficiency into educational curricula extends beyond mere linguistic and cultural knowledge. It cultivates open-mindedness, adaptability, and a global perspective, empowering students to become well-rounded individuals capable of navigating the complexities of an interconnected world.

Educational institutions must adopt innovative teaching methodologies that prioritize experiential learning, cross-cultural exchanges, and immersive language programs. This approach not only enhances academic rigor but also provides students with practical skills and experiences that prepare them for the challenges and opportunities of a globalized society.

In conclusion, as the world continues to evolve into a tightly woven global community, educational systems must embrace a paradigm shift. The cultivation of intercultural competence and proficiency in foreign languages is no longer a luxury but a necessity for students aspiring to succeed in an international environment. By fostering these skills, educational institutions play a pivotal role in shaping a generation capable of contributing positively to the interconnected and dynamic world in which we live.

Environmental Awareness

Increasing attention to environmental issues and sustainable development requires the inclusion of environmental education in curricula. Global trends emphasize the need to shape environmentally conscious citizens. The growing awareness of environmental issues and the increasing importance of sustainable development have underscored the necessity of incorporating environmental education into academic curricula. This shift reflects a global

acknowledgment of the imperative to cultivate environmentally conscious citizens who are equipped to address and mitigate the challenges facing our planet.

One of the key drivers behind the push for environmental education is the recognition of the interconnectedness between human activities and the health of the planet. As societies become more industrialized and populations grow, the impact on the environment becomes more pronounced. Issues such as climate change, deforestation, pollution, and loss of biodiversity are not only global challenges but also urgent threats that require informed and proactive responses.

Integrating environmental education into school curricula provides students with a foundational understanding of ecological systems, the consequences of human actions on the environment, and the principles of sustainability. This education empowers individuals to make informed decisions that promote responsible environmental stewardship. Moreover, it fosters a sense of environmental responsibility and encourages sustainable practices in various aspects of life, including energy consumption, waste management, and resource utilization.

By instilling environmental consciousness from an early age, educational institutions contribute to shaping a generation that values and prioritizes sustainability. Beyond the classroom, students equipped with environmental knowledge become catalysts for positive change in their communities. They can influence social norms, advocate for environmentally friendly policies, and engage in practices that contribute to a healthier planet.

The inclusion of environmental education in curricula is also aligned with international efforts and agreements aimed at addressing global environmental challenges. Initiatives such as the United Nations Sustainable Development Goals (SDGs) recognize the pivotal role of education, particularly environmental education, in achieving a more sustainable and equitable future. Countries worldwide are increasingly incorporating these goals into their educational frameworks, emphasizing the interconnectedness of environmental, social, and economic aspects of sustainability.

In conclusion, the imperative for environmental education in curricula arises from the pressing need to create a global citizenry that is not only aware of environmental challenges but also actively engaged in addressing them. Through a comprehensive and integrated approach to environmental education, societies can foster a mindset that values sustainability, promotes responsible behavior, and ultimately contributes to the well-being of the planet for future generations.

Diversity and Inclusion

Society is becoming increasingly diverse, and educational systems must consider this diversity in their strategies. It is important to develop inclusive approaches to learning and ensure equal access to education for all. As society continues to evolve, embracing an ever-growing diversity of cultures, backgrounds, and perspectives, educational systems play a crucial role in fostering inclusivity and ensuring equal access to education for everyone. Recognizing and celebrating this diversity is not just

a matter of social justice; it is also a key element in promoting a thriving and dynamic society.

Inclusive education is an approach that goes beyond merely accommodating differences; it actively seeks to create an environment where every individual, regardless of their background or characteristics, feels valued and supported. This involves acknowledging various learning styles, cultural contexts, and abilities to tailor educational strategies that cater to the needs of a diverse student body.

An essential aspect of inclusive education is the promotion of equity in access to educational resources and opportunities. This means breaking down barriers that may prevent certain groups from fully participating in the educational process. This could involve addressing economic disparities, providing support for students with disabilities, and actively challenging discriminatory practices that may exist within educational institutions.

Teachers and educators play a pivotal role in implementing inclusive approaches to learning. They must undergo training that enhances their cultural competence, understanding of diverse learning needs, and ability to create an inclusive classroom environment. Curriculum design should also be reflective of the diversity present in society, incorporating perspectives from various cultures and backgrounds to offer a well-rounded and comprehensive educational experience.

Furthermore, technology can serve as a powerful tool for promoting inclusivity in education. Digital platforms can provide personalized learning experiences, accommodating different learning styles and paces. Additionally, online resources can facilitate access to education for individuals who might face geographical or physical challenges in attending traditional brick-and-mortar institutions.

Inclusive education is not just limited to the classroom; it extends to extracurricular activities, school policies, and the overall school culture. Creating an inclusive school environment involves fostering a sense of belonging for all students, irrespective of their differences. This can contribute to the development of a more tolerant and understanding society, as students learn to appreciate and learn from one another's unique perspectives.

In conclusion, as society becomes more diverse, educational systems must adapt to ensure that they are inclusive and provide equal opportunities for all individuals to learn and thrive. Inclusive education is not just an educational philosophy; it is a commitment to creating a society that values and respects the richness of its diversity. By embracing inclusive approaches, educational systems can contribute significantly to building a more equitable and harmonious future.

Economic and Social Turbulence

Global challenges such as pandemics, economic crises, and other social disruptions can significantly impact educational systems. Educational institutions must be prepared to adapt and provide effective distance and hybrid education. The dynamic nature of global challenges necessitates a proactive and flexible approach to education.

One of the key areas that educational institutions need to focus on is the development and implementation of robust technology infrastructure. As the world

becomes increasingly interconnected, the ability to leverage digital tools and platforms is crucial for delivering education remotely. Investing in reliable internet connectivity, online learning platforms, and digital resources can enhance the accessibility of education, ensuring that students can continue their learning journey regardless of external challenges.

Moreover, the shift towards distance and hybrid education requires educators to develop new pedagogical strategies. Teachers need to be equipped with the skills to facilitate engaging and interactive online learning experiences. This includes utilizing multimedia resources, fostering virtual collaboration, and adapting assessments for remote settings. Professional development programs can play a vital role in ensuring that educators are well-prepared to navigate the complexities of digital education.

In addition to technological and pedagogical considerations, there is a need for a holistic approach to student well-being. The challenges posed by global crises can take a toll on students' mental health and overall well-being. Educational institutions should prioritize creating a supportive and inclusive virtual learning environment. This involves implementing measures to address social isolation, providing mental health resources, and promoting a sense of community among students and educators.

Collaboration between educational institutions, governments, and other stakeholders is also essential in overcoming global challenges. Sharing best practices, resources, and expertise can help create a more resilient education system. Governments can play a crucial role in providing financial support, policy frameworks, and guidance to ensure that educational institutions are well-equipped to face disruptions effectively.

Furthermore, global challenges underscore the importance of fostering adaptability and critical thinking skills among students. Educational curricula should be designed to promote resilience, problem-solving, and the ability to navigate uncertainty. This prepares students not only for academic success but also for the challenges they may encounter in their personal and professional lives.

In conclusion, the impact of global challenges on educational systems highlights the need for proactive and adaptable approaches. By investing in technology, supporting educators, prioritizing student well-being, fostering collaboration, and promoting critical thinking, educational institutions can navigate uncertainties and continue to provide quality education in the face of adversity.

In the midst of the ongoing and challenging conflict in Ukraine, the importance of resilient and adaptable educational institutions cannot be overstated. The impact of war on the normal functioning of society, including schools and universities, necessitates a swift and comprehensive response to ensure the continuity of education for students.

The adaptability of educational institutions becomes particularly crucial in the face of such adversity. The implementation of effective distance and hybrid education models emerges as a viable solution to counteract the disruptions caused by the conflict. Distance education, facilitated by digital platforms and online resources, enables students to continue their learning remotely, minimizing the impact of physical barriers imposed by the war.

Hybrid education, combining elements of both traditional in-person classes and virtual learning, offers a flexible and dynamic approach. This model allows educational institutions to navigate the challenges of the war by providing alternatives that accommodate students' diverse needs and circumstances. It also fosters resilience in the educational system, ensuring that disruptions caused by the conflict do not compromise the quality of learning.

The use of technology plays a pivotal role in facilitating distance and hybrid education. Virtual classrooms, video conferencing tools, and online collaboration platforms become essential tools for both educators and students. Institutions need to invest in robust technological infrastructure and provide training for teachers to effectively utilize these resources, ensuring a smooth transition to alternative modes of education.

Moreover, the psychological and emotional well-being of students in a war-torn environment should be a priority. Educational institutions should implement support mechanisms, such as counseling services and mental health programs, to address the unique challenges that students may face during these difficult times. Creating a supportive and understanding learning environment is crucial for fostering resilience and maintaining a sense of normalcy for students amidst the chaos of war.

Conclusion: In conclusion, the formation of educational trends is intricately linked to the evolving landscape of global trends. This literature review has provided insights into the impact of technological advancements, cultural shifts, economic changes, and environmental considerations on education. As the world continues to change at an unprecedented pace, educators, policymakers, and stakeholders must remain vigilant in understanding and adapting to these global trends to ensure that education remains relevant, inclusive, and effective in preparing students for the challenges of the future. Future research in this area should continue to explore emerging global trends and their implications for educational practices.

In summary, the brutal war in Ukraine underscores the urgency for educational institutions to be prepared and adaptable. Embracing distance and hybrid education models, leveraging technology, and prioritizing the well-being of students are essential components of a comprehensive response. By doing so, educational institutions can continue to fulfill their mission of providing quality education, even in the face of extraordinary challenges.

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26. YOUTH DIGITAL INCLUSION

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Introduction. Digital transformation is the process of implementing digital technologies and changing business models to optimize business processes, improve efficiency and create new opportunities for innovation. It includes the use of technologies such as artificial intelligence, data analytics, the Internet of Things, blockchain, and others in order to transform traditional business processes.

Contradictions of digital transformation:

1. New technologies and old systems: Problems often arise when trying to integrate new technologies into already existing systems, especially if the latter are outdated.
2. Data security and privacy: The growth of digital data also raises security threats and privacy issues.
3. Staff Training and Upgrading: The implementation of new technologies often requires staff training, which can be a difficult process.
4. Costly investments: Digital transformation may require significant investments in technology that may not immediately return to profit.

Ways of digital transformation:

1. Strategic planning: Developing a clear strategy is key to successful digital transformation.

2. Innovation and ecosystems: Cooperation with innovative startups and creation of ecosystems can stimulate innovative solutions.

3. Agile approach: The use of agile development methods allows you to quickly implement changes and adapt to new conditions.

4. Education and training of staff: Investing in training and development of staff will ensure their ability to work effectively with new technologies.

5. Digital technologies for customer interaction: Focusing on improving customer interactions using digital technologies can improve the customer experience.

Digital transformation is a complex but necessary process in order to maintain competitiveness in today's digital world.

Literature review. The analysis of scientific sources shows that, in general, new approaches can be summarized as the modern level of education Digital Learning 2.0 [1], within which new technologies and gamification allow for a significant increase in the quality and power of education [2], especially with an emphasis on adaptive approaches in education [3], creating an immersive environment using virtual reality [4]. Digitization is becoming a necessity in today's world, because technologies are becoming an important part of society and economy. The youth growing up in this digital age need special attention in the context of their inclusion in this digital world. Such a topical topic as "Youth Digital Inclusion" (inclusion of young people in the digital world) is of interest to both scientists and practitioners. One of the main trends discovered by scientists is that the digitization of society does not affect everyone equally. Youth in vulnerable socioeconomic conditions may experience limited access to digital resources, leading to digital exclusion.

Scientists note that one of the key aspects of the inclusion of young people in the digital world is education. [5] Research shows that the integration of digital technologies into the educational process can increase interest in learning and develop the necessary skills for further successful careers in the digital society. Youth who do not have access to digital opportunities may remain on the margins of society. Social inclusion through digital tools can be a key factor in reducing social differences and inequalities [7].

Results.As we move towards 2030, developing digital skills has become key to career success. These skills include basic abilities such as conducting research via the internet, communicating online via email or instant messaging, using professional online platforms, and understanding digital financial services .

It is estimated that tens of millions of future jobs will require higher-level digital skills, including coding, software and application development, network management, machine learning, big data analytics, Internet of Things (IoT), cybersecurity and Distributed ledger technologies like blockchain.

While young people are often considered “digital natives”, in reality most of them may not have sufficient job-relevant digital skills to fill the gaps. According to a survey analyzed in ITU's report Measuring Digital Development: Facts and Figures

2020 , less than 40% of individuals in 40% of the countries surveyed reported having activities that require basic digital skills.

Furthermore, only 15% of countries have more than 10% of individuals writing a computer program using a professional programming language in the past three months. In an increasingly digital society, low ICT skills remain a barrier to employment.

In order for young people to participate meaningfully in society, young people must have the skills and opportunities to advance their vision of a connected future. ITU's wider Generation Connected initiative aims to empower young people.

To build a more inclusive digital society, ITU urges leaders from governments, the private sector, academia and other key stakeholders to take action to ensure that young people have the necessary skills to succeed in the job market and civil society Skill.

Sustainable Development Goal 8 (decent work and economic growth for all) can only be achieved by providing digital education and opportunities for young people.

2020 data collected by UNESCO shows that globally, 40% of primary schools and 66% of secondary schools have access to the Internet in 2020. In the least developed countries, 28% of primary schools and 35% of secondary schools have Internet access. Of the 93 countries for which data are available, 42 have 100% internet connectivity in primary schools. All secondary schools in 50 countries have Internet connectivity (available data comes from lower secondary schools in 94 countries and upper secondary schools in 97 countries).

As advanced digital skills become increasingly important for employment and entrepreneurial success, some experts predict that there may soon be a "talent gap" for workers with advanced ICT capabilities. The need for qualified workers is exacerbated by various socioeconomic inequalities, such as lack of internet connectivity at home.

Lack of digital connectivity is only the initial barrier for young people to obtain the technology skills and education they need to succeed. According to the report "How many children and youth are online at home" jointly released by UNICEF and ITU , more than two-thirds of the world's school-age children aged 3 to 17 years (1.3 billion children) and 63% of children aged 15 to 24 young people (nearly 760 million young people) lack Internet connectivity at home. According to the latest data available, about two-thirds (66%) of households globally are connected to the Internet, and approximately 2.2 billion children and young people aged 25 or younger do not have access to the Internet at home.

Access varies greatly depending on the relative wealth of countries: 87% of children and young people in high-income countries have an internet connection at home, but only 6% in low-income countries. Young people's access to the internet (and the resulting development of digital skills) is often dependent on their parents' wealth, income and living standards.

All stakeholders, including government, academia, the private sector and civil society, can design strategies that help develop young people's digital skills and support the full economic, social and digital inclusion of all young people. Digital

technologies can help enhance education, reduce youth unemployment and boost socioeconomic development, but for young people to benefit from these opportunities, all young people must have a range of technology skills and access to affordable connectivity.

Governments should focus on strategies to empower youth and increase their participation in local communities. These strategies include:

Form a coalition of talented young leaders active in the digital space. The government can call on the country's youth to develop a national ICT youth leadership program. These young leaders can then organize and promote ICT- related campaigns, initiatives, youth projects and other activities that contribute to the achievement of the 2030 Agenda for Sustainable Development. They can also lobby for fuller youth participation in political and social forums at local, regional and international levels.

Organize and promote ICT- related challenges and competitions for youth .Governments can fund competitions that invite young people to develop creative digital solutions to existing national or global challenges. Actors from academia can partner with these competitions to increase youth engagement in achieving the 17 Sustainable Development Goals.

Organize regional youth forums. Governments can arrange regional meetings and spaces for youth to discuss technology-related opportunities and challenges in their regions and provide feedback to government leaders. This will lead to meaningful change and expand youth participation in the implementation of technology-related policies.

Engage young people through youth employment opportunities or open spaces such as “youth labs” where young people can find mentors and support networks or develop new digital skills.

Expand primary and secondary school curricula across the country to teach digital empowerment skills (i.e. raising social issues online, creating and sharing content in different media formats), digital engagement skills (i.e. participating in AI conversations), digital participation skills (i.e. how to protect digital devices from being victimized by hackers or phishing scams), digital wellness skills (i.e. how to explore identity online, how to look after mental health when using social media), etc.

Here are some examples of how ICT (Information and Communication Technology) can help build resilient cities:

Riyadh, Saudi Arabia: The city of Riyadh has implemented measures to alleviate traffic congestion, including adaptive traffic management and priority determination. Smart transportation systems track and manage urban traffic using various sensors and closed-circuit television (CCTV) intelligent surveillance systems. The system employs advanced analytical tools for real-time traffic historical analysis and forecasting, including incident reports and road conditions based on scenarios, traffic data, and key performance indicators for reporting.

Mashhad, Iran: The city of Mashhad has introduced an intelligent waste collection program to increase recycling rates. The city has developed a mobile

application (SIMAP) that provides information on waste processing processes to encourage people to improve waste sorting and participate in recycling efforts.

Moscow, Russia: The entire traffic and transportation network in Moscow is managed by a traffic management center. Data from over 2000 traffic lights, 3500 motion detectors, and 2000 video surveillance cameras are transmitted back to the city's traffic management center. A high-tech real-time traffic analysis system, controlled by the center's data, can determine which traffic mechanisms are unnecessary and which are essential.

Singapore: Singapore has developed a dynamic 3D model of the city and a collaboration platform called Virtual Singapore to support innovation among the city's stakeholders. Virtual Singapore enables city stakeholders to analyze, make decisions, and experiment with ideas for policy and business, using valuable information obtained during the project.

Valencia, Spain: Valencia has developed a cloud-based internal city management system, the VLCi platform. The platform allows cities to collect data on key indicators related to urban services, analyze them using advanced tools, and develop decision-making tools based on this data. The platform transparently involves citizens in the process.

Texel, Dutch Island: The Dutch island of Texel has promoted the use of a new type of intelligent energy-saving street lighting throughout the city. This lighting system utilizes a combination of light-emitting diodes (LEDs) and Internet of Things (IoT) sensors to save a significant amount of energy and reduce light pollution.

Engaging in activities related to biological and environmental sciences necessitates a set of specialized digital skills to navigate the complexities of these fields. The integration of technology has become integral in modern scientific research and environmental management.

The general modern trends of digitalization of society are vivid manifested in education. Digitization of education is its modern stage informatization, which involves the saturation of information and education environment with electronic and digital devices, means, systems establishment of electronic communication exchange between them, which actually enables the integrated interaction of virtual and physical, that is, it creates a cyber-physical educational space. It has two sides: first, the formation of a digital educational environment as a whole digital learning tools, online courses, electronic education content, various digital resources and services; secondly, deep modernization of the educational process designed to provide training person to life in the conditions of a digital society and professional activities in the conditions of the digital economy. [6]

Here are some key digital skills essential for individuals involved in biological and environmental sciences:

- 1.Data Analysis and Visualization:

- Proficiency in using data analysis software such as R, Python, or statistical packages for analyzing large datasets.

-Ability to create meaningful visualizations to communicate complex biological and environmental data effectively.

2.Geographic Information Systems (GIS):

-Understanding and use of GIS tools for mapping and spatial analysis, crucial for environmental monitoring, habitat assessment, and ecosystem modeling.

3.Remote Sensing:

-Familiarity with remote sensing technologies and satellite imagery interpretation for monitoring changes in land use, vegetation cover, and environmental conditions.

4.Bioinformatics:

-Competence in bioinformatics tools for processing and analyzing biological data, including DNA sequencing, genomics, and proteomics.

5.Environmental Modeling:

-Knowledge of modeling software for simulating environmental processes, predicting climate change impacts, or studying the dynamics of ecosystems.

6.Digital Lab Techniques:

-Mastery of digital laboratory tools and equipment for tasks such as automated sample analysis, electronic data logging, and sensor integration.

7.Collaborative Technologies:

-Proficient use of collaborative platforms and tools for team-based research, document sharing, and real-time collaboration with peers or experts globally.

8.Database Management:

-Skills in managing and querying large databases to store and retrieve biological and environmental data efficiently.

9.Coding and Scripting:

-Basic programming skills to automate repetitive tasks, develop custom analysis tools, and enhance workflow efficiency.

10.Science Communication:

-Ability to leverage digital platforms for effective science communication, including social media, blogs, and multimedia presentations to convey research findings to a broader audience.

11.Ethical Data Handling:

-Understanding of ethical considerations and responsible data management practices, especially when dealing with sensitive biological or environmental data.

12.Cybersecurity Awareness:

-Awareness of cybersecurity measures to safeguard research data and ensure the integrity and confidentiality of sensitive information.

As technological advancements continue to shape the landscape of biological and environmental sciences, staying updated with the latest tools and methodologies becomes essential for researchers and professionals in these fields. Acquiring and honing these digital skills not only enhances the efficiency of scientific endeavors but also contributes to addressing pressing global environmental challenges.

Digital literacy is built from a number of skills and abilities that can be combined into the following elements: media literacy (the ability to critically perceive, creatively

use academic and professional communications in various mass media information; information literacy (ability to find, interpret, evaluate, manage and share information); ICT literacy (ability to accept, adapt and use digital devices, applications and services); communication and cooperation (ability to use digital networks for training and conducting research); digital scholarships (participation in new academic, professional and research practices that are based on digital systems); learning skills (the ability to teach and learn effectively in formal and informal high-tech environments); career and management style (ability to manage digital reputation and identity on the Internet) [9].

As for the educational process, "innovations became especially relevant with the beginning of a large-scale war unleashed by the Russian Federation on the territory of Ukraine, when it became vitally necessary to make quick, nonstandard, essentially innovative decisions." [10]. Online platforms are increasingly used, various interactive tasks are created that not only teach, but also encourage creative development.

The advantages of using information technologies are as follows:

- intensify the transfer of information;
- significantly expand the illustrative material;
- create problematic situations;
- strengthen the emotional background of learning;
- form educational motivation;
- differentiate and individualize the educational process;
- the material offered for study is remembered much better, and ensures a higher level of mastery of the subject [11].

Conclusion. Youth digital inclusion is defined as a key factor for the successful development of modern society. In the era of rapid technological changes and the digital revolution, active youth participation in the digital space becomes a necessary condition to ensure their full and sustainable development.

The results of the analysis indicate that youth with access to digital technologies and possessing digital skills have significantly more opportunities for education, self-development, employment, and active participation in civic life. However, there are significant challenges that may complicate the process of youth digital inclusion, such as the digital divide, insufficient access to technologies, and a lack of necessary skills.

To ensure successful youth digital inclusion, it is important to implement programs and initiatives aimed at reducing the digital divide, providing access to technologies, and developing digital skills among young people. Civil and governmental organizations, as well as IT industry partners, should work together to create a supportive environment for youth so that they can fully leverage the advantages of the digital world.

Youth digital inclusion is not just a matter of access to technologies but also an opportunity for young people to develop creativity, critical thinking, and innovative skills. Fair and equal access to digital opportunities will contribute to the creation of a knowledge-based and understanding society, providing youth with a path to a successful and fulfilled future in the digital age.

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27.INNOVATIONS AND MODERNIZATION OF ENTERPRISE MANAGEMENT IN THE DIGITAL ERA

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Introduction. Innovations and digital technologies are actively being implemented in all spheres of our lives. Businesses are actively implementing digital technologies to optimize business processes, improve efficiency and reduce costs. Digital transformation involves rethinking management strategies.

The use of data analytics and artificial intelligence in management allows for more accurate forecasting, informed decisions and improvement of development strategies. In the conditions of rapid changes in the market, enterprises must be flexible and able to adapt to new conditions, which requires revision of traditional management methods.

Literature review. A significant array of modern information and communication technologies, along with the potential for their utilization in various contexts, enhances the interest of researchers in exploring the intricacies of the

development of such technologies and their positive impact on the functioning of contemporary society. Problems of innovation development management were studied by scientists Aharon D., Akoff R., Bondarenko S., Geets V., Drury K., Ilyashenko S., Kalman R. and others. Technological trends and industries of the future are studied in the works of Kelly K. and Ross A. The influence of the digital economy and business transformation was studied by Hrisko P., Schwab K., Hicks R., Tapscott D. and others.

Results. The growing importance of e-commerce and the need to effectively manage an enterprise's online presence are important components of modern management. In the past five years, more than 1 billion new Internet users have been added worldwide. The COVID-19 pandemic has triggered a surge in Internet usage, with an estimated 466 million people starting to use the Internet for the first time in 2020. By mid-2021, 5.3 billion people will be online, accounting for more than 63% of the world's population. However, more than one-third of the world's population (2.7 billion) does not use the Internet. Many of them live in least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing countries (SIDS).

In 2019, 87% of people in developed countries were using the Internet, compared with 44% in developing countries. While almost all urban areas in the world are covered by mobile broadband networks, there are still worrying gaps in connectivity and internet access in rural areas. Globally, 76% of urban households had access to the Internet at home in 2020, almost twice the rate in rural areas (39%).

The connectivity gap is particularly severe in rural areas of the least developed countries, with 15% of the rural population living in areas with no mobile coverage at all and 10% with only 2G network coverage.

As a result of COVID-19, more people are encouraged to work or play online, which has increased internet access overall, but in some countries it has exacerbated differences between and within countries in terms of age, disability, gender, geography and socioeconomic status. The digital divide that exists. As many essential services move online, there is a real and present danger that those without broadband internet access could be left far behind.

For many people in developing countries, especially the least developed countries, mobile phones and internet access remain unaffordable. The cost of broadband internet access remains higher than the affordability target set by the Broadband Commission for Sustainable Development, which is 2% of monthly gross national income (GNI) per capita in many least developed countries. According to the latest ITU data, only 96 economies met the 2% target for mobile broadband data-only packages in 2021 (7 fewer than in 2020), and only 64 economies met the target for fixed broadband packages (2 fewer than in 2020).

After years of steady decline, the share of income spent worldwide on telecommunications and internet services increased in 2021, largely driven by the global economic downturn caused by the COVID-19 pandemic (ITU and A4AI 2022 report). The sharp decline in average gross national income in many economies in

2020 exceeded the long-term trend of gradual declines in the prices of such services. This means that children and young people from the poorest households, rural and lower-income countries are further behind their peers in digital inclusion and have fewer opportunities to catch up, facing disproportionate poverty and unemployment.

Assessing investment needs to achieve affordable and universal connectivity is important to achieve the Sustainable Development Goals (SDGs). In some areas, closing the connectivity gap mainly means expanding existing coverage and upgrading capacity sites. However, in sub-Saharan Africa, South Asia and East Asia/Pacific, nearly half of the necessary radio access network (RAN) infrastructure investments will be in untapped areas.

Modern Ukrainian scientists interpret innovative development as «a continuous process of qualitative changes in the target nature associated with innovations that are implemented in accordance with the development strategy of the enterprise, through the effective use of all available, including intellectual resources, both own and involved; is characterized by a progressive change in the quality of all areas of the enterprise and is determined by its ability to create new competencies, which in the theory of strategic management are considered as dynamic abilities» [1]

With adequate information and communications technology (ICT) infrastructure, services and skills, individuals and businesses can participate in the digital economy, and countries can improve their economic well-being and competitiveness. Connected and digitally literate people and communities have the ability to access information, access online health services, and receive life-saving disaster warnings. They can use their phones to purchase goods and services, stay in touch with friends and family, be more productive or take on better-paying jobs.

Despite rapid growth in Internet penetration over the past five years, one-third of the world's population (2.9 billion) still does not use the Internet. Many of them live in rural and remote areas, in least developed countries (LDCs), landlocked developing countries (LLDCs) and small island developing countries (SIDS). With many people having to work and study from home due to the coronavirus pandemic, making digitalization accessible to everyone is one of the most pressing and decisive issues of our time. Finding the investments needed to bring everyone online will require a huge effort from the public and private sectors.

From 2018 to 2019, the penetration rate of active mobile broadband subscriptions per 100 residents increased by nearly 13%.

Mobile technology is rapidly moving from 2G (second generation mobile technology) to 3G, 4G and now 5G (IMT-2020). Between 2015 and 2020, global 4G network coverage doubled, and by the end of 2020, nearly 85% of the world's population was covered by 4G networks. 5G network rollout has begun and is rapidly advancing in many countries.

As companies increasingly adopt Internet technologies, their operations will become more efficient, ultimately leading to increased production efficiency, which will inevitably undergo comprehensive modernization—digital transformation. Information technology undoubtedly plays a key role in modernization, but the real

decisive factor is "people" and the culture of management is about solving people's problems. Therefore, innovation and modernization of enterprise management are crucial.

Digital technologies present new challenges to business operations and management.

Over the past forty years of reforms and openness, the entire social and industrial structure has undergone drastic changes. The impact of the digital era is no less than that of reforms and openness. The complexity of society has exceeded the scale of personal knowledge. The most important thing for us is to know how to resist it. A period of great changes for society. In the era of information and digitization, management has emphasized its importance.

Management is a highly professional ability that requires systematic training and rigorous training to create a complete management system, overcome the inertia of thinking, change past brain patterns, and achieve unity of knowledge and action. This is from the macro perspective of cognition. From a neighborhood perspective, how do large companies need to implement corporate digital transformation? How can a small business make a difference in an industry? Managers must understand what digitization is.

Digitization, humanity has been upgraded to a new intelligent social operating system on a large scale

Regarding the definition of digitalization, Mr. Wang Xin mentioned two words: digitization and digitization. The first means changes in information storage and technology; the second means changes in transmission and application and industry business models. The essence of the method of storing, transmitting and using information is the modernization and iteration of civilization. Digitization is a large-scale modernization of humanity to a new intelligent social operating system.

In the digital era, the digital transformation of enterprises is carried out by managers with an innovative spirit and business thinking, who have the ability and responsibility to think independently and build a modern management system.

Moreover, in the digital era, industries are not divided according to past methods, and industries are constantly integrated to create new industries such as software development, software design, express delivery, take-out, etc. Constantly explore the world and you will discover the possibilities of the digital age. Tools created by humans will eventually change humans themselves, just as smartphones have changed the way we live. So what will it look like after digital transformation? Taking the epidemic as an example, the upgrade of the entire social system has greatly improved the entire epidemic prevention system and infrastructure of China. Coupled with the subtle influence of culture and lifestyles, the obvious benefits of digitalization in China have been highlighted. Humanity around the world is a community with a shared future, and digitalization is a further contribution to human civilization.

Mission and duties of managers and management

Managers and leadership are the ones who plan and implement strategies. They must be aware of three fundamental questions: "What is the company's business? Who

are the company's customers? What value do customers recognize?" to motivate teams in the enterprise to achieve the mission. Management is a decisive factor in economic development. Products and technologies are created by people, and management must create the atmosphere. For example, at Steve Jobs' first job, the company treated everyone the same, regardless of organization, age, or personality. Such an organization makes people feel that they can realize self-created value in it. This is a management culture.

Technology applications differ in different stages of maturity, as companies mature, they mainly develop four technologies (social networks, mobile Internet, data analysis and cloud computing) simultaneously. The biggest difference between the different stages of maturity lies in the business aspect of the enterprise. For example, digital companies are five times more likely to have a clear digital strategy than companies in the early stages of digitalization. Digitally mature companies are also more likely to have a collaborative culture that encourages risk-taking.

As digital technologies evolve, there are many challenges: two of the biggest are the lack of strategic and competitive priorities. According to more than 50% of respondents who are in the early stage of digital maturity, the biggest obstacle in the process of early digital maturity is the lack of a digital strategy for enterprises. As companies evolve digitally, competing priorities and digital security issues become major obstacles.

Having a culture that supports digital transformation is a sign of corporate maturity. These businesses strongly encourage risk-taking, innovation and the development of a collaborative work environment. "Culture has to support collaboration and innovation," said Mohamed-Hedi Charki, an associate professor at École Nord business school in France who has studied the impact of a European cosmetics company's corporate social network. If it is considered gradual, it will be marginalized over the next few years." In fact, the characteristics of enterprises in different industries and their own corporate culture also largely determine their digital maturity, and ultimately help We found that the digital transformation of enterprises is gradually maturing. Three typical signs of a corporate culture are risk-taking, conflict and storytelling, and let's explain them step-by-step.

There are many examples of successful implementation of innovative practices in business management. Here are some empirical studies and examples:

Toyota Production System (TPS):

Empirical study: The concept of TPS has been thoroughly researched and implemented in the automotive industry and other sectors. Results: Through innovative production management methods, Toyota has achieved impressive results in terms of quality, productivity, and cost reduction.

Google:

Empirical study: Google is known for its management approach based on stimulating creativity and innovation. Results: Google has become an example of a successful corporate culture that fosters innovation, leading to the creation of many popular products and services.

IBM:

Empirical study: IBM successfully implements innovations in management, including the concept of design thinking in business. Results: This approach has allowed IBM to create products that better meet the needs of users and the market.

Procter & Gamble (P&G):

Empirical study: P&G uses an "open innovation process" to collaborate with other companies and access new ideas. Results: This approach allows P&G to implement new products and technologies, enhancing their competitiveness.

Tesla:

Empirical study: Tesla introduces innovations in the field of electric vehicles and energy technologies. Results: Tesla is recognized for its advanced technology in the electric vehicle industry and actively uses innovations in production management.

These examples demonstrate that successful implementation of innovations in management can lead to improved efficiency, competitiveness, and the creation of a sustainable competitive advantage for businesses.

The digital transformation of the enterprise represents ten main development trends

The new round of technological revolution represented by the Internet, in terms of important characteristics, is shifting from the explosion of "points" to the breakthrough of "groups", which can be called "new technology groups"; in terms of core content, it includes big data, cloud computing, Internet of Things, blockchain, artificial intelligence, 3D technology, 5G technology, quantum technology, etc.; in terms of development trends, from PC Internet to Mobile Internet, from Consumer Internet to Industrial Internet, from Internet to Internet of Things, from Internet of Everything to Intelligence of Everything, from Internet of Things to Internet of Mind, from weak artificial intelligence to strong artificial intelligence, from strong artificial intelligence to super artificial intelligence; from the point of view of economic effects, it has greatly contributed to enterprises' cost reduction, efficiency improvement and added value, especially for cost reduction. "Three costs": reduction of transaction costs based on ICT information and communication technologies, reduction of production costs based on AIT artificial intelligence technology, and reduction of organizational costs based on the revolution of "new technology clusters".

For a long time, "deindustrialization" became a commonly used construct to describe economic activity. Just as industrialization and modernization is a process, so is "de-...". Here we draw on the "de-..." framework to analyze a series of major changes faced by market actors—enterprises from the industrial economy era to the digital economy era. Or, looking at it from another angle, this issue can be summarized as aspects that can contribute to the digital transformation of enterprises.

For large enterprises, digital transformation is now focused on comprehensive digital transformation of the enterprise. Enterprises' understanding of digital transformation needs to transform their thinking from tools to that of a "true digital enterprise" as quickly as possible.

Digitization is the main trend of modern economic development and a symbol of the integrated development of the digital economy and the real economy, the

economy of unlimited supply and the economy of limited supply in the era of the new dual economy.

Digital strategy is about planning and leading digital transformation strategies, looking into the future at a high level and deciding what to do and what not to do about major areas and general decision-making issues.

Digital transformation is an organization-wide strategy and an important part of an organization's overall strategy. Carrying out a digital transformation guided by a strategy will significantly increase the probability of a successful transformation.

The digital transformation strategy mainly includes:

Vision and mission of digital transformation.

Positioning and goals of digital transformation.

New business models, new business models and new management models.

Strategic initiatives of digital transformation.

Create two guarantee conditions: organizational mechanism + cultural atmosphere

1. Provision of an organizational mechanism

Digital transformation requires a strong organization to support it. It is necessary to clearly define the main body responsible for the transformation, to formulate reasonable organizational business objectives, support assessment and incentive mechanisms, and to optimize the process of cooperation between organizations.

Under appropriate conditions, a dedicated digital transformation team should be created to coordinate business and technical departments, create a mechanism for joint work between the digital and physical worlds, and coordinate the implementation of digital transformation.

2. Create a cultural atmosphere

Organizational culture is a key factor in the success of digital transformation. It is necessary to constantly cultivate the concept of transformation culture, stimulate individual vitality, create a good transformation environment for employees, and form a source of energy for digital transformation.

Develop a digital culture, change culture and innovation culture in the organization to support the digital transformation of the organization.

Digital Culture: Actively embrace digitization, use data to change traditional ideas and management models, and get used to using data to talk, using data to make decisions, using data to manage and using data to innovate.

Change the culture: Have the courage to explore, embrace change, self-disruption, and constant change.

Culture of Innovation : Protect innovation, tolerate failure, support risk, and be more proactive and proactive in digital transformation.

Conclusions. In the modern business environment, it is crucial to continuously explore and experiment with new technologies to stay at the forefront of your industry:

1. Business Process Automation:

-Using various software solutions to automate routine operations enables efficient resource utilization and reduces the number of errors.

2. Analytics and Big Data:

-Utilizing analytical tools and big data systems allows obtaining valuable insights that can be used for making informed managerial decisions.

3.Cloud Technologies:

-Implementing cloud services for data storage, collaboration, and performing various tasks ensures flexibility and mobility in business processes.

4.Internet of Things (IoT):

-Adopting IoT allows real-time data collection from equipment and devices, enhancing monitoring, management, and resource planning.

5.Artificial Intelligence and Machine Learning:

-Using machine learning algorithms for data analysis, trend forecasting, and automation of various tasks.

6.Cybersecurity:

-Ensuring the security of digital systems and data using modern methods and technologies.

7.E-commerce and Digital Marketing:

-Developing e-commerce and utilizing digital channels for marketing enables effective interaction with customers and expands the audience.

Researching and implementing these technologies can lead to improved efficiency, increased competitiveness, and expanded opportunities for the development of the enterprise.

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28.IMPACT OF DIGITIZATION ON ENSURING FINANCIAL INDEPENDENCE OF TERRITORIAL COMMUNITIES

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Introduction. In today's rapidly evolving world, digital technologies define new perspectives and directions for societal development. One of the key sectors significantly impacted by digitization is the financial sphere of territorial communities. Changes in this direction shape not only the economic but also the socio-cultural landscape.

Digitization opens up numerous opportunities for territorial communities to enhance financial independence. The implementation of modern technologies in financial management allows optimizing budgetary processes, increasing expenditure efficiency, and streamlining financial flows. Specifically, digital tools enable communities to conduct precise monitoring of financial transactions, making their management more transparent and open.

However, with increased possibilities come responsibilities. The use of digital tools also requires proper cybersecurity and the preservation of the confidentiality of financial data. Understanding these challenges and the ability to adapt to new realities become imperative for ensuring stability and financial independence of territorial communities in the digital era.

Therefore, the study of the impact of digitization on ensuring the financial independence of territorial communities is a relevant task that demands comprehensive analysis, discussion, and the development of strategies aimed at increasing the resilience and efficiency of their financial management in contemporary conditions.

Literature review. Scientists note that the digital capability of territorial communities (TC) has several positive aspects:

- Broad use of modern information and communication technologies to achieve necessary efficiency and effectiveness;
- Ability to make effective management decisions (collection and preservation of statistical data over many years, analysis of information for operational planning and responding to community challenges);
- Identification of best practices (consideration of data from previous years and the availability of forecasts for developing an action plan to achieve optimal results);
- Ability to exchange standardized documents;
- Reduction of corruption risks at all levels and in all directions (citizens do not communicate directly with government representatives but receive services online);
- Process of control and transparency (in the management and analysis of decisions made);
- Ability to receive administrative services during quarantine (online Administrative Service Centers, etc.) [2, p.73-74].

Results. The latest technologies have become a decisive response of Ukrainian communities to the challenges of the times.

Throughout the full-scale war, Ukrainian communities are trying to maintain sustainable development and effective self-government. One of the factors of such stability was the active implementation of digital technologies. Maintaining digitization processes has remained a priority task of municipalities, because it directly affects the development of the entire country.

State institutions, public organizations, and the business sector are developing initiatives to help digital transformation leaders develop tools and implement them in their work. Digitalization has a significant impact on ensuring the financial independence of territorial communities. Through digital tools, territorial communities can more effectively manage financial accounting, budgetary processes, and reduce the risk of errors.

Automation of budgeting and accounting in territorial communities is a stage in improving financial management and ensuring the efficient use of resources. The advantages of automating these processes include:

- 1.Efficient Budgeting:
 - Automated systems enable more efficient budgeting processes.
- 2.Forecasting and Planning:
 - Automated systems allow communities to easily use historical data to forecast future expenditures and revenues.
- 3.Scenario Modeling:
 - The ability to conduct various scenarios helps evaluate the impact of different factors on the budget and make informed decisions.
- 4.Automated Accounting with Electronic Reports and Documentation:
 - The use of electronic reports replaces manual work, streamlining the accounting process and facilitating monitoring and analysis of financial transactions. Integration with other systems is also relevant. The ability to automatically integrate with other

systems (e.g., resource management or personnel systems) enhances data consistency and accuracy.

Automation contributes to transparency and accountability, with electronic reporting platforms gaining widespread use. Automated tools can generate reports that are clear and accessible for analysis.

Instant access to information is a characteristic feature, providing quick and convenient access to necessary information for all process participants. Automation allows the creation of systems for automatic control over expenditures and budget maintenance. Systems can automatically detect certain risks and provide recommendations for their management. Automation allows focusing on strategic aspects of financial management with minimized errors, indicating a shift in the impact of the human factor on accounting and budgeting processes.

The use of cutting-edge technologies is associated with automation and the utilization of modern technologies. Electronic payments and electronic financial reporting are gaining widespread use. Digital technologies enable the automation of financial operations, contributing to more precise and efficient financial reporting.

Digitization enhances income-generating opportunities. The development of digital technologies allows local communities to bring their goods and services to the digital market, expanding revenue possibilities through the use of e-commerce and online services. Digital tourism is becoming increasingly popular. Using internet platforms and social media marketing, communities can attract more tourists, fostering the development of the tourism business and increasing profits.

Digital tourism is a concept that combines technology and the tourism industry to create and improve the tourist experience and infrastructure. Key components of digital tourism include the use of digital technologies and internet services to facilitate all stages of the journey, from route planning to the return trip.

Key aspects of digital tourism include:

- Mobile applications
- Interactive maps
- Augmented Reality (AR) and Virtual Reality (VR)
- Social media usage
- Analytics and personalization

Mobile applications for smartphones and tablets can help tourists plan routes, locate interesting places and events, and book hotels and transportation, while providing information about cultural landmarks and gastronomic establishments.

The use of real-time interactive maps allows tourists to easily navigate unfamiliar territories, identify locations in historical areas, and obtain information about the surrounding environment.

Augmented Reality (AR) and Virtual Reality (VR) can help tourists experience unique impressions by exploring the history and culture of a locality through immersive virtual tours or exhibitions.

To ensure the safety and convenience of tourists, facial recognition technology can be employed for automatic registration in hotels, airports, and other locations.

Tourists can share their experiences, photos, and recommendations through social networks, allowing other users to receive interesting and useful information.

Analytics technologies enable tourism companies to gather data on user behavior and preferences, creating personalized offers and services.

Digital tourism improves the accessibility of information, travel convenience, and enhances the quality of the tourist experience. However, it is also important to address data security issues and ethical aspects of technology use in the tourism industry.

Digitalization in local communities contributes to the increased efficiency of resource management. Smart technologies for cost optimization, such as the use of modern technologies like IoT (Internet of Things) and smart city systems, enable the efficient utilization of communal resources and reduce expenses.

An essential task is deepening financial literacy. Electronic education and information transparency, facilitated by digital platforms and internet resources, can provide access to community financial information, promote financial literacy, and raise awareness among citizens. Digitalization facilitates more effective anti-corruption measures through the use of electronic monitoring systems. Utilizing digital tools for monitoring and controlling financial transactions can reduce the risk of corruption and the misuse of budgetary funds.

Digitalization creates powerful opportunities for local communities in terms of financial independence but also requires adaptation to new technologies and changes in management approaches. Addressing cybersecurity and data protection is crucial to ensure the resilience and reliability of digital systems in the financial sector.

For effective organizational and regulatory support for the development of the social sphere at the local community level, a shift from a traditional problem-solving approach to a program-project approach is necessary, taking into account territorial-industry specifics. Strengthening the digital capacity of local communities in Ukraine requires a comprehensive approach encompassing technical, organizational, and educational measures.

These measures include creating digital infrastructure to ensure access to high-speed internet in all settlements and the development of digital networks and data processing centers at the local community level. Training sessions and seminars for local government representatives and residents on the use of digital tools, as well as the development of educational programs on digital literacy for schools and higher education institutions, are necessary.

In the current conditions, the management of local communities is carried out in a new institutional dimension, formed in accordance with the Law of Ukraine "On the legal regime of martial law," providing authorities with the necessary powers for legal regime, defense, civil protection, protection of rights, freedoms, and legitimate interests of citizens.

The development of digital strategies for each local community, taking into account its needs and specific characteristics, with concrete goals and tasks for improving digital infrastructure, is particularly important.

Involving the private sector, especially IT companies, in the development of digital initiatives in local communities will contribute to the development and opening of innovative IT projects at the community level.

The establishment of Innovation Centers will provide access to resources for startups and innovative projects, allowing local businesses and citizens to test and implement new technologies.

The implementation of digitalization requires ensuring cybersecurity. Introducing cybersecurity measures will contribute to the protection of information resources in local communities. Organizing training and consultations on cybersecurity for local authorities will support this effort.

In the context of managing territorial communities in the digital era, innovation and modernization imply the implementation of innovative approaches, technologies, and methods to enhance the efficiency and quality of public service delivery, as well as to foster the development and support of local self-government.

Innovation may involve the use of modern information technologies, e-governance, analytical tools for decision-making, and ensuring interaction with citizens. Modernization involves adapting territorial communities to contemporary challenges, including the renewal of infrastructure, improvement of management systems, and the implementation of advanced problem-solving methods.

Thanks to the implementation of digital technologies in the field of self-governance, territorial communities in Ukraine have experienced several positive changes. One of the key advantages of digital transformation is the improvement of financial management. Automated budgeting, accounting, and reporting systems help enhance the accuracy and efficiency of financial operations. This enables local authorities to make more informed decisions regarding resource allocation and expenditures.

Transparency and accountability are also elevated to a new level through the digitization of financial systems. Online platforms and real-time reporting systems create financial information accessible to the public and stakeholders, fostering trust in practical financial management by the community and their ability to attract investments and support.

Improving revenue collection is another significant benefit of implementing digital tools. Electronic payment systems and digital payment platforms streamline transactions, reducing the risk of revenue loss and contributing to the overall financial stability of the community.

However, despite its effectiveness, the digitization process also faces challenges. Digital divide, cybersecurity, and initial implementation costs are just a few aspects that require attention and resolution. Ensuring the accessibility of digital opportunities for all community members and implementing effective cybersecurity measures are key requirements for the successful implementation of digital technologies in governmental bodies. In summary, the digital economy plays a crucial role in ensuring the financial independence of territorial communities in Ukraine, providing them with tools for sustainable development and management that align with the demands of the modern world.

In the digital era, innovation and modernization enable increased transparency, facilitate rapid information exchange, reduce bureaucracy, and enhance citizen engagement in governance processes. This contributes to the creation of a modern, efficient, and open environment for the development of territorial communities.

Conclusion. The impact of digitization on ensuring the financial independence of territorial communities is a multifaceted and transformative process that has the potential to reshape the financial landscape of local governance. Through the integration of digital technologies, territorial communities can achieve enhanced financial management, transparency, and efficiency, thereby contributing to their overall economic sustainability. Several key conclusions can be drawn from the examination of this intersection between digitization and financial independence:

- Digitization facilitates streamlined financial management processes for territorial communities. Automated systems for budgeting, accounting, and reporting contribute to increased accuracy and efficiency in financial operations. This, in turn, empowers local authorities to make more informed decisions regarding resource allocation and expenditure.

- The digitization of financial systems promotes transparency and accountability within territorial communities. Digital platforms enable real-time reporting, making financial information accessible to the public and stakeholders. This transparency fosters trust and confidence in the community's financial management practices, crucial for attracting investments and support.

- Digital tools enhance revenue collection mechanisms, allowing territorial communities to optimize tax and fee collection processes. Online payment systems and digital platforms simplify transactions, reducing the likelihood of revenue leakage and enhancing the overall fiscal health of the community.

- Digitization leads to cost savings through the automation of routine tasks, reducing the administrative burden on territorial communities. The efficiency gains achieved through digital processes free up resources that can be redirected towards essential services, infrastructure development, and community welfare programs.

- The adoption of digitization requires capacity building within territorial communities. Training programs and skill development initiatives empower local officials and staff to harness the full potential of digital tools, enabling them to navigate the complexities of modern financial systems and regulations.

- Despite the numerous benefits, challenges such as the digital divide, cybersecurity risks, and initial implementation costs must be acknowledged. Addressing these challenges is essential to ensure that the benefits of digitization are accessible to all members of the community and that robust cybersecurity measures are in place to safeguard financial data.

In conclusion, the impact of digitization on ensuring the financial independence of territorial communities is profound. By leveraging digital tools, these communities can enhance financial management, promote transparency, and drive economic growth. The ongoing commitment to addressing challenges and fostering a digitally inclusive environment will be key to realizing the full potential of digitization in empowering

territorial communities for sustained financial independence. The proposed measures should be adapted to the specific needs and conditions of each local community, contributing to their sustainable development and increased operational efficiency. The path of Ukrainian communities to digitization is part of a large national digital movement.

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29.DIGITAL TRANSFORMATION OF EDUCATION: THE KEY TO INNOVATING FUTURE LEARNING METHODS

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Introduction. Digital transformation of education has become a hot topic in the education field today. With the rapid development of science and technology, the application of digital technology in education is becoming increasingly popular. This article explores the importance of digital transformation in education and explains how it is key to innovating the future of learning.

Literature review. The global crisis, triggered by the prolonged pandemic and Russia's military invasion of Ukraine, has prompted an anticipated but not so rapid transition to the intensified use of digital technologies in all spheres of life [1], particularly in work and education. The active shift of global leaders such as Facebook, Microsoft, and others towards the development of the metaverse and investments in it [2] leaves no doubt about the expediency of exploring and utilizing the new 'Land of Opportunities' (as assessed by participants in the World Economic Forum in Davos, January 2023). According to estimates from leaders in the world economy, including companies like Statista, 15% are already oriented towards the metaverse [2]. New technologies, especially digital and information-communication technologies (ICT), bring forth new requirements for knowledge seekers [3], as education transforms from acquiring specific facts and performing computational tasks to modeling human-technical systems [4] and life in general [5].

Results. The digital transformation of education means combining traditional teaching methods with modern technology to provide students with a more personalized, flexible and efficient learning experience. It can not only break the limitations of time and space, but also provide more diverse learning resources and tools. The goal of digital transformation in education is to improve students' learning outcomes and engagement, and to develop their creativity, critical thinking, and problem-solving skills.

Innovative methods of future

Innovative methods of future education encompass a range of approaches that leverage advanced technologies, pedagogical insights, and evolving learning paradigms. Here are some key trends and innovative methods in education:

1. Personalized Learning:

- Adaptive Learning Platforms: AI-driven platforms tailor learning experiences to individual student needs, adjusting the pace and content to optimize understanding and retention.

- Learning Analytics: Utilizing data analytics to track and analyze student performance helps educators identify strengths and weaknesses, enabling personalized interventions.

2. Virtual and Augmented Reality (VR/AR):

- Immersive Learning: VR and AR technologies offer immersive experiences, enabling students to explore historical events, conduct virtual experiments, or engage in lifelike simulations across various subjects.

- Virtual Field Trips: Students can virtually visit places around the world, enhancing their understanding of geography, history, and culture.

3. Gamification:

- Game-Based Learning: Incorporating game elements into educational content makes learning more engaging and interactive. This approach can enhance motivation, problem-solving skills, and collaboration among students.

4. Project-Based Learning (PBL):

-Real-World Applications: Students work on projects that simulate real-world problem-solving, promoting critical thinking, collaboration, and practical application of knowledge.

5. Online and Blended Learning:

-Flipped Classroom: Traditional teaching methods are reversed, with students accessing lecture materials online before class, allowing classroom time for interactive discussions and activities.

-Massive Open Online Courses (MOOCs): Platforms offering online courses to a large number of participants provide access to high-quality education globally.

6. Artificial Intelligence (AI) in Education:

-Intelligent Tutoring Systems: AI-powered tutors offer personalized guidance, adapting to individual learning styles and providing real-time feedback.

-Automated Assessment: AI algorithms streamline the assessment process, offering quick and detailed evaluations of student work.

7. Collaborative Learning Platforms:

-Cloud-Based Collaboration: Students and educators can collaborate on projects in real-time using cloud-based tools, fostering teamwork and communication skills.

8. Blockchain in Education:

-Credential Verification: Blockchain ensures the security and authenticity of academic credentials, reducing fraud and simplifying the verification process for employers.

9. Neuroscience-Informed Teaching:

-Brain-Compatible Learning: Applying insights from neuroscience helps optimize teaching methods, considering how the brain processes information, retains knowledge, and engages in learning.

10. Global and Cultural Awareness:

-Cross-Cultural Collaboration: Leveraging digital tools, students can collaborate with peers from diverse backgrounds, promoting global awareness and cultural competency.

These innovative methods collectively aim to create a dynamic and adaptive learning environment that prepares students for the challenges of the future. The integration of technology, personalized approaches, and real-world applications is expected to redefine the landscape of education in the years to come.

Global access to education refers to the idea of providing educational opportunities to individuals worldwide, transcending geographical, economic, and social barriers. The goal is to ensure that people, regardless of their location or background, have the chance to acquire knowledge, skills, and opportunities for personal and professional development.

Several key components contribute to the concept of global access to education:

-Online Learning Platforms: The advent of digital technologies has facilitated the development of online learning platforms that offer courses and resources accessible to anyone with an internet connection. Platforms like Coursera, edX, and Khan Academy provide a diverse range of educational content.

-Open Educational Resources (OER): OER refers to freely accessible, openly licensed educational materials that can be used for teaching, learning, and research. This includes textbooks, lecture notes, and multimedia resources that are available to the public.

-E-Learning Initiatives: Various e-learning initiatives and projects aim to bridge educational gaps by leveraging technology. These initiatives may include virtual classrooms, webinars, and interactive multimedia content to enhance the learning experience.

E-Learning Initiatives refer to efforts and programs that leverage electronic technologies to facilitate and enhance the learning process. These initiatives encompass a wide range of educational activities delivered through digital platforms, often accessible via the internet. Here are key components and features commonly associated with E-Learning Initiatives:

1. Online Courses and Programs:

-E-Learning often involves the creation and delivery of courses or entire academic programs through digital platforms. These can cover a diverse range of subjects and levels of education, from elementary school to higher education and professional development.

2. Digital Content:

-Learning materials such as textbooks, lectures, quizzes, and multimedia resources are provided in digital formats. This content can be accessed at any time, allowing learners to study at their own pace.

3. Interactive Learning Resources:

-E-Learning often includes interactive elements like simulations, games, and virtual labs to engage learners actively and reinforce concepts in a more dynamic way than traditional classroom methods.

4. Learning Management Systems (LMS):

-These are platforms designed to administer, document, track, and deliver educational content. LMS facilitates communication between learners and instructors, as well as the assessment and monitoring of progress.

5. Webinars and Virtual Classrooms:

-Live sessions conducted online, such as webinars and virtual classrooms, enable real-time interaction between instructors and learners. These platforms often include features like chat, video conferencing, and collaborative tools.

6. Adaptive Learning:

-E-Learning initiatives may incorporate adaptive learning technologies that tailor the educational experience based on individual progress, adjusting content and pace to suit each learner's needs.

7. Assessment and Feedback:

-E-Learning platforms typically include tools for assessment, such as quizzes, tests, and assignments. Immediate feedback can be provided electronically, allowing learners to understand their performance and areas for improvement.

8. Global Accessibility:

-One of the advantages of E-Learning is its accessibility to a global audience. Learners from different geographical locations can access the same educational resources and interact with instructors and peers, fostering a diverse and collaborative learning environment.

9.Mobile Learning:

-E-Learning initiatives often utilize mobile devices, enabling learners to access educational content on smartphones and tablets. This flexibility enhances the convenience and accessibility of learning resources.

10.Professional Development and Corporate Training:

-E-Learning is widely used for employee training and professional development. Companies and organizations deploy digital platforms to deliver training modules, keeping their workforce updated on industry trends and skills.

-Global Partnerships: Collaboration between educational institutions, governments, non-profit organizations, and private sectors on a global scale can contribute to expanding access to quality education. Joint efforts can lead to the development of inclusive policies and initiatives. Global Partnerships refer to collaborative relationships and alliances formed between entities, such as countries, organizations, or businesses, with the aim of addressing global challenges, achieving common goals, and fostering mutual benefits. These partnerships often transcend national borders and boundaries, recognizing the interconnectedness of various issues on a global scale. Global Partnerships involve collaboration between different entities, which can include governments, non-governmental organizations (NGOs), multinational corporations, and international institutions. Partnerships are typically formed to address shared challenges or pursue common objectives. These goals may range from promoting economic development and addressing poverty to tackling environmental issues and ensuring global security.

Global Partnerships acknowledge that many challenges facing the world today are interconnected. Issues such as climate change, public health crises, and economic inequality often require coordinated efforts on an international scale. Participants in Global Partnerships can come from various sectors, including public and private entities, civil society, and academic institutions. The diversity of participants brings together different perspectives, expertise, and resources.

Successful Global Partnerships are characterized by mutual benefit. Each participant should derive advantages from the collaboration, whether in the form of knowledge exchange, resource sharing, or achieving common objectives.

Global Partnerships emphasize the importance of international cooperation and diplomacy. They often involve negotiations, agreements, and the pooling of resources to address challenges that no single entity can effectively handle alone.

Many global challenges require sustained efforts over an extended period. Global Partnerships often involve long-term commitments and ongoing cooperation to achieve lasting impact.

Examples of Global Partnerships include international agreements on climate change, collaborative efforts to combat infectious diseases, and initiatives aimed at

promoting sustainable development. These partnerships play a crucial role in addressing complex issues that transcend national boundaries and require a collective, global response.

-Affordable Education: Making education more affordable, if not entirely free, is crucial for ensuring that financial constraints do not hinder access. Scholarships, grants, and subsidies can play a role in making education accessible to a broader population. Affordable education refers to the provision of education at a reasonable cost, making it accessible to a broad range of individuals regardless of their financial status. The concept emphasizes the idea that education should not be prohibitively expensive, and efforts should be made to reduce financial barriers to learning.

In an affordable education system, tuition fees, materials, and other associated costs are set at levels that are manageable for a significant portion of the population. This approach aims to ensure that individuals from diverse socioeconomic backgrounds have the opportunity to pursue education and acquire the knowledge and skills needed for personal and professional development.

Affordable education is crucial for promoting equality and social mobility, as it enables individuals from lower-income households to access educational opportunities that can open doors to better employment prospects and improved quality of life. Governments, educational institutions, and policymakers often play key roles in designing and implementing policies that address affordability challenges and promote inclusive access to education.

Various initiatives, such as scholarships, grants, and financial aid programs, may be implemented to further reduce the financial burden on students. Additionally, advancements in technology, such as online education and open educational resources, have the potential to contribute to affordable education by providing cost-effective alternatives to traditional learning methods.

Overall, affordable education is seen as a cornerstone for building a more equitable society by ensuring that education is not a privilege reserved for a select few but rather a fundamental right accessible to a broader segment of the population.

-Cultural Sensitivity and Adaptability: Recognizing and respecting diverse cultures and learning styles is essential. Educational content and methodologies should be adaptable to various cultural contexts to ensure relevance and inclusivity. Cultural Sensitivity and Adaptability are crucial skills in today's interconnected world. They refer to the ability to understand, respect, and effectively navigate diverse cultures, as well as to adjust one's behavior and communication style in different cultural contexts.

Cultural Sensitivity:

Cultural sensitivity involves being aware of and understanding the values, beliefs, customs, and norms of different cultures. It requires an open-minded approach and a willingness to learn about and appreciate the diversity that exists in the world. Individuals who possess cultural sensitivity are able to interact with people from various backgrounds without imposing their own cultural perspectives. They recognize

that what may be acceptable or normal in one culture may not be in another, and they strive to avoid misunderstandings or unintentional offense.

Adaptability:

Adaptability, on the other hand, is the capacity to adjust to new or changing environments. In a cultural context, adaptability means being flexible in your behavior, communication, and decision-making to fit the expectations and norms of different cultures. This skill is essential for individuals working, living, or interacting with people from diverse backgrounds. Adaptable individuals can easily switch between cultural contexts, demonstrating an understanding of the need for varied approaches in different situations.

In a professional or personal setting, the combination of cultural sensitivity and adaptability fosters effective cross-cultural communication and collaboration. It enables individuals to build positive relationships, resolve conflicts, and work harmoniously with people from diverse cultural backgrounds. As the world becomes more interconnected, these skills are increasingly valued in various fields, promoting successful interactions in a globalized society.

The concept of global access to education aligns with the belief that education is a fundamental right and a powerful tool for empowerment. By breaking down barriers and embracing innovative approaches, we can work towards a more equitable and accessible educational landscape for people around the world.

Key technologies and tools

There are several key technologies and tools that play an important role in the digital transformation of education. The first is online education platforms, which provide online courses, learning resources and communication platforms so that students can study anytime and anywhere. Second is artificial intelligence technology, which can provide personalized learning suggestions and feedback based on students' learning situations and needs. There are also virtual reality and augmented reality technologies, which can create immersive learning environments for students and provide a more vivid and interactive learning experience.

Examples of application scenarios

Digital transformation of education has wide applications in various fields. In school education, teachers can use online education platforms and interactive teaching tools to design personalized learning plans and tasks for students. In corporate training, digital technology can provide online training courses and simulated practice environments to help employees improve their skills and knowledge. In distance education, students can interact and discuss with teachers and classmates in real time through online learning platforms and video conferencing tools.

Benefits of practical application

Digital transformation in education brings many benefits. First, it can provide a more flexible and personalized learning method to meet the learning needs of different students. Secondly, it can break the restrictions of geography and time, and students

can study anytime and anywhere, improving learning efficiency. In addition, the digital transformation of education can also promote students' active learning and cooperative learning, and cultivate their independent learning ability and teamwork spirit.

Possibility of further study

Digital transformation in education is an evolving field with many possibilities for further learning. Interested readers can delve into the design principles and teaching models of online education platforms, learn about the application of artificial intelligence in education, and the development trends of virtual reality and augmented reality technology. In addition, you can also pay attention to case studies of education digital transformation in different countries and regions, as well as related policies and implementation strategies.

One of the most attractive factors of the metaverse is expected to be its immersiveness, the active use of virtual (VR), augmented (AR), augmented reality (XR), and artificial intelligence (AI), which together are expected to radically change education.

Virtual reality in all its forms is already manifesting itself in many areas of human life and activity (Fig. 1).

Conclusions. Digital transformation of education is the key to innovating future learning methods. By applying modern technologies and tools, digital transformation in education can provide students with personalized, flexible and efficient learning experiences, improving learning outcomes and engagement. It is widely used in school education, corporate training and distance education and other fields, and brings many practical application benefits. For readers further studying the digital transformation of education, there are many further learning possibilities and research directions waiting to be explored.

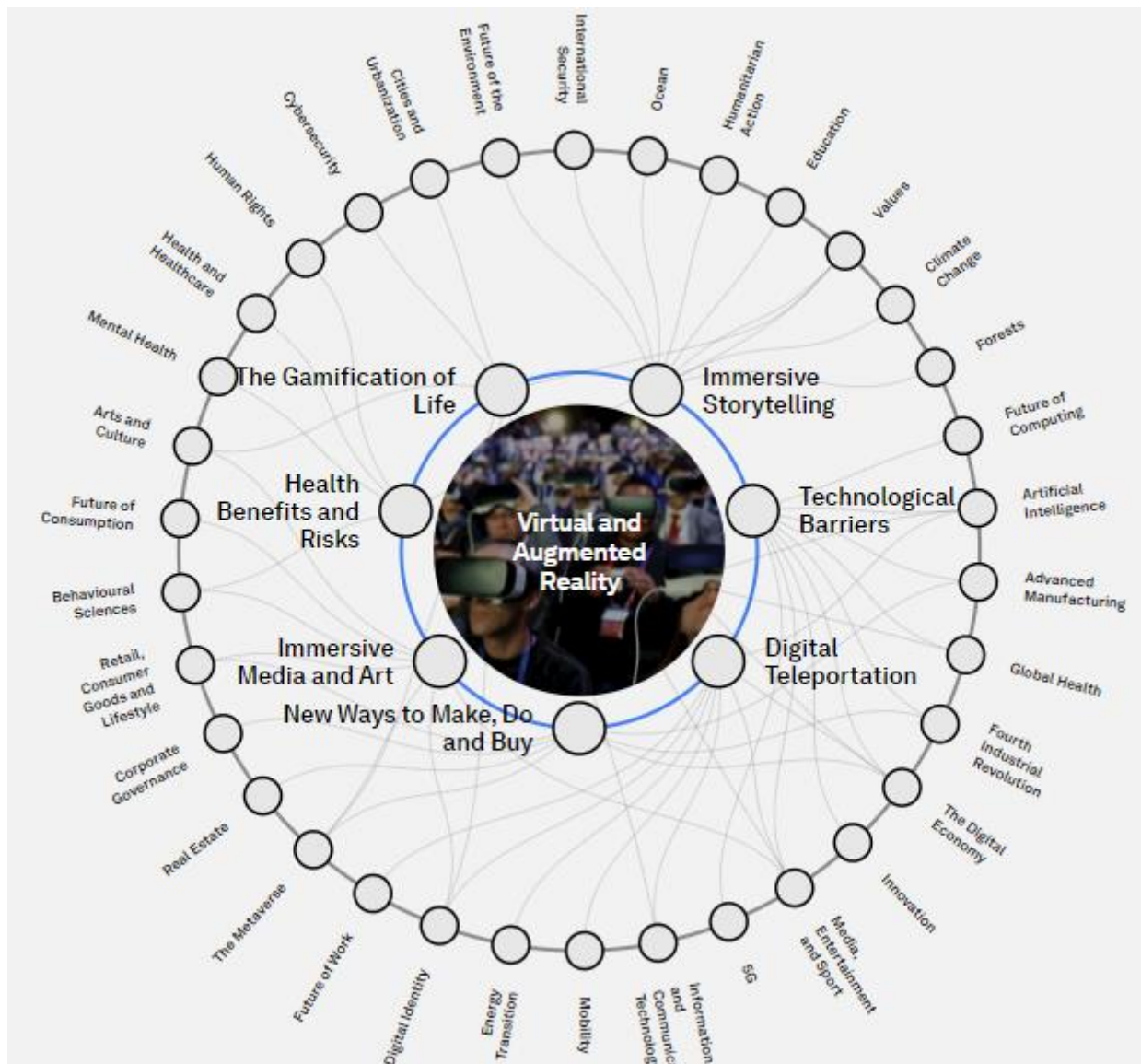


Fig. 1. Use of AR/VR in the modern economy

<https://intelligence.weforum.org/topics/a1Gb0000001k6I0EAI>

The process of democratization of global education unfolds through the affirmation of the trend of human-centeredness and equal access to quality education. As it is known, the right to receive proper education is one of the main norms of the constitution of any state in the world. However, social experience attests that this norm exists more as an ideal and practically is seldom, if ever, fulfilled. Real society introduces its own adjustments to it. To be completely honest and fair, it should be noted that equal conditions (opportunities) for access to quality education for all children are not created in any, even the most democratic state in the world. And although the dream of this exists always and is considered a task of extraordinary importance, its transformation into reality is problematic for every society, even the most developed.

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