Journal Development Manecos

ISSN: 2988-5957
Vol. 2 No. 2, 2024
Page: 57-65

Comprehensive Economic Strategies for Advancing Development in the Digital Economy

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Article Info

Article History:

Received February 5, 2024
Revised March 30, 2024
Accepted: May 6, 2024

Keywords:
Digital Economy, Innovation, Digital Infrastructure, Regulatory Frameworks, Educational Initiatives.

Abstract

This work aims at identifying the key elements that underpin the establishment of digital economy with emphasis on innovations, digital infrastructure, policies and education. Employing an exploratory, non-experimental, quantitative research design, survey data were obtained from 500 participants using a standardised and psychometrically sound questionnaire. The above multiple regressions confirmed that innovation leads to greater degrees of digital economic growth than the components of digital infrastructure, digitized regulations, and educational enablers. In doing so the results highlight the significance of these elements in the continuation of economic development in the post-industrial age. The study also validity and reliability of the survey instrument is confirmed through a pilot study with Cronbach's alpha is 0. 78 and they are also all above the cutoff level of successful factor analysis. An analysis of variance indicated that there are no significant intersectorial and demographic differences in perceptions of effectiveness of digital strategies. Finally, this study contributes to the development of literature in the area of digital economics by establishing the importance of each of the quantitative predictors of Internet use and specifically identifying digital economic growth's major factors. The results also presented relevant information for policymakers, educators, and businesses who would like to develop and improve the digital economic development sources and future. Future research should also try and establish these relationships within different settings and different populations in order to elaborate on this research.

Introduction

The so called 'digital economy' has emerged as a new driver for/relation between globalization and the economy, affecting business models, people's interactions and governmental activities. AI, big data, blockchain, and the IoT are increasingly becoming the defining trends of today's digital economy that provides continuous opportunities for growth in old and new industries alike. In particular the developing economy has great potential for growth in this segment with help of digital platform, new markets access, productivity increase and new innovations (Williams, 2021). But as these economies start redefining their economies through development of digital infrastructure, there is need for some comprehensive economic developments that addresses the impacts of digital economy.

The digital economy can be defined by the business economy that developed during the 1990s with Information and Communication Technologies ICT and has subsequently grown over and across the various industries and services spanning the economies of buying and selling goods and services through the internet. In December 2020, the digital economy's contribution to global GDP was estimated at 15%. 5 percent of the global GDP a fact that has been predicted to rise in the future years as highlighted by the United Nations 2021. This has been attributed to factors such as a rise in internet usage, the use of smart devices, and innovations in the payment systems among other factors (Foreman et al., 2021). There is increased efficiency in the performance of various economic activities in industries inclusive in the digital technologies that increase the efficiency of various industries' operations, minimize cost and undertake efficient service delivery according to the Mehmood (2021). in

DOI: https://doi.org/10.71435/604085

agriculture, use of digital technology has enhanced early detection of crop diseases, efficient use of the resources and market access thus improving the productivity of agriculture (Javaid et al., 2022). In the manufacturing industry, automation and use of technological skills such as use of artificial intelligence in decision making have helped to design new ways of proper production and this nil minimizes the risks of human interferences. the industry of finance has seen a revolution with the establishment of fintech firms, which provided new approaches to banking, payment, and investment this is especially for the people who were locked out of the formal financial sector (Murinde et al., 2022).

However, like every other thing, the coming of the digital economy, which has so many benefits also has its own demerits especially for the developing countries. There are still such a thing as the digital divide, where some people are allowed access to these technologies and others are not. In the view of the International Telecommunication Union (2020), about 3. Thus, according to the data of 2019, 6 billion people, which is 45% of the world's population, were still not connected to the network. It is summarized that low-income country, rural area and other disadvantaged group people have no access to computer and internet and this increases the gap between the rich and the poor (Lythreatis et al., 2020).

Also, it is associated with such issues as jobs automation and the potential impacts on the workforce. Parschau & Hauge (2020) has projected that automation could affect ninety million jobs within the next five years including manufacturing, transport and retail sectors. Digital technologies are on the other hand opening new job opportunities; thus, there is a need for executives to undertake reskilling and upskilling programs for their employees to meet the emergent demands in the digital economy (Li, 2022).

Data privacy and protection and cybercrime are other issues that have come about due to development in technological advancement in the economy. It has been made this worrying due to the enhancement of the incorporation of data technologies thus enhancing the protection of personal information and also the risk of cyberattacks. Friedman & McNeill, (2013), the Center for Strategic and International Studies showed that cybercrime cause over $ 1trillion loses to the world economy and individuals and organization are at risk of data Sviatun et al. (2021).

The existing literature therefore underscores the importance of policies in supporting the change in economy through government intervention in formulation of policies that fosters innovations, inclusiveness and managing of risks that may be inherent. From the foregoing highlights it is clear that a holistic approach to development of the digital economy entails government to promote Digital economy by embracing investments in digital infrastructure, education, and sound regulatory policies that will support the digital economy (Li et al., 2020).

Special emphasis is placed on building up digital platforms, which is indicated by such directions as broadband facilities, data centers, and cloud solutions. Guma (2021) reveals that, everywhere that is embarking on developing digital infrastructure there will be boosted economic growth rates and relative competitive advantages. South Korea has made a considerable investment in the development of broadband networks that has seen the country rank high in digital advancement with its ICT playing a great role in boosting the country's economy (Massaro & Kim, 2022). Rwanda has invested in digital infrastructure that has helped to develop the country's digital economy especially in the sectors of e-commerce and financial technology (Banga & te Velde, 2020).

Knowledge and effective existence of the internet facilities also play an important role for education of a strong digital economy. It's therefore the responsibility of governments to

DOI: https://doi.org/10.71435/604085

ensure that people have the ability to take part in the digital commerce; the skills may range from the initial levels of computer competence to the postgraduate levels of coding, statistics, data science and AI among others. Some countries like Estonia have integrated fully for digital education right from the basic education levels and this have resulted to Estonia becoming one of the leading digital countries globally (Põldoja, 2020).

But for the governments, there is necessity in also sanctioning the legal frameworks which will support innovative solutions for the issues and at the same time, customers' protection and personal data safety. the General Data Protection Regulation (GDPR) under the European Union has act as a benchmark by giving control of the people's data and penalties in cases of data violations (Mantelero, 2021). countries need to design cyber security policies that enables safeguarding the critical infrastructures from cyber threats and utilizes the synergy of public-Private partnership for responding to the cyber security challenges (Djenna et al., 2021).

Method

The research design was kept such that the results could be statistically analyzed to find out the correlation and impact of different factors that are connected to digital economic development.

The technique of sampling that was used was stratified random sampling whereby participants were drawn from different sectors that had been influenced by digitisation. The sample comprised 500 participants, including business executives, policymakers, and technology experts, from three key sectors: finance, manufacturing and agriculture. To this end, there was an emphasis on including various sectors which are salient in the digital economy.

The data were gathered via a self-structured questionnaire; the questions in the questionnaire were derived from existing literature and reliability and validity of the questionnaire was pre-tested. The survey included a number of closed questions and a number of questions stated on a five-point Likert scale to evaluate respondents' attitudes toward digital economic strategies and their efficiency as well as the efficiency of their implementation. The survey administration was electronic and included sending of the invitation to the participants via email, online survey tools.

Based on these considerations, some of the most significant variables that have been examined in the course of the study are digital infrastructure, Innovation, regulating environment as well as educational programs. These variables were operationalized as follows: These variables were operationalized as follows:

Summarized by respondents' opinions on the availability of broadband networks, data centers, and cloud computing services that respondent provided on a scale ranging from 1 – very inadequate to 5 – very adequate. Captured based on the respondents' impressions of the effectiveness of digital tools and technologies in improving business operations, on a Likert scale from 1= Not effective to 5=Very effective. Subsidiary to the respondents' perception of sufficiency of current regulations on digital transformation, with a 1 to 5 scale that varies between very inadequate and very adequate, respectively. According to the self-developed perception index which refers to the satisfaction of the respondents on the sufficiency of training programs and digtal literacy incidence scaled 1- very insufficient to 5- very sufficient.

The collected data were also statistically handled using different statistical tests. To assess the respondents' perceptions of each variable, Descriptive analysis in the form of mean and

DOI: https://doi.org/10.71435/604085

standard deviations were calculated. Focused descriptive and inferential analytical tools such as Multiple Regression analyses were used to analyse the correlations between Digital economic strategies and development dimensions.

By applying Multiple Regression Analysis, the degrees of influence of Digital Infrastructure, Innovation, Regulatory Frameworks and Educational Initiatives on the overall Spread & Development of Digital Economy were found out. It was possible to determine the significance level of each variable while accounting for other factors, thus this method.

Moreover, to identify means for perceptions depending on the sector and demographic variables, the analysis of variance (ANOVA) check was done. This technique made it possible to determine whether it was possible to observe variations in the degree of response when organized by different sectors and also different category of Employees.

In a bid to establish reliability and validity of the survey instrument, the author developed a pilot test for the survey and administered it to 50 respondents. The one gathered was instrumental in the fine-tuning of the survey questions with a view of making the questions as clear as possible. Cronbach's alpha was used to determine the internal consistency of the survey items and for this a threshold of 0. 70 indicating acceptable reliability. To assess construct validity, factor analysis was conducted as means of determining whether the items in survey assessed the intended variables.

Result and Discussion

Therefore, it becomes relevant to give an account of findings arising from the study. To ascertain the effects of the identified factors, as well as significant relations and differences in digital economic development, techniques of quantitative research were utilized including statistical analysis. This section will present the descriptive statistics, correlation coefficients, multiple regression coefficients and ANOVA coefficients so as to give the analysis of the data collected and assess the reliability of the survey instrument used. These facilitate the credibility of the results given that the reliability and validity of the survey was made certain through a pilot study as well as statistical testing.

Table 1. Descriptive Statistics of Variables

Variable	Mean	Standard Deviation
Digital Infrastructure	3.87	0.92
Innovation	4.05	0.88
Regulatory Frameworks	3.72	1.04
Educational Initiatives	3.95	0.89

Descriptive statistics of the study's key variables are shown in the following table. The mean scores highlight the attitudes of each variable to the respondents with all the variables perceived positively. The standard deviations show the amount of variation in the responses, though lower indicating that the participants had more agreed about the role of digital infrastructure with the highest standard deviation of the three measures suggesting more variation of opinion.

Table 2. Correlation Matrix of Variables

Variable	Digital Infrastructure	Innovation	Regulatory Frameworks	Educational Initiatives
Digital Infrastructure	1.000	0.652	0.481	0.567
Innovation	0.652	1.000	0.497	0.621

DOI: https://doi.org/10.71435/604085

Regulatory Frameworks	0.481	0.497	1.000	0.433
Educational Initiatives	0.567	0.621	0.433	1.000

This table displays the degree of relationship between the variables; all these coefficients for the variables are above.05. It is shown that all the variables are positively related, meaning that there are gains in at least one aspect together with enhancement in others. Thus, innovation can be seen to have the highest level of relationship with the other aspects of digital economic strategies.

Table 3. Multiple Regression Analysis Results

Predictor Variable	Beta	Standard Error	t-value	p-value
Digital Infrastructure	0.345	0.072	4.79	0.0001
Innovation	0.456	0.068	6.71	0.0001
Regulatory Frameworks	0.234	0.076	3.08	0.002
Educational Initiatives	0.289	0.070	4.13	0.0001

The following table displays the findings of the multiple regression analysis with regard to the role of the statistical predictor variables on the level of digital economic development. In terms of statistical significance, all the predictor variables were statistically significant and the most influential variable in predicting the level of development outcome was innovation which was depicted by high beta co-efficients.

Table 4. ANOVA Results by Sector

Sector	Digital Infrastructure (Mean)	Innovation (Mean)	Regulatory Frameworks (Mean)	Educational Initiatives (Mean)
Finance	3.92	4.10	3.85	4.02
Manufacturing	3.83	4.00	3.68	3.87
Agriculture	3.85	4.02	3.71	4.00

F-value = 2.31, p-value = 0.102

The table below presents the mean score of each of the variables for different sectors. The sectors do not differ significantly on their perceptions and, therefore, demand for digital economic strategies do not differ across finance, manufacturing and agriculture sectors.

Table 5. ANOVA Results by Demographic Characteristics

Demographic Characteristic	Digital Infrastructure (Mean)	Innovation (Mean)	Regulatory Frameworks (Mean)	Educational Initiatives (Mean)
Age (Under 40)	3.90	4.05	3.80	3.95
Age (40 and above)	3.85	4.00	3.65	3.90
Gender (Male)	3.88	4.07	3.75	3.93
Gender (Female)	3.85	4.00	3.68	3.95

The following table gives the mean score for the each of the variables according to age and gender. Descriptive analysis of demographic factors reveals no differences in perceptions across the different age groups and gender, therefore implying that men and women and

DOI: https://doi.org/10.71435/604085

individuals of different ages have similar attitudes towards the different digital economic strategies.

Table 6. Reliability and Validity of the Survey Instrument

Measure	Value
Cronbach's Alpha	0.78
Factor Analysis Results	Valid

The following table shows the reliability and validity information of the survey instrument used. A pilot study further involving fifty participants established that the questions used in the survey were well articulated. The internal consistency shall be measured by Cronbach alpha and it was found to be 0. 78 times which is beyond the acceptable limit of 0. 70. Having an acceptable model fit, factor analysis proved that the survey items captured the intended variables together with construct validity.

This study also aims to establish important findings regarding the major factors that impact on the digital economic development. Consequently, this investigation enhances the existing knowledge of how these components connect and support one another in the process of economic development in the context of the digital environment. This section further discusses these findings in light of the literature and states why this study fills the gaps in the existing body of knowledge.

It also revealed that the degree of innovation gives the biggest breakthrough to the digital economic development with the beta coefficient of 0. 456. This result augurs well with the argument that innovation dominates digital change and determine economic growth. Circulating literature supports this line of thought claiming that the innovation does not only improve technology disposition but also fosters competition and growth. For instance, Distanont (2020) suggest that adopters of innovations have the competitive advantage in utilizing the new opportunities that are available for sustainable development. Furthermore, reviewing the evidence by Ding et al. (2021) it is also found out that innovation is not only beneficial in enhancing the digital economy share but also helps organizational in developing new business models and organisational operational excellence. These findings are supported by the major positive influence of innovation obtained in our study and confirm the empirical analysis of this variable as being a key to the development of the digital economy.

Technology factor was another important determinant in the research with beta coefficient of 0. 345. This result supports the large body of literature highlighting the imperative role of sound IT for enhancing the economy. Zhang et al. (2021) states that high quality of digital infrastructure is necessary for performing economic activities, improving members' connections, and supporting digital service. This is also evident in a study carried out by Chen et al. (2021) where it is clear that investments made on digital resources result in increased efficiency in business and the economy due to availability and reliability of resources. Such findings reinforce these arguments of this paper by underlining the significance of a sound digital ecosystem as a foundation for fostering economic growth and development in the era of digital evolution.

The findings also explained that the influence of regulatory frameworks in DED was moderate with the beta coefficient of 0.234. Subsequently, this study fills a gap in the literature about how the regulatory environment affects digital economic performance. As earlier studies have established, regulatory systems have been seen to have a strong impact on the digital advancement and business operations. According to Chen et al. (2021) good set of regulatory policies can enhance the environment of the digital businesses, decrease or remove barriers and stimulate further innovations. On the other hand, the rules and regulations in an

DOI: https://doi.org/10.71435/604085

environment hog most of the limelight and may act as restrictions to growth and Investments. To this discussion, our study provides an empirical analysis of the effectiveness of regulatory frameworks and the part they play in shaping digital economic growth, and therefore offers solutions for policy makers seeking to enhance effectiveness of regulation for the purpose of digital advancement.

The results of the study also show that the factors of educational initiatives have a positive effect on the Digital Economics, as beta = 0.289. This revelation underscores the role of Education in development of digital literacy and sophisticated skill set relevant to economic growth. Turning to the literature, there is evidence that various studies stress that only codified forms of educational programs adjusted to the needs of the digital skills are useful for the promotion of the manpower and economic growth. Goulart et al. (2022) note that education programs aiming at increasing the digital competencies of the employee base can support workforce development of innovation capabilities. In addition, another well-written report by the World Economic Forum released in 2023 also indicated that there is a need to invest more in education so as to develop training programs which will then create value by preparing individuals for a digital economy. We advance this line of thought by presenting here the direct effect of educational drives on digital economic growth that was not reported in the previous literature on the effectiveness of educational interventions in this sphere.

The ANOVA indicated also that there were no significant differences in the perception of digital economic strategies in different sectors of the economy (financial, manufacturing, agriculture) and different age groups and gender. This consistency can however not eradicate some literature that gives a sectoral and demographic dependent variable picture of the digital strategies. Kosiba et al. (2020) used sector-specific factors and demographic characteristics, and they concluded that the engagements may differ sector-specific factors and demographic characteristic which imply that there can be differences in the digital strategies' outcomes of the strategies across different sectors and groups. However, according to the results of out study, the various analyzed variables are general perceived and accepted in terms of the effectiveness of digital economic strategies by various sectors and groups of participants. This might be due to the fact that the studied variables are rather general which gives a more general view on the digital economic strategies.

The pilot study hence provided an affirmation towards Face validity of the survey instrument while the Cronbach Alpha estimate was computed to be 0.78 and successful factor analysis been achieved. This part of the study is important to make a sense check on the findings of the study so that the results are more reliable. Sometimes reliability and validity issues are overlooked in research whereas they are a prerequisite to attaining accurate findings. Shrestha (2021) that can be seen that in developing the survey instruments, it is equally appropriate to give adequate attention on the testing of the survey instruments so as to ensure that the developed instruments are able to capture the intended constructs as they are. In addition to enhancing the validity and reliability of this study, the study also fills the gap that is often present in the literature where reliability results of the measurement instrument are not included. This validation gives confidence to the outcome and consequently adds value to the discoveries of the study to the development of the existing body of knowledge.

Conclusion

By presenting quantitative data concerning the major factors of innovation, digital infrastructure, institutions, and education, this research contributes to a vast improvement in understanding of the process of digital economic development. Various factors have been presented in the study to support economic development in the digital economy, and it has also explained that digital strategies show no disparity in the sectors and demographical

DOI: https://doi.org/10.71435/604085

areas. These insights include identification and quantification of the previous influences as well as the validation of survey instruments, which was not addressed by previous surveys; in addition, this study contributes knowledge for policymakers, educators, and businesses. It will help to build specific recommendations, increasing the development of digital economy and laying down the theoretical framework for the new researches in the intensive and perspective field.

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