The Impact of Organizational Leaders' Perceptions of the Fourth Industrial Revolution Technologies

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Abstract

Artificial Intelligence (AI), Big Data (BD), Blockchain (BC), Cloud Computing (CC), Fifth Generation (5G) Wireless Network, and Internet of Things (IoT) are the six technologies that constitute the Fourth Industrial Revolution Technologies (FIRT) in the context of this quantitative study. The purpose of the quantitative study which was based on Technology Acceptance Model (TAM) and Cognitive Model (CM) was to understand how the perceptions of the America-based organizational leaders would affect the leaders' acceptance of the Fourth Industrial Revolution Technologies (FIRT). The researcher created a questionnaire which was pre-tested by conducting a pilot study with 13 participants after which a total number of 135 respondents participated in the full study by responding to a 5-point Likert scale questionnaire through an online data collection platform. Cronbach's Alpha, Confirmatory Factor Analysis (CFA), and Kendall's Tau Correlation techniques were adopted using R and SPSS statistical packages to determine the impact of the leaders' perceptions on their acceptance of the technologies. The findings of the study indicated that there was a statistically significant relationship between organizational leaders' Perceived Ease of Use (PEOU) and the leaders' Perceived Usefulness (PU) of the six technologies, between Perceived Usefulness (PU) and the Intention to Use (ITU) Cloud Computing technology, between Perceived Ease of Use (PEOU) and the Intention to Use (ITU) Cloud Computing technology, and between Perceived Ease of Use (PEOU) and the Intention to Use (ITU) 5G Network technology. There was however no statistically significant relationship between the leaders' Perceived Usefulness (PU) or Perceived Ease of Use (PEOU) and the Intention to Use (ITU) the Artificial Intelligence, Big Data, Blockchain, and Internet of Things technologies. There was also no statistically significant relationship between the leaders' Perceived Usefulness (PU) and the leaders' Intention to Use (ITU) 5G Network technology. Recommendations for future research include investigating the impact of participants' age on the acceptance of the technologies, targeting different and more narrowed sample populations, considering additional and new technologies, and repeating the research at a later point in time.

Keywords: Leadership, Fourth Industrial Revolution Technologies, Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Intention to Use (ITU).

Background of the Study

The World Economic Forum (2021) described the different stages of industrial revolution the world had undergone. During the first industrial revolution, industries applied water and steam power for manufacturing their products, the second industrial revolution ushered in the use of electric power for mass production while the third applied electronics and information technology to automate production. The fourth industrial revolution enhances the third industrial revolution with smart and autonomous systems fuelled by data and machine learning (Marr, 2018). The fourth industrial revolution is an enhanced version of the third with modern technologies such as the Artificial Intelligence, Big Data, Blockchain, Cloud Computing, Fifth Generation (5G) Wireless, and Internet of Things (World Economic Forum, 2021).

Organizational leaders converge around new technological changes with many concerns such as cyberattacks, loss of leadership power, lack of new skills required, robots' lack of capacity of moral reasoning and inability to make ethical decisions in complex scenarios, high cost of deployment of new technologies, and replacement of human employees by new technologies (Xu, David, Jeanne, & Suk, 2018). Successful migration to new technologies therefore depends on organizational stakeholders' adoption of the new innovations (Kelley et al., 2018). Whether the organizational leaders would accept to deploy and use the Fourth Industrial Revolution Technologies (FIRT) within their organizations is of great concern considering the various challenges the new technologies come with. The study therefore measured the relationship between the organizational leaders' perceptions of the Fourth Industrial Revolution Technologies (FIRT) and the leaders' acceptance or intention to use the technologies in American companies.

Literature Review

Organizational Leadership in the Fourth Industrial Revolution Era

Leadership is the capacity to direct followers to achieve goals that the followers would not achieve ordinarily (Emler, 2019). According to the Center for Creative Leadership, CCL (2021), great leaders consistently possess certain qualities that make them stand out. Such leadership qualities are integrity, ability to delegate responsibilities, effective communication skills, gratitude, influence, empathy, courage, and respect (Tracy, 2021 & Enfroy, 2021). The challenge for leadership is to deploy new technologies in ways that not only yield fresh efficiencies but also amplifies human creativity, ingenuity and judgment (World Economic Forum, 2018). Organizational leaders therefore will have to search for different ways to do more with less, find value where innovations overlap, and strategically invest in technologies (Baig et al., 2023).

Artificial Intelligence (AI) Technology

Artificial Intelligence (AI) is described as computer systems that perform tasks requiring human-like intelligence (Garbuio & Lin, 2019). Haenlein and Kaplan (2019) defined Artificial Intelligence (AI) as a system's ability to interpret external data correctly, learn from such data, and use the learning to achieve specific goals and tasks through flexible adaptation.

Big Data Technology

The word “Big” in the name “Big Data” suggests a large volume of the Big Data concept (Paraschiv & Danubianu, 2019). Grover, Chiang, Liang and Zhang (2018) explained that the ways businesses generate, share, communicate, access, analyze data and adapt to environmental changes have been transformed by the number of connected people, devices, and sensors.

Blockchain Technology

Blockchain technology is a multiple global ledgers that permit assets to be transferred from one party to another simultaneously without the need for a third party’s involvement thereby guaranteeing utmost security (Khalifa, 2019). Blockchain technology enables businesses to generate required reporting information directly from financial data (Mosteanu, 2019). Among all the uses of Blockchain technology, the Bitcoin, which is a digital currency, is outstanding (Da Silva Momo, Sordi Schiavi, Behr, & Lucena, 2019).

Cloud Computing Technology

According to Pise (2019), Cloud Computing is one of the information technology service delivery methods which permit users to store data on distant devices rather than storing data on hard drive or local devices. Cloud Computing comprises of three main services namely Infrastructure as a Service (IaaS), Software as a Service (SaaS), and Platform as a Service (PaaS) (Pise, 2019).

Fifth Generation (5G) Wireless Technology

Every new generation technology is an improvement on the previous one. The first generation (1G) wireless technology focused on the simple mobile voice (Mahmod, 2017) and offered extremely low degree of bandwidth efficiency and security (Cisar, & Maravic, 2019). The second generation (2G) focused on both better bandwidth and coverage (Mahmod, 2017) and offered a much higher security and new features such as text messaging and communication with low data transmission rates (Cisar, & Maravic, 2019). The third generation (3G) was concerned with higher data level, multimedia backing, and spread spectrum (Mahmod, 2017) in order to achieve faster data transmission (Cisar, & Maravic, 2019). The 4G offered access to multiple communication facilities including developed smartphone services, and mobility application (Mahmod, 2017; Cisar, & Maravic, 2019). The Fifth Generation (5G) Technology has many features such as data capabilities, unlimited call volumes, unrestricted data broadcast, live camera, MP3 recording, video chat, huge phone memory, and many others (Mahmod, 2017).

Internet of Things (IoT) Technology

Sethi and Sarangi (2017) defined Internet of Things (IoT) as a new kind of world where almost all the devices and appliances are connected to a network by using these devices and appliances collaboratively to achieve complex tasks that require a high level of intelligence. Internet of Things (IoT) is not a single technology; it is rather a collection of various technologies that work together in tandem (Sethi, & Sarangi, 2017).

Table 1

Definitions of Constructs and Indicators

Table 1 helps to understand the acronyms used in the study. The parent constructs (variables); *Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Intention to Use (ITU)* were measured through the lens of the six technologies (items or indicators)-Artificial Intelligence (AI), Big Data (BD), Blockchain (BC), Cloud Computing (CC), Fifth Generation (5G) Network, and Internet of Things (IoT).

Constructs (Variables)	Indicators (Items)	Definitions of Indicators (Items)
Perceived Usefulness (PU)	PU_AI	Artificial Intelligence (AI) indicator for measuring or representing Perceived Usefulness (PU) construct
	PU_BD	Big Data (BD) indicator for measuring or representing Perceived Usefulness (PU) construct
	PU_BC	Blockchain (BC) indicator for measuring or representing Perceived Usefulness (PU) construct
	PU_CC	Cloud Computing (CC) indicator for measuring or representing Perceived Usefulness (PU) construct
	PU_FG	Fifth Generation (5G) Network indicator for measuring or representing Perceived Usefulness (PU) construct
	PU_IoT	Internet of Things (IoT) indicator for measuring or representing Perceived Usefulness (PU) construct
Perceived Ease of Use (PEOU)	PEOU_AI	Artificial Intelligence (AI) indicator for measuring or representing Perceived Ease of Use (PEOU) construct
	PEOU_BD	Big Data (BD) indicator for measuring or representing Perceived Ease of Use (PEOU) construct
	PEOU_BC	Blockchain (BC) indicator for measuring or representing Perceived Ease of Use (PEOU) construct
	PEOU_CC	Cloud Computing (CC) indicator for measuring or representing Perceived Ease of Use (PEOU) construct
	PEOU_FG	Fifth Generation (5G) Network indicator for measuring or representing Perceived Ease of Use (PEOU) construct
	PEOU_IoT	Internet of Things (IoT) indicator for measuring or representing Perceived Ease of Use (PEOU) construct

Intention to Use (ITU)	ITU_AI	Artificial Intelligence (AI) indicator for measuring or representing Intention to Use (ITU) construct
	ITU_BD	Big Data (BD) indicator for measuring or representing Intention to Use (ITU) construct
	ITU_BC	Blockchain (BC) indicator for measuring or representing Intention to Use (ITU) construct
	ITU_CC	Cloud Computing (CC) indicator for measuring or representing Intention to Use (ITU) construct
	ITU_FG	Fifth Generation (5G) Network indicator for measuring or representing Intention to Use (ITU) construct
	ITU_IoT	Internet of Things (IoT) indicator for measuring or representing Intention to Use (ITU) construct

Note. The table helps to understand the acronym used for each item. The items are the six technologies while the constructs are Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Intention to Use (ITU).

Methods

Hypothesis Testing

The study was guided by three research questions (RQ1, RQ2, and RQ3) with each having two hypotheses (Null- H_0 and Alternate- H_A) which measured the relationship between the organizational leaders' *Perceived Usefulness (PU)* of the Fourth Industrial Revolution Technologies and the leaders' *Perceived Ease of Use (PEOU)*, the leaders' *Perceived Usefulness (PU)* and *Intention to Use (ITU)* the technologies, and the leaders' *Perceived Ease of Use (PEOU)* and *Intention to Use (ITU)* the technologies. Bevans (2022) explained that p-values are used in hypothesis testing to help decide whether to reject or accept a hypothesis. The most common p-value threshold is 0.05. Any hypothesis result with p-value that was less than 0.05 ($p<0.05$) was considered significant and accepted, however, any hypothesis result with p-value that was greater than 0.05 ($p>0.05$) was considered insignificant and rejected. Kendall Rank-Order Correlation Coefficient was selected as the test statistic for each hypothesis.

Research Questions and Hypotheses

RQ1: What is the relationship between the organizational leaders' *Perceived Usefulness (PU)* of the fourth industrial revolution technologies and the leaders' *Perceived Ease of Use (PEOU)* of the technologies?

$H1_0$ - There is no relationship between the organizational leaders' *Perceived Usefulness (PU)* of the fourth industrial revolution technologies and the leaders' *Perceived Ease of Use (PEOU)* of the technologies

$H1_A$ - There is a relationship between the organizational leaders' *Perceived Usefulness (PU)* of the fourth industrial revolution technologies and the leaders' *Perceived Ease of Use (PEOU)* of the technologies

RQ2: What is the relationship between the organizational leaders' *Perceived Usefulness (PU)* of the fourth industrial revolution technologies and the leaders' *Intention to Use (ITU)* the technologies?

$H2_0$ - There is no relationship between the organizational leaders' *Perceived Usefulness (PU)* of the fourth industrial revolution technologies and the leaders' *Intention to Use (ITU)* the technologies

$H2_A$ - There is a relationship between the organizational leaders' *Perceived Usefulness (PU)* of the fourth industrial revolution technologies and the leaders' *Intention to Use (ITU)* the technologies

RQ3: What is the relationship between the organizational leaders' *Perceived Ease of Use (PEOU)* of the fourth industrial revolution technologies and the leaders' *Intention to Use (ITU)* the technologies?

$H3_0$ - There is no relationship between the organizational leaders' *Perceived Ease of Use (PEOU)* of the fourth industrial revolution technologies and the leaders' *Intention to Use (ITU)* the technologies

$H3_A$ - There is a relationship between the organizational leaders' *Perceived Ease of Use (PEOU)* of the fourth industrial revolution technologies and the leaders' *Intention to Use (ITU)* the technologies

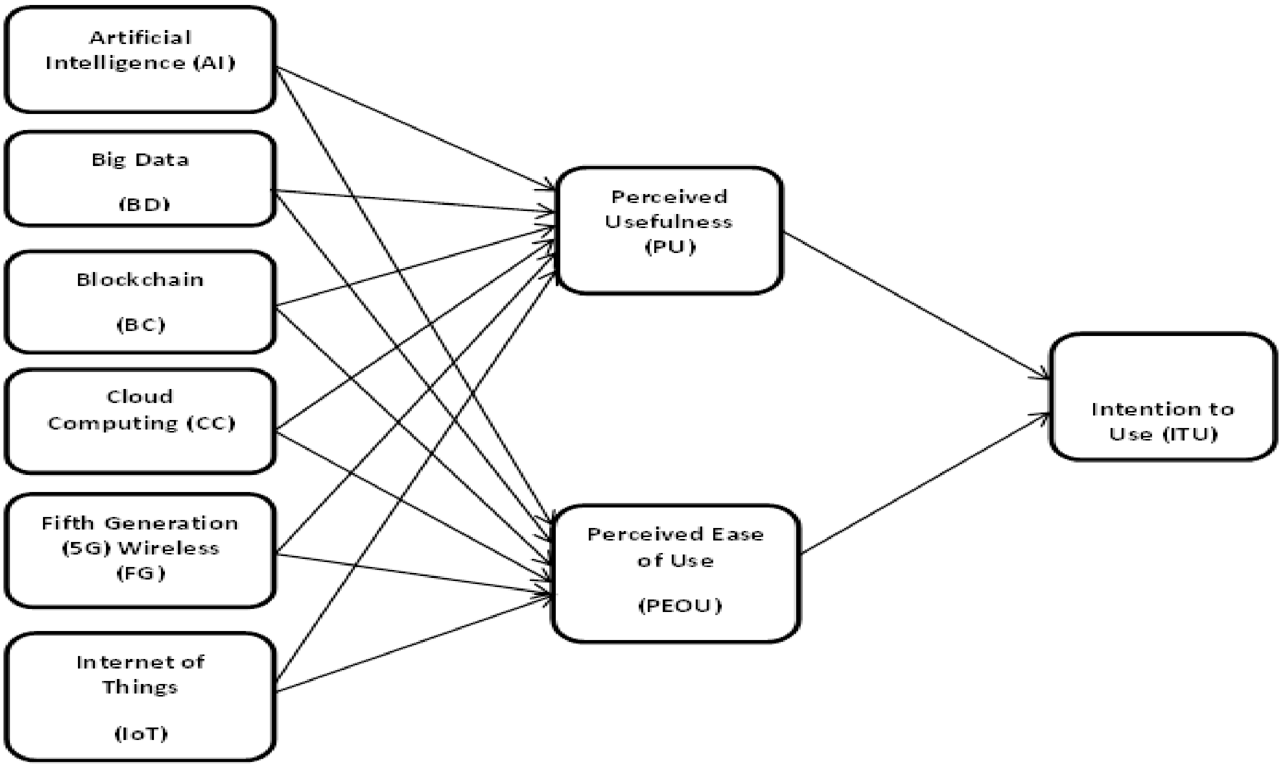
Models

Fourth Industrial Revolution Technology Acceptance Model (FIRTAM) and the Cognitive Model (CM) were the two research models that guided the study.

Fourth Industrial Revolution Technology Acceptance Model (FIRTAM)

Figure 1 shows the Fourth Industrial Revolution Technology Acceptance Model (FIRTAM) adapted from the Technology Acceptance Model (TAM) of Davis and Venkatesh (1996) and Koul and Eydgahi (2018). The FIRTAM applied the TAM to the domain of Fourth Industrial Revolution Technologies in order to build more specificity by examining relationship between the organizational leaders' perceptions and the leaders' intention to use the Fourth Industrial Revolution Technologies.

Figure 1



Note. This fourth industrial revolution technology acceptance model (FIRTAM) explains the impact of technology users' perceptions on their acceptance of the fourth industrial revolution technologies, which was transformed by Ademola (2021) from Koul and Eydgahi (2018) and Davis and Venkatesh (1996).

The Cognitive Model

Cognitive theory is based on the idea that people's thoughts and beliefs influence their behaviors and responses (DiGiuseppe, David & Venezia, 2016). The ease of using a new technology influences the users' decision in adopting the technology while the difficulties in using a new technology influences the users' decision in rejecting the technology (Koul & Eydgahi, 2018; Arvie & Tanaamah, 2019; Primasari, Sudjono, & Abriani, 2019; Bayraktaroglu, Kahya, Atay, & Ilhan, 2019).

Instrumentation

Pilot Study

In order to gather the data required to assess the participants' perceptions of the Fourth Industrial Revolution Technologies, a questionnaire was created based on questions adapted from previous researches by Sevim, Yuncu, and Erogluhall (2017); Koul and Eydgahi (2018); Diop, Zhao, and Duy

(2019) and Lee, Kriscenski, and Lim (2019). The questionnaire was a 5-item Likert scale survey instrument which was distributed through an online survey provider which allowed for downloading the results into an excel spreadsheet for further data analysis. The instrument measured three main constructs namely *Perceived Usefulness (PU), Perceived Ease of Use (PEOU)*, and the *Intention to Use (ITU)* Fourth Industrial Revolution Technologies. A pilot study with 13 participants was subsequently conducted before the distribution of the questionnaire to 135 participants for full study participation. Running a pilot study, according to Bhandari (2022), helps test the validity and reliability of a questionnaire, catch any errors or confusing points, find if any questions were particularly difficult to answer, unclear or inconsistent, and make necessary changes before performing a full study. The 13 pilot study participants from organizations based in the United States helped ensure the interview questions were valid for meaningful data collection by reviewing the wordings of the questionnaire, pointing out any errors, and checking the clarity of the questions.

The participants gave feedbacks in the comment section of the questionnaire. Eleven (11) pilot study participants indicated that all the questions were clear and well understood while two (2) gave useful recommendations. Responding to a security-related question in the questionnaire, the first of the two pilot study participants explained that the Fourth Industrial Revolution Technologies still had a long way to go before showing any proof of security and that the spread of 5G infrastructure in the rural areas was still lacking, consequently, most organizations would probably not invest in the technologies until they had more proven indicators that the technologies could add value to their companies' operations. The second pilot study participant suggested that the questionnaire choices be randomized because of respondents' tendency to argue positive bias if 'Strongly Agree' was at the top of the questionnaire choices, and negative bias if 'Strongly Disagree' was at the top of the choices.

Validation and Reliability

Validity, according to Field (2013), is defined as the determination of whether an instrument measures what it is designed to measure while reliability is defined as the determination of whether an instrument can be interpreted consistently across different situations. Cronbach's Alpha and Confirmatory Factor Analysis (CFA) statistical techniques were used to validate and confirm the consistency of internal reliability of the questionnaire items relating to *Perceived Usefulness , Perceived Ease of Use ,* and the *Intention to Use* (Sujatha & Sekkizhar, 2019).

Cronbach's Alpha Technique

The researcher tested the reliability of the survey instrument by computing the Cronbach's alpha coefficient using the Statistical Package for Social Science (SPSS) tool. Based on the Cronbach's alpha coefficient, the questionnaire was tested to be reliable with the Cronbach's Alpha value of 0.805 (Table 2). The Cronbach's Alpha's value of 0.805 is acceptable as it is greater than the minimum value (0.70) recommended by Hair et al. (2014).

Table 2

Reliability Statistical Test Using SPSS

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.805	0.813	18

Internal consistency reliability testing of the three constructs (Perceived Usefulness, Perceived Ease of Use, and Intention to Use) in the survey instrument was done and the Cronbach's alpha values derived (Table 3) satisfied the minimum required value (0.70) for acceptable internal consistency reliability.

Table 3

Constructs' Cronbach's Alpha

Dimension	**Cronbach's Alpha α (95% CI)**
Perceived Usefulness (PU)	0.832
Perceived Ease of Use (PEOU)	0.799
Intention to Use (ITU)	0.781

Confirmatory Factor Analysis (CFA) Technique

Confirmatory Factor Analysis (CFA) was conducted using R statistical technique to determine specific goodness-of-fit measures such as the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). While the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) are acceptable as they are below the recommended cut-off value of 0.95 (Hu & Bentler, 1999), the Standardized Root Mean Square Residual (SRMR) exceeds the acceptable value (< 0.08) recommended by Hu & Bentler (1999). The Root Mean Square Error of Approximation (RMSEA) exceeds the acceptable value (0.07) as recommended by Steiger (2007). Hence, the CFA results (Table 4) indicate the survey instrument has internal inconsistencies that may impact the reliability of results.

Table 4

Confirmatory Factor Analysis Goodness of Fit Measures

Goodness of Fit Index	Test Statistic
Comparative Fit Index (CFI)	0.781
Tucker-Lewis Index (TLI)	0.747
Root Mean Square Error of Approximation (RMSEA)	0.123 90% CI (0.108; 0.138)
Standardized Root Mean Square Residual (SRMR)	0.119

Data Collection and Analysis

The research study investigated the organizational leaders' *intention to use* the Fourth Industrial Revolution Technologies based on the leaders' *perceptions of usefulness and ease of use* of the technologies. Quantitative research method was used to examine the relationship between the perceptions of organizational leaders about the Fourth Industrial Revolution Technologies and the leaders' acceptance of the technologies. A total of 135 participants responded to a 5-point-Likert-scale questionnaire. The questionnaire was delivered through SurveyMonkey platform and data were collected from the organizational leaders who worked with companies within the United States. SurveyMonkey maintained a reliable panel of respondents by processing all responses with machine learning to check for quality and compliance with the research methodology and the confidentiality of the respondents (SurveyMonkey, 2021).

Population and Sample Selection

Using a confidence interval of 95%, margin error of 5%, and effect size of 0.3, the required sample size was calculated using G*Power Software (Faul, Erdfelder, Buchner, & Lang, 2009) to be 134.

Descriptive Data

A total of 135 respondents working within America-based organizations completed the survey. Nine participants were disqualified for lack of leadership qualities. Responses were converted to numeric values for the purpose of statistical data analysis. The raw survey data collected were coded and the results from the negatively-worded questions were reverse coded using the Statistical Package for Social Science (SPSS) tool (Sonderen, Sanderman, & Coyne, 2013). The Median Time to Complete (MTC) the survey was 2 minutes, 17 seconds while the Margin of Error was +/- 8.607%. The margin of error is a range of values above and below the actual survey results. The smaller the margin of error the higher the confidence level in the results (SurveyMonkey, 2021).

Demographic Profile of Respondents

Age

Table 5 shows the age distribution of the respondents; 29.63% (40 respondents) of the sample is in 18-29 age range, 17.04% (23 respondents) in 30-44 age range, 27.41% (37 respondents) in 45-60 age range, and 25.93% (35 respondents) in age range that is above 60 years. There was no participant below the age of 18. The highest age range of the respondents was 29.63% (40 respondents).

Table 5

Ages of Respondents

Age		
Answer Choices	**Percentages**	**Number of Respondents**
< 18	0.00%	0
18-29	29.63%	40
30-44	17.04%	23
45-60	27.41%	37
> 60	25.93%	35
Total		**135**

Gender

The gender breakdown (Table 6) shows there were 70 female respondents constituting 52% and 65 female respondents constituting 48% of the sample population. The total number of female participants was higher than the male by 5 respondents.

Table 6

Percentage Gender Breakdown

Gender	Percentages	Number of Respondents
Male	48.15%	65
Female	51.85%	70
Total		**135**

American Regions

The survey participants were from 9 regions of the United States (Table 7). The highest percentage (21.05%) of the respondents was from Pacific Region while the lowest percentage (1.50%) was from (West North Central). Two participants skipped the question about their region.

Table 7

Regional Locations of the Respondents

Region	Percentage	Number of Respondents
East North Central	15.79%	21
East South Central	4.51%	6
Middle Atlantic	13.53%	18
Mountain	12.78%	17
New England	0.75%	1
Pacific	21.05%	28
South Atlantic	18.05%	24
West North Central	1.50%	2
West South Central	12.03%	16
	Skipped	2
Total		135

Discussion and Summary of Findings

Based on the three research questions (RQ1, RQ2, and RQ3) in the study, Kendall Correlation test was conducted to determine the relationship between the leaders' Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) in relation to RQ1, between Perceived Usefulness (PU) and Intention To Use (ITU) in relation to RQ2, and between Perceived Ease of Use (PEOU) and Intention To Use (ITU) in relation to RQ3. The three correlation test scenarios were conducted through the lens of the six Fourth Industrial Revolution Technologies- Artificial Intelligence (AI), Big Data (BD), Blockchain (BC), Cloud Computing (CC), 5G Network (FG), and Internet of Things (IoT). As shown in Table 8, for each technology, Kendall Correlation coefficient value (τ) was generated with its corresponding p-value. If the corresponding p-value was less than 0.05 ($p < 0.05$), the hypothesis result was considered significant and accepted, however, if the corresponding p-value was greater than 0.05, the hypothesis result was considered insignificant and rejected.

Table 8

Kendall's Correlation Test Results and Decisions

Research Question	Correlation	Hypothesis Type	Z-Value	tau (Ʈ)	P-Value	Hypothesis Result	Decision
RQ1 (What is the relationship between the organizational leaders' Perceived Usefulness (PU) of the fourth industrial revolution technologies and the leaders' Perceived Ease of Use (PEOU) of the technologies?)	PU_AI-->PEOU_AI	Null ($H1_0$)					Rejected
		Alternate ($H1_A$)	3.4716	0.2681353	**0.0005174**	**Statistically Significant**	**Accepted**
	PU_BD-->PEOU_BD	Null ($H1_0$)					Rejected
		Alternate ($H1_A$)	3.965	0.3082377	**7.34E-05**	**Statistically Significant**	**Accepted**
	PU_BC -->PEOU_BC	Null ($H1_0$)					Rejected
		Alternate ($H1_A$)	5.735	0.4470702	**9.75E-09**	**Statistically Significant**	**Accepted**
	PU_CC -->PEOU_CC	Null ($H1_0$)					Rejected
		Alternate ($H1_A$)	4.5339	0.3514791	**5.79E-06**	**Statistically Significant**	**Accepted**
	PU_FG -->PEOU_FG	Null ($H1_0$)					Rejected

		Alternate ($H1_A$)	5.5154	0.4243429	**3.48E-08**	**Statistically Significant**	**Accepted**
	PU_IoT -->PEOU_IoT	Null ($H1_0$)					Rejected
		Alternate ($H1_A$)	6.5581	0.5256835	**5.45E-11**	**Statistically Significant**	**Accepted**
RQ2 (What is the relationship between the organizational leaders' Perceived Usefulness (PU) of the fourth industrial revolution technologies and the leaders' Intention to Use (ITU) the technologies?)	PU_AI -->ITU_AI	Null ($H2_0$)					**Accepted**
		Alternate ($H2_A$)	0.67703	0.0510185	0.4984	Insignificant	Rejected
	PU_BD -->ITU_BD	Null ($H2_0$)					**Accepted**
		Alternate ($H2_A$)	1.2744	0.0987181	0.2025	Insignificant	Rejected
	PU_BC -->ITU_BC	Null ($H2_0$)					**Accepted**
		Alternate ($H2_A$)	0.74675	0.0587028	0.4552	Insignificant	Rejected
	PU_CC -->ITU_CC	Null ($H2_0$)					Rejected
		Alternate ($H2_A$)	4.2688	0.3342134	**1.97E-05**	**Statistically Significant**	**Accepted**
	PU_FG -->ITU_FG	Null ($H2_0$)					**Accepted**
		Alternate ($H2_A$)	1.0004	0.0757775	0.3171	Insignificant	Rejected
	PU_IoT -->ITU_IoT	Null ($H2_0$)					**Accepted**
		Alternate ($H2_A$)	0.08433	0.0065714	0.9328	Insignificant	Rejected

Research Question	Correlation	Hypothesis Type	Z-Value	tau (Ƭ)	P-Value	Hypothesis Result	Decision
RQ3 (What is the relationship between the organizational leaders' Perceived Ease of Use (PEOU) of the fourth industrial revolution technologies and the leaders' Intention to Use (ITU) the technologies?)	PEOU_AI ->ITU_AI	Null ($H3_0$)					**Accepted**
		Alternate ($H3_A$)	0.59474	0.045596	0.552	Insignificant	Rejected
	PEOU_BD ->ITU_BD	Null ($H3_0$)					**Accepted**
		Alternate ($H3_A$)	0.18825	0.0145997	0.8507	Insignificant	Rejected
	PEOU_BC ->ITU_BC	Null ($H3_0$)					**Accepted**
		Alternate ($H3_A$)	0.25371	0.0198619	0.7997	Insignificant	Rejected
	PEOU_CC ->ITU_CC	Null ($H3_0$)					Rejected
		Alternate ($H3_A$)	3.4767	0.270338	**0.0005076**	**Statistically Significant**	**Accepted**
	PEOU_FG ->ITU_FG	Null ($H3_0$)					Rejected
		Alternate ($H3_A$)	3.9534	0.2988926	**7.71E-05**	**Statistically Significant**	**Accepted**
	PEOU_IoT ->ITU_IoT	Null ($H3_0$)					**Accepted**
		Alternate ($H3_A$)	1.2202	0.0948238	0.2224	Insignificant	Rejected

Theoretical and Practical Implications

The practical implication of the positive and statistically significant results mentioned is that businesses need to start engaging stakeholders by sensitizing them on the importance of the use of Cloud Computing and 5G Wireless Network technologies. Failure to do so would mean that organizational leaders would refuse to deploy new technologies that would benefit businesses. The non-statistically significant results make it difficult to know the true perceptions of the organizational leaders. It is very important to first of all establish that organizational leaders' Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) have impacts on the leaders' Intention to Use (ITU) the technologies before proffering any real-world solutions. Consequently, it is recommended that researchers repeat the study at another time to see if there could be different results from the ones found in the current study as it is possible that the knowledge about the technologies could have increased and consequently influenced the organizational leaders' acceptance of the technologies

Research Limitations and Assumptions

Limitations

- Although, the research population was narrowed to only American employees who occupied leadership positions in their various organizations, the population selected is still considered to be too broad. It is strongly recommended that future researchers narrow the population to leaders from specific industries such as telecommunications, oil and gas, health, and banking.

- Regardless of the acceptable value of the Cronbach's Alpha achieved, the survey instrument was still found to be less than optimum when evaluated using Confirmatory Factor Analysis (CFA). The CFA results in Table 5 indicate the survey instrument has internal inconsistencies that could affect the accuracy of the results.

Assumptions

- Survey participants would respond to each question truthfully

- The survey instrument would accurately measure the Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and the Intention to Use (ITU) the technologies

- Survey respondents would be organizational leaders who truly worked with companies within the United States of America

Recommendations for Action

Future research could include the replication of the study to include the impact of the age of the participants on the participants' Intention to Use new technologies and in different geographical locations. The study could help decision makers prepare for any form of oppositions that might erupt from organizational leaders in the process of migrating to new technologies. Organizational leaders might use the study as a reference when developing guidelines for implementing the fourth industrial revolution technologies initiatives. It is strongly recommended that technology industry experts who already understand the great benefits of the fourth industrial revolution technologies create more awareness about the benefits and the importance of adopting new technologies.

Conclusion

Although the emergence of the Fourth Industrial Revolution Technologies comes along with different fears and concerns, organizational leaders and other industry stakeholders should consider mitigating the challenges that come along with the new technologies instead of rejecting the technologies because the future belongs to only businesses that adopt new technologies. The integration of the Fourth Industrial Revolution Technologies (Artificial Intelligence, Big Data, Blockchain, Cloud Computing, Fifth Generation (5G) Networks, and the Internet of Things) into the existing business processes should be done in a way that keeps organizational disruption to a minimum.

References

Althuizen, N. (2018). Using structural technology acceptance models to segment intended users of a new technology: Propositions and an empirical illustration. *Information Systems Journal*, *28*(5), 879–904.

Arvie, D., & Tanaamah, A. R. (2019). Technology acceptance model for evaluating IT of online based transportation acceptance: a case of GO-JEK in Salatiga. *Telkomnika*, *17*(2), 667–675

Baig, A.; Brown, J.S.; Forrest,W.; Vinayak, H.; Hjartar, K. and Yee, L. (2023). Where IsTech Going in 2023? https://hbr.org/2023/01/where-is-tech-going-in-2023. *Harvard Business Publishing*

Bayraktaroglu, S., Kahya, V., Atay, E., & Ilhan, H. (2019). Application of expanded technology acceptance model for enhancing the HRIS usage in SMEs. *International Journal of Applied Management & Technology,* 18(1), 48–66.

Bevans, R. (2022). *Understanding P-values | Definition and Examples.* Scribbr. https://www.scribbr.com/statistics/p-value/

Bhandari, P. (2022). *Questionnaire Design | Methods, Question Types & Examples.* Scribbr. https://www.scribbr.com/methodology/questionnaire/

Center for Creative Leadership (2021). What Are the Characteristics of a Good Leader? https://www.ccl.org/articles/leading-effectively-articles/characteristics-good-leader/

Cisar, P., & Maravic Cisar, S. (2019). Security aspects of 5G mobile networks. *Annals of the Faculty of Engineering Hunedoara - International Journal of Engineering*, *17*(4), 137–143.

Da Silva Momo, F., Sordi Schiavi, G., Behr, A., & Lucena, P. (2019). Business modelsand blockchain: What can change? *RAC - Revista de Administração Contemporânea*, *23*(2), 228–248.

Davis F. D., Venkatesh V. (1996). A critical assessment of potential measurement biases in the technology acceptance model: Three experiments. *International Journal of Human-Computer Studies*. ;45(1):19–45. https://doi.org/10.1006/ijhc.1996.0040.

DiGiuseppe, R., David, D., & Venezia, R. (2016). Cognitive theories. In J. C. Norcross, G. R., VandenBos, D. K. Freedheim, & B. O. Olatunji (Eds.), *APA handbook of clinical psychology: Theory and research* (pp. 145–182). American Psychological Association. https://doi.org/10.1037/14773-006

Diop, E. B., Zhao, S., & Duy, T. V. (2019). An extension of the technology acceptance model for understanding travelers' adoption of variable message signs.*PLoS ONE*, *14*(4),1-17.

Emler, N. (2019). Seven moral challenges of leadership. *Consulting Psychology Journal: Practice and Research*

Enfroy, A. (2021). 11 Leadership Qualities: A List of Skills to Make a Good Leader. https://www.adamenfroy.com/leadership-qualities

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analysis using G*Power 3.1: Tests for correlation and regression analysis. *Behavior Research Methods, 41*, 1149-1160. doi:10.3758/BRM.41.4.1149

Field, A. (2013). *Discovering statistics using IBM SPSS statistics.* Thousand Oaks, CA: Sage Publications.

Garbuio, M., & Lin, N. (2019). Artificial intelligence as a growth engine for health care Startups: Emerging business models. *California Management Review*, *61*(2), 59–83.

Grover, V., Chiang, R. H. L., Liang, T.-P., & Zhang, D. (2018). Creating strategic business value from big data analytics: A research framework. *Journal of Management Information Systems*, *35*(2), 388–423.

Haenlein, M., & Kaplan, A. (2019). A brief history of artificial intelligence: On the past, present, and future of artificial intelligence. *California Management Review*, 61(4), 5–14.

Hair, J. F., Black, W C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate Data Analysis*. 7th Edition, Pearson, New York.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate data analysis (7th ed.). Essex, Pearson Education Limited.

Hu, L.T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6,* 1-55.

Kelley, K. H., Fontanetta, L. M., Heintzman, M., & Pereira, N. (2018). Artificial intelligence:

Implications for social inflation and insurance. *Risk Management & Insurance Review*, *21*(3), 373–387.

Khalifa, E. (2019). Blockchain: Technological revolution in business and administration. *American Journal of Management*, *19*(2), 40–46.

Koul, S., & Eydgahi, A. (2018). Utilizing technology acceptance model (TAM) for driverless car technology adoption. *Journal of Technology Management & Innovation*, *13*(4), 37–46.

Lee, C., Kriscenski, J., & Lim, H. (2019). An empirical study of behavioral intention to use blockchain technology. Journal of International Business Disciplines, 14 (1).

Mahmod, S. A. (2017). 5G Wireless technologies- Future generation communication Technologies. *International Journal of Computing and Digital Systems. 6* (3).

Marr, B. (2018). *What is industry 4.0? Here's a super easy explanation for anyone*. https://www.forbes.com/sites/bernardmarr/2018/09/02/what-is-industry-4-0-heres-a-super-easy-explanation-for-anyone/#2842d76b9788

Mosteanu, N. R. (2019). International financial markets face to face with artificial intelligence and digital era. *Theoretical & Applied Economics*, *26*(3), 123–134.

Paraschiv, A. M., & Danubianu, M. (2019). BIG DATA - Present opportunities and challenges. *BRAIN: Broad Research in Artificial Intelligence & Neuroscience*, *10*, 15–21.

Pise, V. H. (2019). Cloud computing - Recent trends in information technology. *ANWESH: International Journal of Management & Information Technology*, *4*(1), 27–29.

Primasari, D., Sudjono, & Abriani, N. (2019). The implementation of e-commerce system by the theoretical approach of technology acceptance model: An empirical study in banyumas, indonesia. *Economy Transdisciplinarity Cognition*, *22*(2), 89–94.

Sethi, P. & Sarangi, S. (2017). Internet of things: Architectures, protocols, and applications. *Journal of Electrical and Computer Engineering*. 1-25. Doi:10.1155/2017/9324035.

Sevim, N., Yuncu, D., & Erogluhall, E. (2017). Analysis of the extended technology acceptance model in online travel products. *Journal of Internet Applications & Management / İnternet Uygulamaları ve Yönetimi Dergisi*, *8*(2), 45–61.

Sonderen, E. v., Sanderman, R., & Coyne, J. C. (2013). Ineffectiveness of reverse wording of reverse wording of questionnaire items; let's learn from cows in the rain. Plos One, 8(9). doi:10.1371/annotation/af78b324-7b44-4f89-b932-e851fe04a8e5

Steiger, J. H. (2007). Understanding the limitations of global fit assessment in structural equation modeling. *Personality and Individual Differences, 42,* 893-98.

Sujatha, R., & Sekkizhar, J. (2019). Determinants of m-commerce adoption in India using technology acceptance model infused with Innovation Diffusion Theory. *Journal of Management Research*. *19* (3), 193-204.

SurveyMonkey (2021). Margin of error calculator. https://www.surveymonkey.com/mp/margin-of-error-calculator/

Tracy, B. (2021). 7 Leadership Qualities, Attributes & Characteristics of Good Leaders. https://www.briantracy.com/blog/leadership-success/the-seven-leadership-qualities-of-great-leaders-strategic-planning/

World Economic Forum (2018). How technology can transform leadership – for the good of employees. https://www.weforum.org/agenda/2018/03/how-technology-can-transform-business-performance-for-human-good/

World Economic Forum (2021). The fourth industrial revolution: What it means, how to respond. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

Xu, M., David, M., Jeanne, Suk, H. (2018). The fourth industrial revolution: Opportunities and challenges. *International Journal of Financial Research*.

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