TIM Journal

International Journal of Technology, Innovation and Management

Volume.1, Issue.1, 2021

Editors-in-Chief
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Global Academic Forum on Technology, Innovation and Management

gaftim.com

Online at: https://journals.gaftim.com/index.php/ijtim/issue/view/1

EDITORIAL

The academic world is growing rapidly but still it's an everyday requirement to introduce more and more literature, not only for the academic's persons but also for the organizations and industries for practical implication. Introducing a journal in such a competitive world is a real challenge which comes along with many questions that need to be answered. This is the exact purpose of International Journal of Technology, Innovation and Management (IJTIM). IJTIM covers all articles related to the subjects of organizational strategies. That includes technology and innovation. IJTIM aims to deliver the message and answers the organizational questions where in a recession period organizations struggle to survive. Also, not only in recession but due to perfect competition market, only those organizations survive who keep up with innovation. Innovation is not only a matter of technology but also, a very main result-oriented factor in strategies. One of the main reason for organizational failure is only focusing on customers and not fulfilling the needs of its very own employees. When employees are silenced that's when the organizations are destined to doom.

To let organizations figuring out the cause of their failures and their recovery options,

IJTIM is here to help. Apart from organizations, IJTIM is also serving the academic world, where researchers are participating in generating new ideas every day. IJTIM is providing a platform and a stage to all those researchers and academics to voice their ideas. IJTIM is also for those who are just here as the audience.

IJTIM aims to provide world class scholarly articles to readers whether they belong to businesses or academics, this promise is fulfilled through peer-reviewing process of each article with same level of quality and criteria. These services are provided by world class doctoral scholars in our editorial board. IJTIM has editors from more than 10 countries around the globe, and all these members are highly qualified in their very own specialized field.

The inaugural volume of IJTIM includes six articles. The main concept of these articles is organizational betterment and improvement through their management skills for employees and quality assurance for the customers. Two articles are based on quality assurance and maintenance and its importance. Whereas one article is solely based on management skills and

improvement of organizations. Each article has chosen a unique industry to have a diversity. Like banking industry, hotel industry etc. Two articles are based on internet usage and its safety.

This versatile range of articles being published in the first volume is proof that IJTIM is aimed for high achievements. But the team of IJTIM is highly motivated to make sure that IJTIM achieves great results and reader and viewership within its first year. This can only be done, if the quality of articles is not being compromised at any cost.

IJTIM appreciates all the support that it is receiving from its members as well as from its readers.

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The Impact of Information Sharing and Quality Assurance on Customer Service at UAE Banking Sector

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Abstract

In the present competitive market, information sharing and quality assurance are both needed for client support. This relationship was set up through a quantitative examination study. The information was gathered utilizing the poll strategy, and the discoveries uncovered that, despite options, banks are continually enticed to bundle item contributions to draw in clients. This appeal stems exclusively from the arrangement of excellent administrations. At last, ideas are made for additional improvement to remain competitive in the monetary market.

Keywords: Quality assurance, information sharing, customer services, banking industry

Introduction

Information sharing has become a vital part of successful organizations. The exchange of data between technologies, people, and within an organization or outside organization is called information sharing [1]. Information sharing can be divided into different types, such as when an individual shares some information, for example, on social media platforms (Facebook, Instagram, YouTube, etc.). Another type can be the information shared by an organization through different methods, for example, using RSS feed to share information about the weather [2]. The objective of value affirmation is to ceaselessly work on the item or administration's quality, including increasing present expectations for fulfilling new quality guidelines by raising the general quality principles of the organization's item. It might likewise involve working on the cycle to work on the item or administration's quality [3].

Quality assurance is the efforts put by an organization or body to ensure that the services or products offered to the customers are of the best possible quality and meet the organization's standards [4]. The objective of quality assurance is to consistently improve the quality of the product or service, including improving the overall quality standards of the company’s product by raising the general quality norms of the organization's item. Also, it can include improving the process to improve the quality of the product or service [5].

Customer service is a professional act of delighting customers by satisfying their needs by providing the best quality services on time. It should be an ongoing process and improves gradually [6].

In terms of the banking industry and banks such as ADIB, quality assurance plays an important role because the shared information should be of high quality. The bank can depend on it, and based on that, and shared information can take an effective and efficient decision.

Information Sharing

The robotized administration quality has improved since the web's appearance [7]. It has become mandatory for organizations to implement advanced technology to communicate effectively. Information sharing enables organizations to expedite their operations and bridge the services to reach the end customers through the internet, mobile banking, and ATMs. The operations quality has tremendously improved because it has provided ease in meeting the customers' daily needs [8]. As exchange level data is recorded and shared, the degree of control can be estimated by the quantity of exchanges. Thus, data sharing is a critical factor in expanding consumer loyalty [8].

Quality Assurance

In the banking sector, quality assurance is always measured in terms of products and services offered by the bank in a timely manner [9]. Quality assurance determines the customer level of satisfaction which they perceive through transactions. Since in the financial market, the competition is higher, so banks need to market their product offering to distinguish [3]. It comes possible only when how the product is packaged because customers expect a complete package including bills payment, a complete record of transactions and balance, bank statements on a monthly and quarterly basis, easy installments and insurance policies, etc. because the services of the bank are highly intangible in nature, therefore; it provides edge to compete assuring high-quality standards to serve customers better [5].

Customer Service

The financial business serves an assorted scope of customers, from people to organizations. Banks place a high need on consumer loyalty, which is intensely dependent on quality affirmation measures and information sharing. Because quality assurance guarantees the probability of increasing the number of satisfied customers [10], the resulting efforts would be enhancement of word of positive mouth attitude towards services incase if there is any kind

of failure happens [11]. In the competitive era, the banks have understood that the way which is highly associated with satisfied customers, and it is possible only through information sharing and quality assurance [5].

Information Sharing

The exchange of data between technologies, people, and within an organization or outside organization is called information sharing [1]. The sharing information procedures and method of knowledge sharing in banking sectors provide a reliable source of connectivity with industries and stakeholders through relevant financial information of the sector. The information-sharing system also encourages managers to make quick decisions on time with significant proof of information to overcome the conflict that arises [12]. The banking system and procedures are the ongoing processes of operations where all banking departments are linked with financial departments of the government and private-public sectors. All relevant information could be circulating with specific time limits [3].

Quality Assurance

Quality assurance can be simply defined as efforts put by an organization or body to ensure that the services or products offered to the customers are of the best possible quality and meet the standards set by that organization [9]. The banking monetary area is quite possibly the most delicate and exact portions of the business, with no leeway in functional frameworks or client relations [13]. The little error in negative interaction creates the loss of stakeholders in the financial service organization. The little offense charges the customer is switching towards other banks or businesses elsewhere. Business organizations are investing their huge assets in employees training and development, especially the interaction with customers [2].

The need for training is for the employees to get involvement with customers, their interests, and the consistency of the relationship with the business. The banking sector also develops its employee's frontline management, especially with the interaction of the bank's customers [14]. Clients are the most important resource in the financial business,, and their satisfaction level is linked with the providing services and facilities from the banking procedures. Competitive policies attracting customers, face-to-face interaction, phone calls, internet banking, and other providing competitive services enhance the customer's satisfaction and retention towards the bank. The training of the employees in the banking system focuses on the soft skills of the interactions in which employees learn how to welcome customers with soft smiles and gestures [5].

Customer Service

In simple terms, customer service is defined as a professional act of delighting customers through satisfying their needs by providing the best quality services in a timely manner [10]. It should be an ongoing process and improves gradually.

Problem Statement

Client care has gotten a great deal of consideration in the financial business. Be that as it may, most of these examinations zeroed in on a solitary country. Lasser et al. (2000), for instance, taken a gander at quality affirmation and fulfillment in private banking. Clients' impression of the nature of banks' administrations in the UAE were additionally looked at by Dash et al (2009). Obviously none of these investigations partitioned bank clients by sex, age, instruction, occupation, or geographic area (networks, regions, or locales). They just took a gander at what clients needed to say overall. However, a couple of studies zeroed in on a solitary country, like Caruana (2002), characterized bank clients by occupation, age, race, age, and instruction, none of them joined these factors (sexual orientation, age, schooling, and occupation) or gathered them by geographic area [15].

The flow study, specifically, adds to existing exploration on client care and quality affirmation. By suggesting the accompanying exploration conversation starters, it centers on the adequacy of vital assets in a brilliant policing setting:

RQ1: What are the various parts of policing quality affirmation that people in general sees and how would they influence client care?

RQ2: Which parts of shrewd policing greatest affect client support?

RQ3: Which aspects of quality assurance have the UAE banks demonstrated?

RQ4: What is the relationship between quality assurance dimensions and overall customer service?

RQ5: What factors have had the greatest impact on the level of quality assurance in UAE banks?

Literature Review

As indicated by [16], the information sharing system in the banking sector impacts quality assurance as it is one of the components that is handling and managing entire business banking operations within the timeline and accuracy of the data. The information-sharing procedure implementations in the banking sector help to operate functional properties of the financial sector develop risk management assessments on time. The information-sharing system in the banking sector integrates with information technology and digitalization that provides the interlinked relationship between information sharing and risk management. The

entire operational activities in the banking system increase the financial performance and its positive impacts on risk management policies. The worldwide economy and banking area are changing their tasks with the digital time zone to provide effective and reliable information to the customers through direct connectivity with the banking linkages [17].

The information-sharing system of the banking sectors revitalized their functional strategies through digital applications and achieved desired goals. [6] stated that sharing information has a link with customer service improvement because the procedure of banking operations facilitates customers for their asset management resources and provides all detailed information of the account statements through digital applications to aware with their possessions. The banking sectors provide the security of the financial outcomes through information sharing systems to the industries and stakeholders. They know about their all kind of transactions and ongoing in-out processes [3]. The whole financial framework on the planet is interconnected, with monetary availabilities working on a worldwide scale. The entire banking system provides the information sharing system of the transactions, cash, debit, loan, interest, and other financial activities. The entire banking financial operations are covering through technology implementations in which all functional properties covering through sharing of information procedures and circulate all required information to the specific departments of the banks [18].

The sharing information system in the banking sector not only providing financial asset management services to the customers. In fact, it is a tool to create risk management policies and them aware of the coming threats in business functions. The information-sharing system in the banking sector helps banks for coming risks. It creates arrangements and methodologies to address the dangers that are associated inside the particular time limit with a precision of the data [19].

As indicated by [4], quality assurance is one of the new introducing terms in the business industry responsible for evaluating all that measures related to providing services to the customers to get their satisfaction towards them the products. The quality assurance system recommends quality assurance service standards to banking sectors to operate functional procedures for best business practices, especially in customer retention [2]. Apart from other business industries, the banking and financial business industry adopted high-quality digital information methods to assure the quality services of the business in which they are managing best practices of possible solutions through mobile banking, mobile wallets, online services through applications, and digital connectivity around the world to assure the quality services and products [5].

These quality confirmation administrations are given by the banking and monetary ventures as per worldwide sub-principles and guidelines. The quality assurance in business industries and banking financial development sectors focusing on providing persistent and high-quality services to their customers. The key component of the business productivity and customer acquisition depends on the banks' quality assurance services that improve the customer's retention and lead the profit. Quality assurance is also providing end-to-end monitoring and evaluating the process of functional activities of the banking sector and increases the productivity of the business [20]. The planned activities to ensure quality assurance make the possibilities of the profitable business outcomes through its implementation. The systematic strategies that create quality assurance for products help understand better the banking system's complex and challenging business. The quality assurance working implementations ensure the customer's expectancies towards their banks and get satisfactory outcomes through their efficient services [21].

As per [22], customers' expectations and achievement are the banking departments' core purpose. Several banking industries are circulating in the market and providing effective banking facilities to their customers through digital processes. The competitive advantage in banking sectors is high, which is why all banking sectors are improving their quality assurance activities for customer retention. Quality assurance aims to get customer satisfaction in all manners by providing in and out services of banking procedures and providing detailed information of the customers' asset management through efficient sources. Customer satisfaction relies on the product and services provided by the banks to their stakeholders [23].

Quality assurance is handling and catering to customers' processes, and it is a strategy to create brand position and acquisition in the market. The quality assurance service practices help to enhance the bank's reputation and its reliability in the market. The quality assurance services provide the operations' management and help create cost-effective controlling strategies for the banking sectors [24]. Quality assurance not only implementing to get customer retention and loyalty; it is developing the reduced cost of the goods and improve the level of good quality services. The quality assurance productivity in the banking sector creates profitable revenues for financial sectors [25].

As indicated by [7], the relationship of how quality assurance improves the quality of service through information sharing. The entire business operations of the banking sector are handling by the technology software and equipment, and the only method is to attain the customer is the employee's body language, an expression that presents the interest of the bank towards its customers. The improved banking system depends on its financial customers and

banking sectors, emphasizing all technical skills involved to target the customers through product delivery and customer satisfaction interaction level through the bank staff. The customer services are started by entering the customer in branch and staff member would be ready to welcome them. The banking staff should acknowledge customers for their quire and provide easy and straight information of the process. The non-cooperative attitude of the staff member creates difficulty in understanding the procedures of banking information. The banking and finance department staff members should realize the customer interests and provide detailed sources of information most efficiently and accurately.

The staff member should be ready to provide truly care findings for customers' solutions and help them understand the technical banking information. The clear communication and personal skills of the banking and financial sector staff members help customers get knowledge in progressive ways. All banking information should be provided by explanations that could be easy to manage or understand for laymen. Several procedures are difficult to understand customers, especially in calculating the units and interest; the staff integration helps customers gain their interest to build their relationship through customer services [8].

Research Gap and Contribution

In the financial institutes, the banking sector is one of the major sectors with a long-range of customers. These customers expect service quality guaranteed by the banks, knowing that any loophole will cause switching behavior among the customers. Quality assurance and information sharing are the two major factors that influence customer service level because it has become mandatory to be competitive. Also, studies have shown that the bank's performance is highly dependent on the availability of information-sharing resources and quality assurance, which positively enhances the customer service base.

UAE Banking Industry

The objective of this exploration is to investigate the UAE's financial area and perceive that it is so ready to join the worldwide monetary framework. The little UAE banking area was served by 21 homegrown and 25 unfamiliar banks starting at 2005, demonstrating that the UAE banking area is exceptionally divided. Over 90% of complete homegrown resources are held by banks fused in Abu Dhabi and Dubai, with the absolute separated uniformly between Abu Dhabi and Dubai banks. Unfamiliar banks had restricted market access since they were just permitted to open up to eight branches all through the advanced financial activity (1980-2003) [7].

Notwithstanding, laws were changed in 2003, and banks are presently allowed to open in excess of eight branches with unique consent. At the point when it came to opening a

delegate office, notwithstanding, unfamiliar banks had no issues. There were 36 delegate workplaces across the emirates toward the finish of 2004. Subsequently, the UAE has been all around addressed by a different gathering of global banks. The customary financial area (barring Islamic banks) is administered by Federal Law 10, which was sanctioned in 1980, and Islamic banking is represented by Federal Law 6, which was ordered in 1985. The UAE banking area actually has a little Islamic financial area. Banks are restricted from charging a proper financing cost on stores or credits under Islamic financial laws. The establishment of Islamic banking is variable loan fees dependent on a benefit/misfortune sharing model. The Central Bank of the UAE was additionally settled under Federal Law 10, and it assumed control over the obligations of the Currency Board [16].

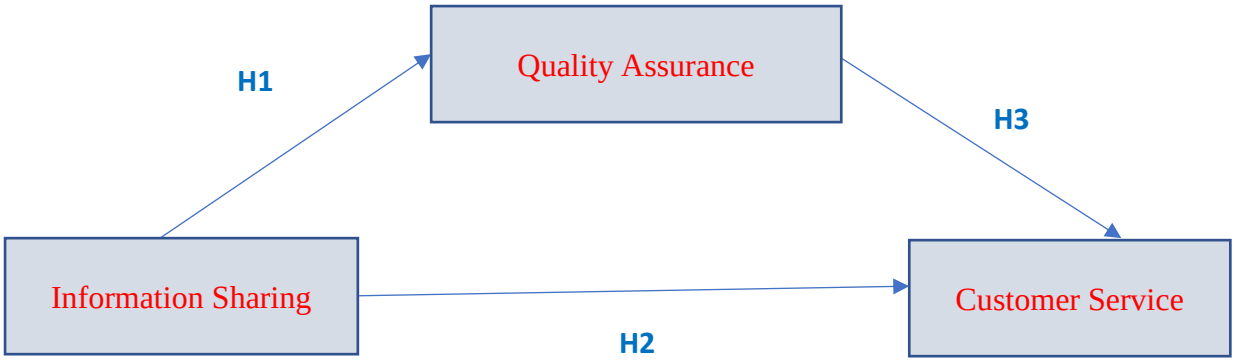
The bank's liabilities incorporate giving money related and monetary counsel to the public authority, giving cash, keeping up with gold and unfamiliar money holds, and fostering a credit strategy. The Central Bank is responsible for all administrative and administrative capacities. Since the UAE money is fixed to the US dollar, the national bank plays a restricted part in financial arrangement and loan fee control; in any case, it practices some money related and credit controls through the deal and acquisition of endorsements of stores. The national bank is associated with credit strategy plan and checking, just as monetary area management.

The national bank licenses all business banks joined in the UAE, and they are accordingly dependent upon the national bank's necessities and guidelines. The national bank ordered that all banks utilize International Accounting Standards (IAS) in 1998, and nearby banks were advised to build up clear corporate constructions in mid-1999. The UAE national bank likewise commands that banks keep a funding to-chance weighted-resources proportion of basically 10% consistently. All banks should be as indicated by UAE Central Bank guidelines. The difficulties that the UAE banking area is confronting are relied upon to endure for the following 18 to two years, with property showcases especially Dubai, proceeding to show a descending pattern in costs and rental yields. Project workers, building material providers, more modest engineers, and high-total assets people with openness to these areas will all endure because of the housing business sector's troubles.

Confronted with the monetary slump, various secretly held organizations, including family combinations, will rebuild their unique credits and advances with longer terms and lower loan fees. Different elements, for example, an increment in the proportion of nonperforming credits, could be set off by the rising number of rethought advances, which could caution market onlookers and bank valuators since they could adversely affect bank productivity. They should likewise be enlisted with the Federal Ministry of Economy and Trade

as a "Shareholding Company" as characterized by the UAE Companies Law. (Joined Arab Emirates Central Bank, 2005).

Research Model



Research Hypotheses

H_{O1}: Information Sharing has no statistical impact on Quality Assurance in the Banking sector in Dubai at ($\alpha \leq 0.05$)
H_{O2}: Information Sharing has no statistical impact on Customer Service in Banking sector in Dubai at ($\alpha \leq 0.05$) level.
H_{O3}: Quality Assurance has no statistical impact on Customer Service in the Banking sector in Dubai at ($\alpha \leq 0.05$) level.

Methodology and Research Design

The proposed research methodology for this research report is the quantitative research design. We chose this research study because we were interested in collecting data and then analyzing it through hypothesis testing, which is very much likely to be done through statistical analysis. There were two sorts of inquiries in the study: (1) close ended inquiries, which required the respondent to browse a rundown of alternatives; and open-ended inquiries, which required the respondent to look over a rundown of choices. (2) scaled-reaction questions, which are shut finished inquiries with a rating scale to survey reaction alternatives (five-point Likert scale).

Every one of the four areas of the poll tended to at least one components of interest. The principal segment managed the socioeconomics of the association all in all. The subsequent segment focused on financial experience. The third segment zeroed in on assessing basic achievement factors and the criticality of all key achievement factors got from the writing. To take out predisposition and meet the rules needed by the logical techniques utilized, a huge

and satisfactory example size was taken to guarantee that the information gathered would give a dependable premise to drawing deductions, making proposals, and supporting choices (Bryman and Cramer, 1996). Bryman and associates, then again, underline that the example size should be relative to the size of the populace. They likewise accept that the bigger the example size, the more exact the outcomes will be.

The option is to gather information from a couple of individuals in the gathering, with their reactions and qualities mirroring those of the gathering from which they were drawn. This strategy is significantly less costly, quicker, and simpler than surveying all individuals from a gathering, and it is broadly utilized in research. To accomplish the investigation's goals, quantitative examination philosophy was utilized. This is because of the way that this strategy can be utilized to create mathematical estimations and assessments of UAE banking reception. Study polls were utilized as a feature of the quantitative examination strategy to take into consideration the collection of the outcomes. On a 5-point likert scale, a survey was made. To quantify the factors and measurements of the exploration, strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree were utilized.

Population and Sample

The population of the study is the banking sector of the UAE, including both private and public banks. There are 22 local and 30 foreign banks in the UAE. The sample is the banks in Dubai. A pilot study is required in light of the fact that it permits the analyst to get criticism from the members. Thusly, the scientist will actually want to decide whether the inquiries are hard to comprehend or then again in case they are one-sided or uncertain. Accordingly, respondents were approached to take part in a pilot study. Accordingly, all input was considered, and the poll was altered prior to being approved. The primary overview was dispersed to the planned populace after this stage was finished. The unit of analysis has been chosen by the managers working in the surveyed banks. We chose these banking sectors of their service quality, improving through gradual processes to ensure high customer services. The sampling technique for this study was convenient sampling which is the one type of non-random sampling technique. A proper 248 questionnaires were used for analysis.

Data Collection

There are many ways in data collection used by researchers to ensure high quality of research. There are two sources widely used for data collection.

Primary data source of collection: Surveys, observations, experiments, questionnaires, focus groups, interviews, and other primary data sources.

Secondary data source of collection: While secondary data sources include books, journals, articles, web pages, blogs, and other secondary data sources.

In our research study, we applied both data sources for the compilation of the report. The secondary data source was used to collect data from the literature on the two independent variables information, sharing, and quality assurance. Literature was also reviewed on the dependent variable that is customer services at the banking sector.

A questionnaire survey design method was used to collect data. Questions were distributed among the Emirates NBD bank employees, and within two days, data was collected and prepared for analysis. The validity and reliability of the data was checked for final analysis.

Reliability

A reliability test is a stable and consistent result that can be produced through assessment tools over time. A study can be measured to be reliable if its result produced under comparable methodology, which means study tool can be applicable and repeatable over time. Hence, this research has used Cronbach's alpha tool, and the minimum reliability score to be accepted is 0.60. As shown in below table 1, the reliability tool has been tested two variables (dependent and independent factors) and each variable and its dimensions through the measurement instrument. The reliability scores for Quality Assurance, Information Sharing, and Customer Service and its dimensions showed strongly significant, where Cronbach's alpha value was above (0.60) for all variables, which indicates that the items are internally consistent for each dimension.

Table 1 Cronbach's Alpha Coefficient for Study variables

Construct	Cronbach's Alpha
Information Sharing	0.761
Quality Assurance	0.872
Customer Service	0.783

Data Analysis

The questionnaire of the study, which was distributed to 22 different bank branches in Fujairah, has been given to a number of academic and industrial experts to review. All comments have been taken into serious consideration and adapted before it distributed. All received questionnaires were checked for validity. A 220 valid Questionnaire and the data were investigated and examined through statistical and analytical package (SPSS) in order to test the relationship, and the impact of Information System Capabilities, Quality Assurance on Customer Service, descriptive statistic, correlation, and regression analysis, and ANOVA analysis were conducted to obtain the results.

Descriptive Analysis

Descriptive analysis and statistics are ways used for studying data and responsiveness of respondents about research variables that help in describing and summarizing the information into a meaningful. As showed in Table 2 the importance for each construct of the study indicating significant value, as all means and standard deviation refer to accepted values.

Table 2 Descriptive Statistics for Study variables

Construct	Mean	Std. Deviation	Variance
Information Sharing	3.751	.88138	.971
Quality Assurance	3.562	.72636	.784
Customer Service	3.749	.91981	.891

Hypotheses Testing

Table 3 illustrates the results of Correlation, ANOVA, and Regression analysis to Quality Assurance in Information Sharing, and it described the significant relationship between Customer Service in Information Sharing where the correlation (r) is (0.588). The determinant coefficient is (0.346), which means that (0.346) changeability in the Quality Assurance is explained by the changeability in Information Sharing.

Table 3 Correlation, ANOVA and Regression analysis to Quality Assurance in Information Sharing

	r	r^2	F	DF	Sig*	β		t	Sig*
Quality Assurance	.588	.346	26.368	1 247 248	.000	Information Sharing	0.621	4.016	0.000

* level of significance (α≤0.05) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of Information Sharing on Quality Assurance at beta is (0.621) confirmed by (t) is (4.016) and (f) is (26.368) and all values are significant at (α≤0.05) level. This evidence supports the first hypothesis which prove the impact of Information Sharing on Quality Assurance.

Table 4 illustrate the results of Correlation, ANOVA and Regression analysis to Customer Service in Information Sharing, it described significant relationship between Customer Service in Information Sharing where the correlation (r) is (0.549). The determinant coefficient is (0.301) which means that (0. 301) changeability in the Customer Service is explained by the changeability in Information Sharing.

Table 4 Correlation, ANOVA and Regression analysis to Customer Service in Information Sharing

	r	r^2	F	DF	Sig*	β		t	Sig*
Customer Service	.549	.301	18.798	1 258 259	.000	Information Sharing	0.519	3.173	0.001

* level of significance (α≤0.05) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is an impact of Information Sharing on Customer Service at beta is (0.519) confirmed by (t) is (3.173) and (f) is (18.798) and all values are significant at (α≤0.05) level. This evidence supports the second hypothesis, which proves the impact of Information Sharing on Customer Service.

Table 5 illustrates the results of Correlation, ANOVA, and Regression analysis to Customer Service in Quality Assurance. It described a significant relationship between Customer Service in Information Sharing and Quality Assurance where the correlation (r) is (0.491). The determinant coefficient is (0.241), which means that (0.241) changeability in the Customer Service is explained by the changeability in Quality Assurance.

Table 5 Correlation, ANOVA and Regression analysis to Customer Service in Quality Assurance

	r	r^2	F	DF	Sig*	β		t	Sig*
Customer Service	.491	.241	13.836	1 258 259	.000	Quality Assurance	0.348	2.856	0.002

* level of significance (α≤0.05) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is an impact of Quality Assurance on Customer Service at beta is (0.348), confirmed by (t) is (2.856) and (f) is (13.836), and all values are significant at (α≤0.05) level. This evidence supports the third hypothesis, which proves the impact of Quality Assurance on Customer Service.

Discussion of the Results

The results showed that information sharing of the 5-stars hotels in Dubai lead to more quality assurance, coefficient of determination (0.346), correlation coefficient (0.588), ANOVA results (t=4.016), and regression results (f=26.368) are significant at (a£0.05), all prove the first alternative hypothesis which stated that Information sharing has a statistical impact on Quality assurance in 5-stars hotels in Dubai at (a£0.05).

Whereas the results refer that information sharing of the 5-stars hotels in Dubai lead to organizational Customer Service, coefficient of determination (0.301), correlation coefficient (0.549), ANOVA results (t=3.173), and regression results (f=18.798) are significant at (a£0.05), all prove the first alternative hypothesis which stated that Information sharing has no statistical impact on Customer Service in 5-stars hotels in Dubai at (a£0.05).

Moreover, The results indicated that quality assurance of the 5-stars hotels in Dubai leads to organizational Customer Service, coefficient of determination (0.241), correlation coefficient (0.491), ANOVA results (t=2.856), and regression results (f=13.836) are significant at (a£0.05), all prove the first alternative hypothesis which stated that Quality assurance has no statistical impact on Customer Service in 5-stars hotels in Dubai at (a£0.05).

Through questionnaire analysis, we have come to know that information sharing and quality assurance both go hand in hand because if the shared information is of quality only then, it will be possible for the organization's customer service department to serve the customers appropriately and to resolve the issue being faced by the customer. When it comes to a bank's customer service, the application of information sharing and quality assurance was made by ADIB as the bank faced several issues when it came to sharing information and the quality of shared information. There was no proper coordination between the IT department and customer service in the bank, which caused several issues. For example, when a customer complained to the customer service about any issue they faced with online banking or mobile

banking, the customer service could not help immediately because of a lack of quality assurance in information sharing [26].

The customer service could not immediately solve the problem or get back to the customer in due time as the IT department and customer service was not on the same page. The information shared between these two departments was not of high quality or reliable, which confused both the departments and hence the problem. Therefore, ADIB bank applied quality assurance (QA) in information sharing to achieve healthy results between the customer service department and the IT department to solve or resolve the issues faced by customers [16].

The application of quality assurance in the information sharing between the departments in ADIB bank has improved the overall results of the customer service department as the department can now resolve customer's issues efficiently and quickly. If a customer is not receiving SMS for mobile banking services, the customer service department can immediately contact the IT department and take up the issue. A complaint number is assigned when a customer registers any issue being followed up by the customer service department with the IT department to expedite the matter. This is one of the examples through which quality assurance in information sharing has improved the customer service in ADIB bank.

Conclusion and Recommendations

Based on the above analysis and results, below are some recommendations:

The banking industry is evolving day by day, and so will be the technology. Therefore, the customer service department must be given periodic training to better understand the latest technology and to serve customers better. The banking sector needs to make sure that the their intra and inter related issues are resolved timely without any delays. The organizations only purpose is not to serve the customers but also to make sure that their employees are being accommodated in every possible way.

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Improving Internet Privacy, Data Protection and Security Concerns

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Abstract

IoT has continued to evolve over the years with a promise to provide the users with effective means to interact, communicate, transact and create strong relationship. The invention and the development of IoT have created benefits for many businesses and individuals. However, as the IoT continues to evolve and develop, it has been subjected to certain threats and vulnerabilities. The common vulnerabilities notable in IoT include the security, privacy and data protection concerns. These issues have not been addressed by many scholars thus necessitated the need for this research study. Therefor the research study was concerned with the developed of a new IoT model that can enhance the security and privacy of the users of the IoT. The results indicate that the new model can be effective in addressing the needs of the IoT users. However, it noted that future research studies are still needed to improve the performance of the IoT security models.

Keywords: Internet of Things, Privacy, Data, Security Concerns, Users, Threats. Cyber.

Introduction

The current global environment is characterized with the rapid growth in the Internet of Things. The Internet of Things (IOT) have changed the way people communicate do business, work, interact, educate, and transact with each other. Although the rapid growth in IoT has been beneficial to many individuals and businesses, it has been subjected to certain challenges that affect its effectiveness in meeting the established goals [1]. Internet of things was initially developed to help connect the globe to an internet platform. Since its introduction, millions of businesses, individuals, and other devices have been connected via IoT [41]. This shows that it has been a

major technological innovation that has shaped the global business landscape. Many of the current research studies have exposed that the IoT has many vulnerabilities that has compromised its usage in many areas [42]. Currently, the IoT technology is synonymous among many industries that are making significant attempt to gain a competive edge in the market. A research study by [2] shows that the major threat for the application of IoT is the privacy issue. It is a concern for many of the information technology experts to come up with an appropriate technology to address the issue of the privacy. The other study on IoT vulnerabilities indicated that it is critical to design an appropriate IoT infrastructure that can improve the data protection of individuals [41]. The effectiveness of the IoT relies on its ability to protect the data of users. In particular, the protection of data and information that are personal and confidential to users should be apriority to the software developers. The software developers should ensure that they come up with appropriate design that can enhance the security of the internet users [43].

The popularity of IoT has rapidly increased over the past decades since these technologies are used to serve various purposes such as transportation, communication, business development, and education. According to [43], IoT introduced the concept of hyperconnectivity, which implies the individuals and businesses are able to communicate with each other effortlessly from remote places. IoT was initially invented in 199 for the primary purpose of promoting the concept of Radio Frequency Identification (RFID), which included the embedded actuators and sensors. However, the original concept of the IoT was introduced during 1960s and was initially referred to as the embedded Internet or pervasive computing [44]. The IoT concept was introduced to enhance the supply chain processes and activities. However, the growth in diverse functionality and applications of IoT has helped achieve the strong popularity in 2010. As the concept of IoT continues to expand and gain popularity globally, many countries accepted its implementation as a means to achieve a competitive edge in the market. As an example, the government of China gave the strategic priority on the development of IoT and introduced a five-year expansion plan. The massive explosion of IoT started in 2011 with the introduction of devices that include the smart-energy meters, wearable devices and home automation [45]. This rapid development of IoT has benefitted many organizations across different industries in various ways. In addition, it has helped improve and support the business strategies and market research. Similarly, IoT has helped enhance the individual's lifestyles through the introduction of automated services. However, the uncontrolled expansion of the IoT has comprised its privacy and security [43].

Various activities such as failure to change passwords, unconscious us, and lack of device updates has typical increased the risks of cybersecurity and accessibility to malicious application in the IoT system's data. Such threats and intrusion in the IoT data system increases the likelihood of data breach and other security vulnerabilities. Majority of the security professionals argues that IoT is the vulnerable platform for cyberattacks because of the weak security policies and protocols [46]. Although several mechanisms have been implemented to protect the IoT system and devices from attacks, there is inappropriate documentation of the security guidelines. As a result, the end users might not be in a position to use the protected measures to counter the data attack. In essence, hackers have developed various types of malware to attack the IoT applications from 2008 [7]. In particular, they have designed the phishing techniques, which they use to provoke individuals or employees to share and reveal sensitive data and information. Thus, the personal devices and corporate workstations frequently face privacy and confidentiality violation due to the high profile risks [40]. If the manufacturers of the devices and security experts assess the cyber threats accurately, they can design and develop an efficient and effective protective system and mechanism to neutralize or prevent the cyber threats [43].

Theoretical Framework

The research is based on the theoretical framework that focuses on general framework architecture. The general framework architecture is designed to help in monitoring and surveillance of activities to address the issue of trust among the parties transacting via blockchain. The general framework was developed by [8] to reduce the threats and vulnerabilities regarding the internet of things. The research paper will meet most of the requirements of IoT systems and block technology by design appropriate architecture that combines the IoT and the block chain [47]. The main layers of the system architecture include devices, data, applications, security, integrity, IoT, SQL and program interface bbb. The framework developed for this research study follows the nomenclature of the International Electro-technical Commissions or the System Committee Acted Assisted Learning [9].

Operational Definitions

- IoT is used to refer to the Internet of Things
- Security refers to the threats in IoT

- Privacy refers to the confidentiality of the IoT users
- Data protection is the protection of data for the users of IoT

Industry description

The IoT industry is currently evolving fast to incorporate the changes in technology. Blockchain is emerging as a powerful industry that supports the operation of many firms and businesses across different sectors [10]. The emergence of blockchain as an innovative and disruptive technology has evidently helped revolutionize the information, communication and transactions [39]. Currently, there are several attempts and research studies aimed at integrating blockchain technology with IoT. The research thus considers various models that have been used to align the blockchain technology with the past and recommend the best model that can help improve the accuracy and accountability of the blockchain technology [11].

Literature Review

Several scholars have suggested that there exist various challenges of IoT that include spoofing attack and jamming as well as the unauthorized access, which can compromise the integrity of the user's data [12]. However, potential solutions that can help users to secure their IoT data can be designed and implemented [37]. The implementation of the various security and threat measures can prove effective in securing the IoT devices and applications. Accordingly, there are various privacy threats and vulnerabilities that have emerged over the past few decades and pose a significant threat in penetrating and attacking IoT devices and applications in organizations and businesses [13]. As a result, the organizations and businesses should deploy appropriate scanning and monitoring tools and techniques to for all their IoT applications and devices that can help in detecting any type of threats related to data privacy and attempt to mitigate the risk associated with breaching [38]. In essence, the traffic analyzers and interceptors help in the identification and investigation of the various cyber threats.

There are various research studies and services that have been conducted to identify the current trends in IoT security and threats [14]. The multiple applications, services and devices present certain attack vectors and challenges to different IoT devices and their applications. The existence of the various simulation tools, availability of several platforms, and presence of modelers to conform to the security protocol can help produce the protocol associated with the novel IoT privacy and security [15]. It is argued that the rapid progress and growth in the research associated with the IoT security and privacy has supported the research on appropriate IoT infrastructure that can protect the privacy and security of the users [16]. The aim is to ensure that the IoT devices and application succeed in serving individuals and businesses across the globe [48].

Although there are enormous benefits of IoT to the users, it is believed that there are several challenges attributed to its usage. The privacy risks and cyber security issues are the main concerns that have been cited by many scholars [17]. The two challenges are posing enormous threats and predicament to the majority of individuals and organizations in their attempt to conduct different

activities and obligations. The common high profile cyber-attacks are an indication of the vulnerabilities of the IoT applications and devices [18].

Problem statement & Research Gap & Research Contribution

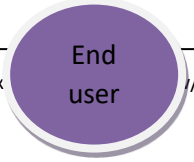
The main problem is to reduce the security vulnerabilities and threats of the IoT devices. It is important that IT professionals to develop appropriate IoT design that can effectively reduce the security vulnerabilities [19]. Currently, the rapid growth on the seucirity vulnerability exposes the firms to various threats that can affect their operation [20]. The contribution of the current research study plays an important role in enhancing the future design of the IoT infrastructure.

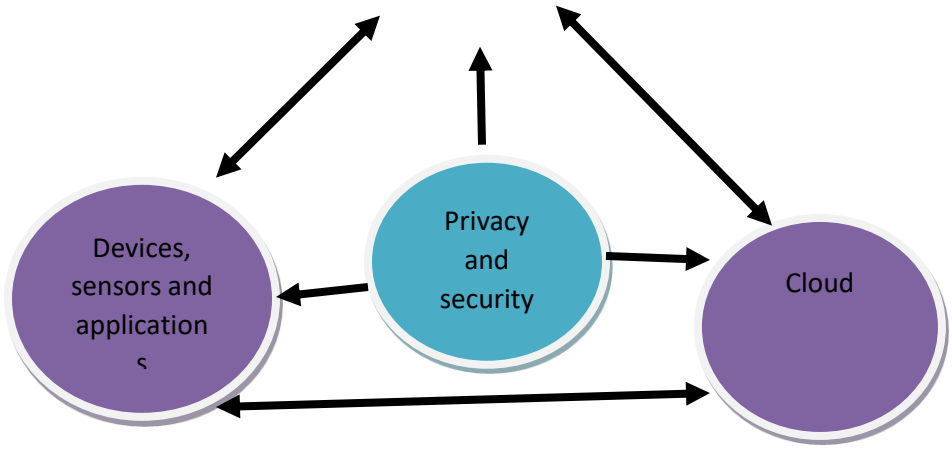
Research MODEL & Hypotheses

The research study emphasized on the two main models to help analyses the privacy and security of the IoT devices and applications [21]. The work proposes the new view of the IoT models that includes the generic and stretched. Both the proposed models have security and privacy components and the layers of separation and identification. The research is completed by building cloud or edge supported IoT application and system to help in the implementation of the proposed IoT models. The research starts by first introducing the generic and stretched models. It then describes the experimental set up as well as the implementation of the environment which primarily consists of the layered model implementation [22]. Lastly, the research presents and discusses the findings and results of the study. The research model is appropriate as it enables the assessment of the various privacy and security issues in the design of the IoT infrastructure.

The generic IoT layered data is the main perceptive of the research study. The generic architecture of the IoT model consists of a group of the wireless connection, cloud, devices, and end user layers [23]. In this model, the device layers include the pool of the internet-enabled sensor devices, communication protocols and data acquisition circuitry [36]. It also has the communication protocols that typically send the data and information to remote or local storage to enable further processing, removal of noise, data massaging, and feature extraction [24]. In addition, the devices allow for the real time collection of data and information using different frequencies of acquisition. The cloud layer typically hosts the data and information collected from the sensor [49]. The figure 1 below shows the generic layered model.

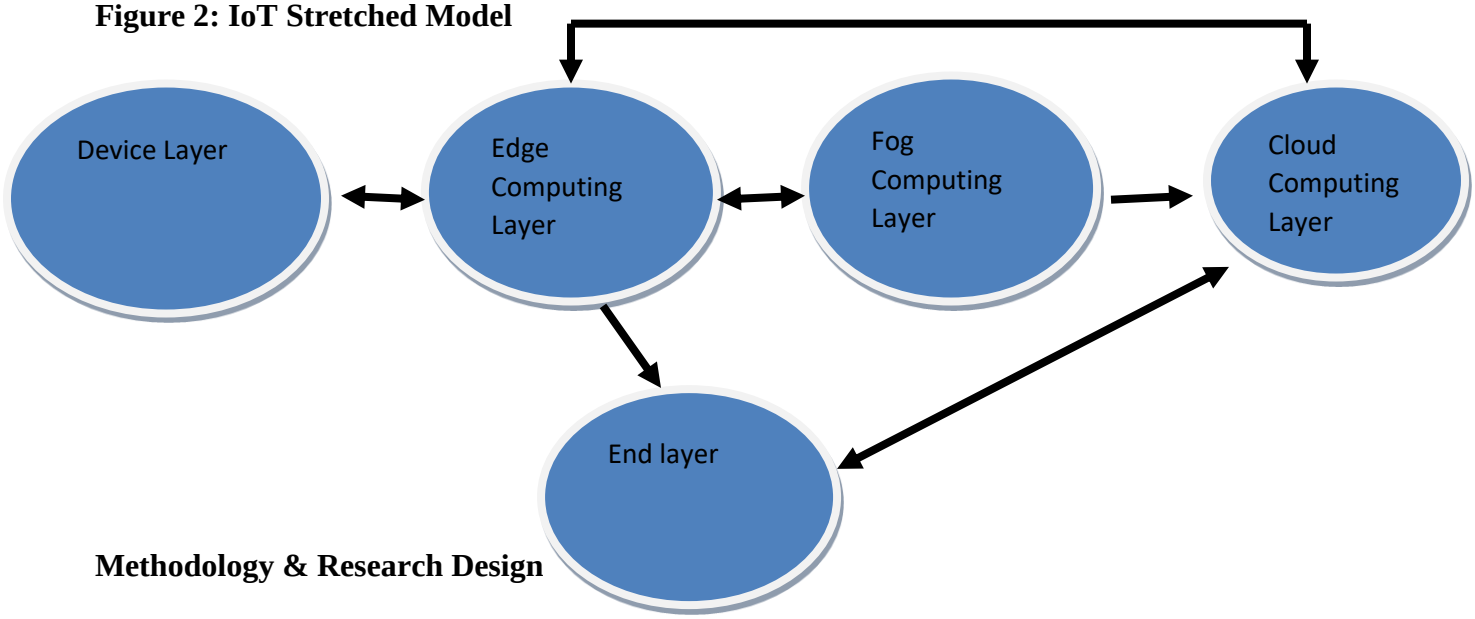
Figure 1: IoT Generic Layered Model





The stretched layered model is another IoT architecture proposed for this research study. The stretched layered model has the additional features to the generic layered model [25]. It is a stretched version of the generic layered model with additional features which include edge, new layers and fog [50]. The three layers can typically overcome and address the latency concerns due to the dependence on the cloud layer services and can make faster decisions [35]. The edge commuting basically occurs to the devices and applications attached to the sensors [26]. They can provide the real-time information, control and decisions to the data sources and also communicate with the other layers in order to transfer the collected data for fusion. It is also note that the fog computing layer moves the edge computing activities to a powerful computing resources connected to the local area network [27]. The added benefits on the model help improve the level of security and privacy issue on the IoT devices and applications.

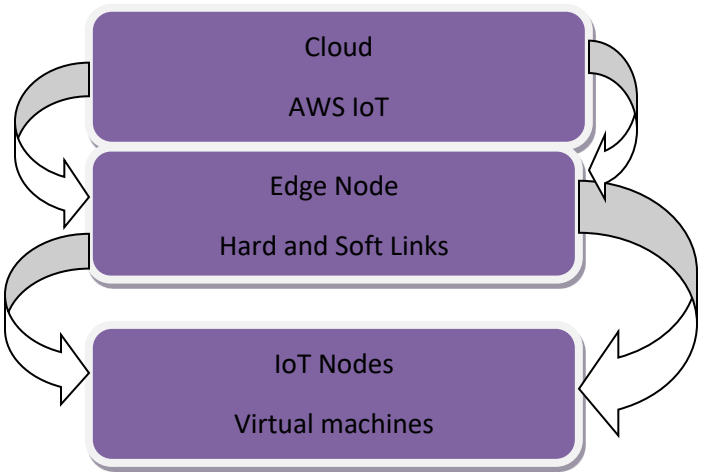
Figure 2: IoT Stretched Model



Methodology & Research Design

The methodology of the research study considered the experimental research design. The experimental research model was considered as an appropriate in improve the current security and privacy issues associated with the previous models. The study developed the proposed models, which was The Layered Cloud-Edge-Iot Model [28]. The aims of the study were to reduce the security of IoT devices and enhance the privacy of the users as well as protect the sensitive data of the users [44]. The new proposed The Layered Cloud-Edge-Iot Model is shown in the diagram 3 below.

Figure 3: The Proposed New Model



The proposed research model considers the identification of the threats and vulnerabilities in the previous models and the new models. It will compare the three aspects that include the security vulnerabilities, data protection and privacy [29]. The comparative research design was considered as an appropriate as it enables the researcher to determine which model can help in the protection of data and information of the users.

Population & Sample & Unit of Analysis

The study primary considered the various application model used by organization when adopting IoT. In the study, the five firms across different sector were considered as the sample for the research. Generally, the study population was huge and considered all the firms that have been using the IoT devices [30]. Although the population was large, selecting a sample of five firms was considered as an appropriate for the study.

The study considered three main unit of analysis that includes the privacy, security and data protection. Each of these elopements was analyzed to determine the vulnerabilities of the IoT device [31]. The main concern of this research study was to determine the appropriate

infrastructure for the development of an appropriate IoT system. As a result, the study used the three unit of measurement to determine the percentage of the efficiency of the new model [51].

Analyzing Data

The analysis of data considered the three units of measurement to determine the data security for IoT devices. The main units of analysis are described in the equations below.

Privacy, P=f (x)

Security, S, = f (y)

Data protection D, = f (z)

The overall equation for reduction of security threat is given as follows.

Efficiency = f (x) + f (y) + f (z)

The overall efficiency is found by determining the total percentages of each unit for the measurements for each of the three models considered for analysis.

Discussion of the Results

The research study compared three models to determine their efficiency. The three models that include the IoT generic layered model, IoT stretched Model, and The Layered Cloud-Edge was compared to determine the one with highest percentage of efficiency that can reduce the security vulnerability of the devices [32]. The results are indicated in the table below.

Table 1: Comparison of the Security efficiency of the models

Number	Model	Security Efficiency
1	IoT generic layered model	82 %
2	IoT stretched Model	91 %
3	The Layered Cloud-Edge	94%

The table one above shows the comparison of the security model for the three proposed IoT infrastructure. From the table, it is noted that The Layered Cloud-Edge has the highest percentage (94 %) followed by the IoT stretched Model (91 %) and lastly the IoT generic layered model (82 %). The result indicates that each model has a variation with regards to the efficiency of the security. This is an indication that IoT devices are subjected to some cyber security threats that can compromise their performance. The threats of the cyber security in these models can be explained with ineffective infrastructure that can compromise their performance [33]. It shows that The Layered Cloud-Edge model is the most appropriate that can enhance the security of the users and ensure that their data remains safe and protected from various cyber-attacks and threats.

However, it is noted that there is no model that proves perfect in the protection of the user's data and information.

The comparison was also made on two models included the proposed model of the research study. The research compared the security effectiveness of the proposed model and one of the commonly used models by organizations. The table 2 below show a comparison between the proposed model and the IoT stretched Model.

Table 2: Comparison Between the Proposed Model and the IoT stretched Model

Number	Model	Security Efficiency
1	IoT stretched Model	91 %
1	The proposed Layered Cloud-Edge model	94%

The comparison from the above table indicates that the proposed model has a high percentage of the frequency. It shows that the proposed model has 94 % frequency as compared to the IoT stretched Model. This show that the proposed model can prove appropriate in addressing the needs of the current organizations that depends on the IoT does perform several activities [34]. The findings of this research study indicate that there is a need to continue developing other models to improve the security of the IoT devices.

Conclusion & Recommendations

The research study on the IoT security, threat and data protection provides insightful information on how to improve the data reliability and validity. It shows that there is a need to develop an appropriate infrastructure to enhance the security of the users of IoT devices. From the findings, it is note that the proposed model for the IoT architecture proves powerful in addressing the security vulnerabilities that organizations and businesses face in their daily operations. As a result, it is important to design appropriate information devices that can improve the security of IoT.

Based on the result of the research study, it is recommended that further research be conducted on the security vulnerability and threats. This is because the proposed model is still not 100 % security efficient which means that there is a need for the design of new model. Also, the future research study should focus on increasing the sample size to capture adequate data that can ensure that there is full representation of the population sample.

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Convergence Between Blockchain and The Internet of Things

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Abstract

The objective of this study was to determine the effectiveness of a particular convergence model for IoT and blockchain. Multiple regression model was selected to determine the effective of a specific convergence model. Three convergence models were selected for this study, including the hybrid approach, the IoT-blockchain approach, and the IoT-IoT approach. The findings indicated that there are issues with convergence between two different technologies. The other finding was that the hybrid model provided the best convergence platform for integrating IoT with blockchain. Regarding the IoT and blockchain, convergence challenges included the limited capacity of IoT devices to handle the nature of distributed ledgers. The recommendation is that the aspects of traditional blockchain should be redesigned because of new requirements of IoT, including smart contracts, consensus protocol, data privacy, and security.

Keywords: Internet of Things, Blockchain, Privacy, Data.

Introduction

As a concept, the Internet of Things (IoT) is exciting and fascinating. One of the challenging features of IoT, however, is possessing a secure ecosystem that covers all the building blocks in the IoT design [1]. Blockchain denotes the database holding a seamless and growing dataset. Generally, blockchain has a distributive nature, indicating that there is no single or master PC controlling the entire chain. Instead, the involved nodes feature a copy of the entire chain.

Understanding the diverse building blocks of blockchains and IoT can determine the vulnerability areas in each unit [2]. Accordingly, exploring the different technologies required to address each of the emerging weaknesses are crucial to tackling the convergence issues between IoT and blockchain technologies [45].

In a typical architecture of IoT, the blockchain functions to maintain an immutable data record of the entire history of device operations. The benefit of this feature is that it allows the independent functioning of the devices within the system without the demand for any centralized authority [2]. Consequently, the blockchain provides an avenue to a sequence of IoT contexts that were previously complex or impossible to deploy [46].

Despite the ever-increasing agreement on the likelihood of IoT and blockchain convergence, the principal issue is the actual place in which the blockchain will be housed [3]. The direct hosting of blockchain on resource-deficient IoT systems and devices is not appropriate because of limited bandwidth, limited computational infrastructure, and the need for power preservation [47]. Concerning latency and computational resources, the fog and cloud are among the two suggested service platforms for hosting blockchain [3]. Founded on the challenges, characteristics, and constraints of IoT device, the wide range of architectures suggested for IoT and Blockchain combination include the hybrid approach, IoT-blockchain, and IoT-IoT.

The architectural elements of blockchain and IoT convergence control myriad elements in determining the effectiveness of transaction control. Aspects such as Hyperledger Fabric-based blockchain designs, hybrid models, and IoT-blockchain models have enabled users to establish communication channels, view transaction history, and manage assets [3]. The benefit of integrating blockchains to IoT systems is that the transaction occurring via blockchain are secure because they are routed between diverse peers within the model. Each IoT device, in this regard,

initiates a transaction by getting a registration certificate from the certification authority (CA) of the fabric. These considerations are important they function to enhance the overall effectiveness of the integrated system [48].

Theoretical Framework

The current study is founded on the principle that the blockchain technology is one of the main missing links that can settle the reliability and privacy issues of the IoT. Conceptually, blockchain could act the silver bullet required by the whole IoT sector. Blockchain can be adopted to track innumerable connected devices, allowing the ease of processing and coordinating transactions between the devices [4]. Several studies have addressed the issues associated with the effective framework for the integration of IoT with blockchain to limit the emerging vulnerabilities in their operations. Accordingly, this study is focused on identifying the best convergence structure to integrate IoT with blockchain [49].

Operational Definitions

IoT – Internet of Things

Blockchain – a distributed set of records comprised of a chain of blocks that has three fundamental aspects: decentralized, transparent, and recorded.

CA – certification authority

Industry Description

Based on its decentralized nature, along with its multi-phased procedures, blockchain provides a useful approach that can address several challenges facing IoT. Research highlight that

until a few recently, blockchain was only understood and applied in the context of online transactions and payments, including Ethereum and Bitcoin [5]. Over the past years, however, multiple non-financial contexts have incorporated or considered the deployment of blockchain technology, including digital identities and supply chain management [6]. As a result, there is the need to identify an appropriate convergence model to link IoT with blockchain [49].

Literature Review

The struggle to use an effective convergence platform for IoT and blockchain technologies has never been more urgent than the current issues of urbanization and efficiency of transactions. For example the shift towards constructing smart transportation systems and cities has increased daily [6]. Intelligent transportation systems (ITS) can improve user experience and offer intelligence to understand road safety level, efficiency, security, decentralization, and autonomy [50]. However, the lack of convergence between IoT and blockchain means that ITSs are currently facing countless challenges linked with trustful communication, centralization, and integrity [7]. One of the main areas that the use of effective convergence between IoT and blockchain can encompass the work of [8] to stage the prediction of Hepatitis C via the Fine Gaussian SVM technique. Issues addressed in the study performed by [8] have always involved the contribution of the Center for Cyber Security, CCSIS, and Departments of Computer Science from various universities, including Lahore Garrison University, School of Systems and Technology, Government College University, Skyline University College, and numerous other universities across the developing and developed economies [42].

Because of the diversity of alternatives guiding blockchain convergence with IoT, along with various kinds of IoT applications and devices, designers of IoT should choose a suitable

option based on their requirements and restrictions [9, 10]. Despite the availability of research options, however, there is the lack of comprehensive resolutions and analyses for IoT developers and vendors to implement an appropriate blockchain platform to guide the integration requirements [11].

Several shreds of literature have supported the implementation of a decentralized architecture to enhance convergence between IoT and blockchain [12, 13]. A decentralized framework can lessen the overall charges of the IoT system compared to centralized models [14]. Nonetheless, the decentralized nature of blockchain means that it is affected by a new form of resource wastage, which introduces new challenges to its convergence with IoT [15, 26, 17]. The requirements of materials, equipment, or resources rely on the specificity of the consensus protocol in a particular blockchain network. Primarily, alternatives often assign these roles to gateways and autonomous devices that can offer this functionality [18].

Numerous other challenges have also affected the integration requirements of blockchain and IoT [19]. Regarding scalability issues, the size of blockchain has increased with the growing number of connected devices [20]. This is one of the key blockades to the integration needs because IoT networks serving these devices are required to contain a large set of nodes that can produce massive data amounts in real-time [23]. Furthermore, some current implementations of the blockchain can only handle or process a limited number of transactions per second [43]. Generally, this is a potential challenge for IoT performance [24]. Tackling scalability issues of blockchain has involved suggestions such as storage optimization by removing or deleting old transaction records [24, 26].

Problem Statement, Research Gap, and Research Contribution

The Internet of Things (IoT) has emerged an integral part of people's daily lives because of its ability to enhance the monitoring and control of objects and processes that revolutionize the manner in which people interact [27,28]. Concerning the requirement for ensuring that all the aspects of IoT are full and effectively functional, there is the need to address the numerous obstacles that have developed overtime [29]. Major issues have included, among others, scalability, consumption, data privacy, and cybersecurity [52].

Research Model and Hypothesis

Similar to other studies performed on the integration and convergence between blockchain and IoT, the research model employed in this study is the analytical model [30]. The selected model considers the existing architectures that have been used to connect blockchain to IoT [31]. The adopted analysis involves elements such as the efficiency, trust level, accuracy, scalability, and legitimacy of the blockchain and IoT architecture [32, 33]. The principle purpose of analyzing the existing architecture is to understand the opportunities and challenges that can influence the effective convergence and performance of these two technologies [53].

Methodology and Research Design

The multiple regression approach was chosen for the current study. The rationale for selecting linear regression was founded on the fact that almost all the existing shreds of research on the integration of block chain and IoT have relied on exploratory studies [54]. The benefit of linear regression approach is that it strives to model the connection between different variables by fitting the observed to a linear equation. The multiple regression will rely on data collected from a group of companies that have integrated IoT with blockchain and their performance based on the

chosen convergence method, including the hybrid approach, IoT-blockchain architecture, and IoT-IoT model [55].

About the appropriate sampling approach and research design, purposive sampling was utilized to understand the best timeframe and data on the possible implications of the independent variables (type of convergence model) on the dependent variable [56]. Similarly known as subjective sampling, the selected sampling technique (purposive sampling) relies on the decisions or observations of the researcher concerning the selection of data features [34].

Population, Sample, and Unit of Analysis

The sample collected for this study was the performance of 10 firms that have integrated blockchain with IoT to improve performance. Three convergence models were considered for this study: hybrid approach, IoT-blockchain, and IoT-IoT. Generally, the data involved gathering the level of positive ratings of the companies between 2009 and 2020 from the appropriate social media sites. The final data for analysis entailed constraints such as the level of positive customer reviews concerning functionality of the company, company profit margin, and the apparent brand image (Table 1). The dependent variable was the positive customer rating, with the independent variables being the type of convergence models available for use by organizations desiring to integrate IoT with blockchain.

Analyzing Data

The collected data comprised of elements, including decentralization, immutability, access and identity management, resiliency, reliability, security, autonomy, anonymity, and cost-saving for the three suggested convergence models. Table 1 illustrates the dataset utilized in this study.

Table 1: Dataset showing the independent and dependent variables

Year	Average Positive Customer Response	IoT-IoT Model	IoT-blockchain model	Hybrid model
2020	1.5	561	3178	3750
2019	1.3	5578	5203	2792
2018	1.35	3011	4486	2834
2017	1.37	3301	7136	7975
2016	1.13	2014	6094	8119
2015	1.28	4484	4652	7078
2014	1.20	2971	4799	7781
2013	1.26	3788	8653	2452
2012	1.12	1302	1965	3278
2011	1.21	950	3549	4510
2010	1.1	3239	8128	1378
2009	1.07	4832	1452	4844

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.89132177							
R Square	0.79445449							
Adjusted R Square	0.6376666							
Standard Error	2802.88436							
Observations	12							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	3	273283812.4	91094604	11.59531	0.002773			
Residual	9	70705446.6	7856161					
Total	12	343989259						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
IoT-IoT model	3485.40929	1772.758677	1.966093	0.080848	-524.849	7495.668	-524.849	7495.668
Iot-blockchain model	0.1197548	0.535532849	0.223618	0.828048	-1.0917	1.331214	-1.0917	1.331214
Hybridmodel	-0.00973166	0.388838106	-0.02503	0.980579	-0.88934	0.869881	-0.88934	0.869881

Figure 1: Multiple regression analysis output

The results of the multiple regression analysis shows interesting trends concerning the connection between the effectiveness of the specific convergence models. Based on the positive ratings of customers over the highlighted period, the results are described comprehensively as described in the next sections. Firstly, the adopted regression model depended on three independent variables denotes as n. the series of the variables or constraints selected is presented in Equation 1, which also highlights the whole regression equation based on the three variables.

$$\mu_y=\beta_0+_1x_1+ \beta_2x_2+ \beta_3x_3\ldots.+ \beta_nx_n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Equation } 1$$

Equation 1 demonstrates that the response of positive customer rating of a company (dependent variable), represented by the mean of the left-hand side (μ_y), shifts with the change in the value of the predictor variables (IoT-IoT architecture, IoT-blockchain model, and Hybrid model). According to the equation above, the result of the predicted variable y will differ as per

the mean of the independent variables [35]. The analysis assumed that the predicted variable will have a similar standard deviation as the predictor variable.

The study findings indicate that the intercept or slope of the regression model is 0. This finding highlight that the expected mean of y (dependent variable) is 0, especially when all the predictor variables have a mean of 0. Secondly, R-squared (the coefficient of determination) is approximately 0.79. R-squared defines the variance percentage in the predicted variable that the independent variable can affect. Regarding the findings above, 79% of the variance of positive customer ratings (dependent variable) is influenced by the predictor variables. Thirdly, the estimate of the standard error is approximately 2802.90. The value of the standard error highlight the projected standard deviation of the sample. Precisely, the standard error of estimate outlines the ambiguity associated with the estimate. Finally, at the 95% confidence interval, the t-statistic for the IoT-IoT architecture, IoT-blockchain model, and Hybrid model were 1.97, 0.22, and -0.03, respectively.

Discussion of Results

The findings or results indicate the connections between the effectiveness and ineffectiveness, thereof, of convergence models in ensuring security, trust, and seamless communication between IoT devices. Different models of convergence highlighted performance regarding anonymity, autonomy, reliability, security, and cost-saving issues when blockchain and IoT are integrated. From the outcomes of the multiple regression, the equation offers some insights into the association between the study variables. According to the research hypothesis, positive customer rating of a company on the social media sites relates positively with the type of a convergence approach. The p-values of the independent variables are 0.98, 0.83, and 0.08. In

particular, the p-values of the predictor variables exceed 0.05, the alpha value. This implies that the null hypothesis should be accepts that the type of convergence relates to a positive and strong company performance, which echoes positive customer ratings.

Commensurate with the dataset and selected analysis technique, the value of Adjusted R of about 64% highlights that the independent variables control consumer intentions to rate a company positively based on the strategic approach to integrating blockchain with IoT. However, the considerably extreme value of SEE insinuate that there is the need to use a larger sample of data [41]. Founded on the outlined regression output, the aspects connected to the selected convergence framework have significant effects on the type of rating assigned by customers to a company [36].

As supported by the analyzed data and information from the companies and customers, the hybrid approach only deals with specific aspects of the integration that the blockchain can handle [17, 18]. In the hybrid approach, only some sections of the interactions occur in the blockchain, with the other parts taking place directly between the involved IoT devices [37]. It appropriate to contend that one of the challenges of the hybrid approach is selecting the type of interaction that should occur via the blockchain while offering a means to decide in the run-time [38]. The hybrid model is an excellent way to balance the benefits of both actual IoT interactions and blockchain [38].

The other two models, IoT-IoT and IoT-blockchain also have their benefits and drawbacks [38]. The IoT-blockchain design, for example, involves the entire interactions as well as associated data to occur via the blockchain, including gathering traceable and immutable interaction records 39]. This design is specifically important for renting and trading scenarios because of its security

and reliability [40]. The main drawback of the approach, however, is that recording and storing all forms of interactions often increase data resource and bandwidth consumption.

The final model (IoT-IoT) that affects its ineffectiveness as a convergence alternative is its reliance on the routing and discovery mechanism [40] As a result, only some section of data transferred between IoT is stored inside a blockchain while the interactions occurring in the IoT happen without the blockchain. The method, however, is useful in contexts in which the IoT interactions are reliable are have low latency.

Conclusions and Recommendations

With the sporadic increase in the number of devices connected to the Internet of Things (IoT), innumerable hindrances have developed that can potentially slow down the implementation of the IoT across diverse sectors. Firstly, the IoT platforms and devices' market is greatly differentiated, with many vendors and standards. Secondly, concerns have developed concerning interoperability because of the implemented solutions tend to generate new data records. Data created and stored by an IoT device is secure in the cloud platform, but these data cannot be safeguarded when the source is tampered or the integrity device is compromised. Specifically, the centralized design of several IoT alternatives means that the device owner should trust the vendor or manufacturer to ensure the security of their data, especially if hackers compromise the central server. Blockchain, on the other hand, can address the resiliency issues of the IoT as an emerging technology.

Blockchain offers a distributed ledger that helps users to avoid centralized design issues. Additionally, it stores transaction information securely through its unique features. As a new system, blockchain establishes trust between all the devices within an IoT system, which helps in

reduction of treats associated with tampering the cryptography of blockchain. Additionally, blockchain has in reducing the expenses of management and overhead IoT because it eliminates intermediaries and middlemen. Subsequently, it is appropriate to contend that blockchain can offer a promising alternative that addresses several of the emerging IoT challenges. However, any convergence or integration between two different technologies have often created new obstacles and issues. For example, IoT devices possess limited storage devices and power that can handle the distributed ledgers, which are often resource intensive. Other issues have included the limited ability to perform node encryption, consensus execution of protocol, and full copy storage.

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The impact of Process Quality and Quality Control on Organizational Competitiveness at 5-star hotels in Dubai

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Abstract

Hotel industry is seeing many challenges because of the market challenges due to perfect competition market. Among these challenges quality assurance and quality control has significant impact because these factors determine the competitiveness level of the organization. In this research study we explained the hotel industry in the light of process quality and quality control. Interview was arranged and data was collected for interpretation. Results stated that process quality and quality control has significant impact on attaining competitiveness in hotel industry. This study can contribute a lot not just in theoretical field but also in practical field where the hotels can evaluate their own performance and the lacking in their own strategies.

Keywords: Process control, quality control, organizational competitiveness, hotel industry

Introduction

Process quality is the degree to which implementation as well as observation is done when it comes to acceptable process with regards to quality's criteria and measurement by an organization for the production of artifacts [1]. In simple words, the process quality actually means or its focus is on the parts of manufacturing process i.e. the efficiency of the process and its effectiveness in order to achieve the required goals and objectives [2]. An example can be used of the temperature control which is being used when a component has to be molded in order to manufacture the final product. This is part of the process and hence if a single part of the process is not controlled or is of inferior quality then it can impact the final good and thus leading to inferior quality final product [3].

Quality control or QC, refers to a process which is being used by a business in order to make sure that quality of the product is improved with time and is also maintained as per the standards of the company or international standards [4]. It is actually a process which through an

environment is created for employees as well as the management so that they can always look for perfection [5]. This is usually achieved by periodic training for employees, setting high standards of quality, conducting quality tests on the goods manufactured and dispatching only final products to customers which have passed final quality control tests [6].

The quality control process is beneficial for consumers as well because researchers and scholars have devised that this process always increases the satisfaction of customers. Since hotel industry is highly competitiveness, customers prefer quality over prices there and thus they want value against the prices they pay [7]. So for this reason, the quality control process plays a vital control in increasing their satisfaction and thus this comes handy to the hotel as well because it retains its loyal customers who love to visit the place again. The better quality services with the help of quality control is the key in this process [8].

Competitiveness refers to the ability of an organization, an individual or a country etc. to be competitive enough to compete with its rivals in the industry [9]. In terms of an organization, it is directly linked with its performance because if the performance of the company is of high standards and satisfies its customers only then we can say that the organization is a competitive organization [10].

Process Quality

The operational definition of process quality is the degree to which implementation as well as observation is done when it comes to acceptable process with regards to quality's criteria and measurement by an organization for the production of artifacts [9].

Process quality is the overall procedure utilized by the organizations in order to perform quality system in the organization [11]. The purpose of process quality is to implement such activities which ensures that every process is designed on the philosophy of quality. Since hotel industry is the service sector so maintain quality is a big challenge. Process quality will ensure the competitiveness to the hotel [12]. Process quality is the translation of such approach which is highly systematic and aim to optimize the overall process [10].

Quality Control

Quality control or QC, refers to a process which is being used by a business in order to make sure that quality of the product is improved with time and is also maintained as per the standards of the company or international standards [13]. In order to be competitive, the quality control processes are done regularly in hotels so that the operational and administrative expenses are controlled. With the help of this, the hotels are able to increase their revenues and profits which in turn place them in a more competitive position in the market against their competitors and thus they are better off. There were different types of research studies carried

out in different parts of the world regarding the importance of quality control in hotel industry [14].

Quality control is a controlling system which is designed to monitor the process of quality and avoid errors [8]. Under the quality control system, the number of errors always reduced and show zero tolerance. This philosophy ensures that there is no tolerance towards negligence. In the hotel industry quality control is the fundamental principle which enables them to compete effectively [15]. For hotels, goodwill is important because it increases the attraction and influx of customers. With the help of goodwill, the share prices also rise which in turn make the companies more valuable. The quality control processes always raise the goodwill in the minds of consumers and thus they pay more visits to the hotel because of their historic experience [14][2]. This is the reason the hotels are paying more and more attention to quality control processes in order to have more productive operations so that they fight the competition in the market against other new and old rivals. Since the industry is highly volatile, there are new entrants in the market almost every day which in turn increases the competition in the hotel industry [16]. One of the advantages of a rigid competition in the industry is that it increases the quality of the services provided by the companies and thus this is done through quality control measures. The quality control measures are taken at each and every step so that if there are any flaws, they can be removed on the spot otherwise the quality check in the end might be detrimental if the hotels find flaws in their process [17].

Organizational Competitiveness

Competitiveness refers to the ability of an organization, an individual or a country etc. to be competitive enough to compete with its rivals in the industry [14]. Competitiveness in the industry explains unique characteristics of an organization which differentiates it from others [18]. In the hotel industry achieving competitiveness is a big challenge especially in the region where tourism is very high. Above average performance is possible only when there is a system of process quality and quality control [17].

Literature Review

[1] evaluated in their research that process quality improves quality control. Hotel industry has seen a rise in its demand since the world has become a global heritage. The reason is that people have been flying more often than before because of business or personal reasons. And thus the demand for hotel industry has risen. For this reason, it’s very important for hotels to retain their competitive edges in the market so that they do not lose their customers and retain their loyalty [19]. The quality control process is one of the key reasons why hotels have retained their competitive edge in the market. According to the research studies carried out at

John Hopkins University, the quality control process makes the employees quality consciousness [20]. This is encouraging because it lets the workers be more productive towards the organization because they focus on quality and since quality is one of the foremost demands of the customers, the hotels retain their competitive edge in the market [10]. This allows them to attract more and more customers because people do not compromise on quality but they can compromise on price. Value for money is important which can only be done through quality control [1].

[11] stated that process quality leads competitiveness. Hotel industry experiences a lot of different administrative and operational expenses. These continuously increase if there is no quality control process. But with the help of quality control, the hotel is able to reduce the prices or at least control them [21]. According to Oxford University, resources are more formally and smoothly utilized when there is quality control in hotels than those where the idea and concept of quality control do not exist. This is because of the reason that maximum efficiency is achieved due to quality control. The wastes are minimized and thus the hotels are more efficient in the market. And for this reason, the quality control has a vital place in hotel industry since long [22].

[4] evaluated that inspection is important in hotels which is done through implementing process quality standards. The inspection costs are high if the inspection process is longer. The inspection team carried out a detailed inspection of the hotel and finds out the flaws and thus the flaws are higher if there are no quality control processes [10]. The economies are achieved with the help of quality control and thus the hotels have to bear a minimum cost in terms of inspection and quality. This is important because it actually derives more profits to the company which in turn places them in a stronger position in the market which is a healthy activity.

[18] evaluated that employees are very important for hotels. For hotels, employees are perhaps the most important assets. For this reason, the morale of employees is very necessary at the workplace. It has been seen through different researches that employees have a high morale if they are working for a company which is focusing on providing quality products and services to the consumers. This is important because this is a psychological factor where employees are comfortable if their companies are providing quality service to the customers in the market [15]. And this is always done with the help of quality control at the workplace. This also increases the relation between employers and employees. The relation is always cordial between the management and workers because quality control provides a friendly and supportive atmosphere where the customers are happy and when the customers are happy, the

company always prospers. This is the reason that quality control is beneficial for hotels around the globe [23]. Since Europe and North America have a big hotel industry, quality control matters a lot because it's a process which refines the services of the organizations and puts them in a better place in the market. This enhances the employer and employee relations too. Also, hotels are very much dependent on advertisements as well because these advertisements and promotional campaigns play a vital role in attracting customers [8].

For this reason, the quality control processes are important because the quality control processes allow hotels to present them in a much better way than their competitors who have not implemented the quality control process. Customers come to know about the hotel through advertisements and thus they prefer to visit because advertising and promotions play a vital role. The public confidence is always won through effective advertising which is done extensively in the hotel industry [7].

[9] explained that process quality and quality controls work together. The standard quality is maintained and thus the hotel does not have to put fixed prices for its products. The prevalent prices are often adopted by the other hotels too and thus the threat of fixed price is no more in the industry. This is a big advantage of quality control measure especially for the hotel industry [24]. According to researchers in Harvard University, quality control increases sales. The reason is that quality is enhanced because of quality control measures and thus the services are more attractive than before. This helps organizations increase their sales. The same goes for the hotel industry because increase in quality is something which is preferred by customers around the globe and hotel industry is famous for its quality and comfort for its customers. The quality control measures create new demands for the hotel industry which in turn helps the hotels get new prospective clients and thus they see an increase in their sales in the market.

[22] stated that process quality and quality control brings competitiveness. Quality control plays a very important role in the hotel industry. Since the demands are changing, the tastes and preferences of people are also changing and that's why hotels have to fight the competition and stay in the business. For this reason, quality control matters a lot at each stage in order to have a competitive edge and to remain abreast of competition. For these and many other reasons, the advantages of quality control cannot be eliminated because its implementation in the hotel industry is on the boom like in manufacturing industry because the ultimate advantages of both are same i.e. to remain abreast of competition and provide a competitive edge. Because of the nature of the industry, companies (hotels) cannot survive because of the rigid competition [5]. They have to extensively go for marketing and

promotional campaigns in order to attract people from around the globe. The tourism has played a vital part in booming the hotel industry because tourists are one of the reasons why hotel industry is successful in the market. The prospective customer base in the hotel industry is all because of tourism and business trips. And thus quality control is playing a fundamental role in this regard [21].

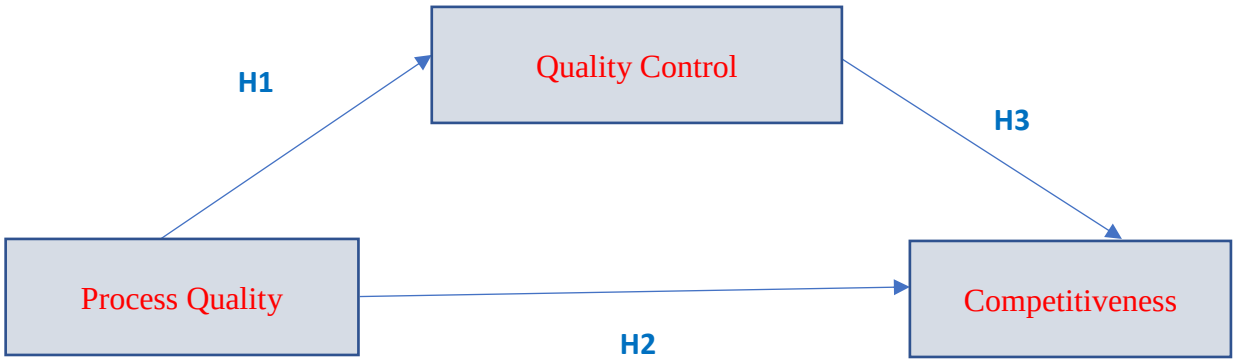
UAE Hotels Industry

United Arab Emirates (UAE) as the second largest economy in the Middle East consists of more than one thousand, 300 of them classified as 5-star and above. The emirate of Dubai is the focal point of the UAE's tourism industry, in terms of numbers of visitors and fabulous infrastructure (Vij and Upadhya, 2020). The country has been ranked sixth in the world for the quality of its infrastructure according to the World Economic Forum (WEF, 2019). UAE, and Dubai particularly has not only successfully diversified from being dominated by the oil industry to development of the tourism sector, but also poses an example of excelling in tourism in the absence of a conducive environment and natural attractions, Hospitality sector being reshaped by disruptions, changing consumer behaviour (Vij and Verma, 2016). The tourism and hospitality sector in Dubai has also grown steeply in the past decade. The hotel business in Dubai covers the ownership and representation of many national and international hotels.

Problem Statement and Research Gap and Contribution

In the hotel industry being competitive means that the hotel is offering such quality and services which is above the industry standards and customer satisfaction is higher. It is possible only when there is a structured approach towards the implementation of process quality and to run this process the system, should be monitored which is based on quality standards. Therefore; hotel industry is highly influenced by the process quality and quality control to achieve competitiveness.

Research Model



Research Hypotheses

H_{O1}: Process Quality has no statistical impact on Quality Control in 5-stars hotels in Dubai at ($\alpha \leq 0.05$)
H_{O2}: Process Quality has no statistical impact on Organizational Competitiveness in 5-stars hotels in Dubai at ($\alpha \leq 0.05$) level. level.
H_{O3}: Quality Control has no statistical impact on Organizational Competitiveness in 5-stars hotels in Dubai at ($\alpha \leq 0.05$) level.

Methodology and Research Design

The research falls under the Applied research category since it aims to expand the existing knowledge, and Relativism Ontology Type, Subjectivism (EMIC) Epistemology Type, and Interpretivism Research Philosophy because the research asking the participants to express their perceptions toward the research questions (questionnaire).

The research will follow the quantitative research nature by collecting empirical and numerical data through structured survey then statistical tools will be used to prove the model validation. The methodology nature will follow the deductive analysis approach since we aim to expand the knowledge about the research variables. While the research method will take the Descriptive and Explanatory research design since we aim to investigate the relationship and the impact of Quality Orientation on Achieving a Competitive Advantage: The mediating role of Dynamic Capabilities [25]. On the other hand, the research strategy will be the Correlational/Causal strategy because we attempt to establish cause- effect relationships among the variables. A questionnaire has been designed on a 5-points likert scale to measure the variables and dimensions of the research.

Population and Sample

The hotel industry at UAE considered to be the population of this research. The 5-star hotels at Dubai which are (119) hotels have been chosen as the sample of this research. 5-star hotels of Dubai have its own unique characteristics and differentiates on the basis of quality services, premium location and high standard of meeting quality control. The sampling technique was the nonrandom convenient sampling technique. The unit of analysis consisted managers working at the surveyed hotels in Dubai. The survey is the instrumental design. A 259 appropriate questionnaires used for the analysis out of the total number of employees who participated in the survey. Empirical and primary data was collected through questionnaire. Self-administrative questionnaire was utilized for data collection. Questionnaire was distributed to the surveyed employees through email within 3 months' follow-up. The validity of the questionnaire was tested and reliability analysis was done before generalizing the results.

Reliability

A reliability test is basically a stable and consistent results that can be produced through assessment tool over the time. A study can be measured to be reliable if the its result produced under comparable methodology; which means study tool has the ability to be applicable and repeatable over the time. Hence, this research has used Cronbach's alpha tool, and the minimum reliability score to be accepted is 0.60. As shown in below table 1, the reliability tool has been tested two variables (dependent and independent factors), and each variable and its dimensions through the measurement instrument. The reliability scores for quality control, process quality, and competitiveness and its dimensions showed strongly significant, where Cronbach's alpha value were above (0.60) for all variables, which indicates that the items are internally consistent for each dimension.

Table 1 Cronbach's Alpha Coefficient for Study variables

Construct	Cronbach's Alpha
Process quality	0.698
Quality control	0.751
Competitiveness	0.802

Data Analysis

The questionnaire of the study which was distributed to 22 different bank branches in Fujairah, has been given to a number of academic and industrial experts to review, then all

comments have been take into serious consideration and adapted before it distributed. All received questionnaires were checked for validity. A 220 valid Questionnaire and the data were investigated and examined through statistical and analytical package (SPSS), in order to test the relationship and the impact of Information System Capabilities, Quality control on Competitiveness, descriptive statistic, correlation and regression analysis and ANOVA analysis were conducted to obtain the results [19].

Descriptive Analysis

Descriptive analysis and statistic are a way used on studying of data and responsiveness of respondents about research variables that help in describing and summarizing the information into a meaningful. As showed in Table 2 the importance for each construct of the study indicating significant value, as all means and standard deviation refer to accepted values.

Table 2 Descriptive Statistics for Study variables

Construct	Mean	Std. Deviation	Variance
Process quality	3.571	.91834	.708
Quality control	3.652	.86632	.846
Competitiveness	3.479	.79841	.912

Hypotheses Testing

Table 3 illustrate the results of Correlation, ANOVA and Regression analysis to quality control in Process quality, it described significant relationship between competitiveness in Process quality where the correlation (r) is (0.591). The determinant coefficient is (0.349) which means that (0.349) changeability in the quality control is explained by the changeability in process quality.

Table 3 Correlation, ANOVA and Regression analysis to Quality control in Process quality

	r	r^2	F	DF	Sig*	β		t	Sig*
Quality control	.591	.349	19.138	1 258 259	.000	Process quality	0.318	2.201	0.002

* level of significance (α≤0.05) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of process quality on quality control at beta is (0.318) confirmed by (t) is (2.201) and (f) is (19.138) and all values are significant at (α≤0.05) level. This evidence supports the first hypothesis which prove the impact of process quality on quality control.

Table 4 illustrate the results of Correlation, ANOVA and Regression analysis to competitiveness in process quality, it described significant relationship between competitiveness in process quality where the correlation (r) is (0.518). The determinant coefficient is (0.268) which means that (0. 268) changeability in the competitiveness is explained by the changeability in process quality.

Table 4 Correlation, ANOVA and Regression analysis to competitiveness in Process quality

	r	r^2	F	DF	Sig*	β		t	Sig*
Competitiveness	.518	.268		1 258	.000	Process quality	0.298	2.971	0.001

			10.783	259				

* level of significance (α≤0.05) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of process quality on competitiveness at beta is (0.298) confirmed by (t) is (2.971) and (f) is (10.783) and all values are significant at (α≤0.05) level. This evidence supports the second hypothesis which prove the impact of process quality on competitiveness.

Table 5 illustrate the results of Correlation, ANOVA and Regression analysis to competitiveness in Quality control, it described significant relationship between competitiveness in Process quality and Quality control where the correlation (r) is (0.509). The determinant coefficient is (0.259) which means that (0.259) changeability in the competitiveness is explained by the changeability in quality control.

Table 5 Correlation, ANOVA and Regression analysis to competitiveness in Quality control

	r	r^2	F	DF	Sig*	β		t	Sig*
Competitiveness	.509	.259	22.326	1 258 259	.000	Quality control	0.413	3.156	0.001

* level of significance (α≤0.05) ** Critical t (df/p)=1.64

ANOVA analysis results indicate that there is impact of quality control on competitiveness at beta is (0.413) confirmed by (t) is (3.156) and (f) is (22.326) and all values are significant at (α≤0.05) level. This evidence supports the third hypothesis which prove the impact of quality control on competitiveness.

Discussion of the Results

In this section, the collected data through the questionnaire is analyzed and the results of data were interpreted. The results showed the analysis of process quality of the 5-stars hotels in Dubai, their quality services and their organizational competitiveness.

The results showed that process quality of the 5-stars hotels in Dubai lead to more quality control, coefficient of determination (0.349) correlation coefficient (0.591), ANOVA results (t=2.201) and regression results (f=19.138) are significant at ($\alpha \leq 0.05$), all prove the first alternative hypothesis which stated that Process Quality has statistical impact on Quality Control in 5-stars hotels in Dubai at ($\alpha \leq 0.05$).

Whereas the results refers that process quality of the 5-stars hotels in Dubai lead to organizational competitiveness, coefficient of determination (0.268) correlation coefficient (0.518), ANOVA results (t=2.971) and regression results (f=10.783) are significant at ($\alpha \leq 0.05$), all prove the first alternative hypothesis which stated that Process Quality has no statistical impact on Organizational Competitiveness in 5-stars hotels in Dubai at ($\alpha \leq 0.05$).

Moreover, The results indicated that quality control of the 5-stars hotels in Dubai lead to organizational competitiveness, coefficient of determination (0.259) correlation coefficient (0.509), ANOVA results (t=3.156) and regression results (f=22.326) are significant at ($\alpha \leq 0.05$), all prove the first alternative hypothesis which stated that Quality Control has no statistical impact on Organizational Competitiveness in 5-stars hotels in Dubai at ($\alpha \leq 0.05$).

However, a few years back things were not the same for them because most hotels did not have had the competitive edge before over its competitors which it enjoys today. The became possible once they applied process quality and quality control in their operations. The application of process quality helped the hotels to find out where they are lacking and what was their weakness. Some hotels did not have required amount of control on its staff when it came to serving customers and therefore after applying the process quality and quality control it was able to tackle this issue. Staff members were given better training to improve the overall process quality which resulted in better quality control over its services and thus, improved services to customers which increased the competitiveness of the 5-stars hotels in Dubai in the UAE hotel industry.

Conclusion

Improvement is an ongoing process and therefore 5-stars hotels in Dubai should keep working on this by providing regular training to its staff members. Regular feedback should also be taken from its guests in order to find out their experience at the hotel so that competitiveness level can be evaluated on regular basis. The results show that the hotel industry needs to fix their quality standards and make sure it never goes down in any case. But then again it is also necessary to improve day by day with new strategies and policies that would help the hospitality experience of the guests better and best. Knowing that no hotel is alone in the race but there are thousands of other competitions standing and waiting to take the place of top [4].

Theoretical and Practical Implications

This study contributes a lot in the field of learning for academics in the field of hospitality and how the industry works and makes everyday a try of improvement. The hotel industry is suffering not because of lack of profitability by customers but because of the fact of inconsistency where a customer is unable to receive the same standard of services every single time. This is where the quality assurance comes in. The results in this study support the evidence that hotels not only need to standardize their quality but also improve it and in no way can let it down.

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The Growth of Internet of Things (IoT) In The Management of Healthcare Issues and Healthcare Policy Development

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Abstract

The internet of things is becoming a new sensation in the medical and healthcare field. Healthcare is one of the sustainable development areas across different regions. This study aims at developing an analysis of Internet of Things (IoT) in the healthcare sector for the purposes of achieving sustainable development. The study took a direction of applied descriptive research. The methodology applied was Fuzzy Analytical Hierarchy Process (FAHP). This is a single cross-section survey research. After data gathering, the agreed paired comparison matrices, allocated to weighted criteria and the priority of internet of things usage were determined. The two criteria, quality of life and economic prosperity had the highest priority for internet of things sustainable development in the healthcare system. Fall detection, dental health, and ultraviolet radiation were among the areas where IoT was found to be applied prominently.

Keywords: Internet of Things, Management, Healthcare, Development, FAHP

Introduction

The internet revolution in the past decades indicated that new technologies could affect all aspects of business. Today, ubiquitous communication has been made possible by new advancements in network connections, wireless technologies and sensors [1]. Communication across devices and communication between humans and devices has improved tremendously. Internet of things (IoT) has developed has become a new factor to consider in technology and how it is applied to achieve various goals and objectives for businesses [2]. IoT is a new ICT development that has a great potential to deliver on different business aspects. The medical and healthcare sector is also benefiting from different technologies and IoT is being applied in various aspects of healthcare service delivery. Therefore, the IoT has become one of the essential technology trends that has to be followed for organizations and industries to be effective in delivering their services [3].

The Internet of Things is a new development on the internet that empowers different objects to connect with each other. Prioritizing IoT is essential for the development of a sustainable healthcare sector. The connectivity between different devices is vital in creating solutions to be used in the management of different healthcare needs [4]. The development of smart technologies has been critical in enhancing the application of IoT in various healthcare platforms. The rise in the need for healthcare services has prompted the need to strategize and deliver highly effective and sustainable methods of delivering the needs of the society in terms of enhancing accessibility and affordability of healthcare services [5].

Healthcare resources are constrained and there is a need to develop an effective means through which the issue can be handled effectively. Developing a sustainable healthcare sector is vital in the delivery of healthcare services to all in the society [6]. For instance, in the developing world, healthcare services are not accessed by many people and there are limited resources to

develop highly effective healthcare systems [7]. Internet of Things can be used in the healthcare system to enhance the delivery of services because there are many factors that come into play as the sector develops. It is important to have an effective means through which healthcare services can be delivered to people without any further straining of resources [8].

An important aspect of IoT is the way information is used. Data is critical in the development of IoT systems for effectiveness to be achieved in the application of the technology. Big data and big data analytics plays a vital role in the development of an effective means through which IoT can be applied in the healthcare sector [9] and [10]. The purpose of this study is to prioritize the functional areas in the healthcare sector where development of IoT can enhance sustainable development in the sector. [11] Economic prosperity and quality of life that people lead in the society is influenced by the nature of healthcare services available for people in the society [12].

Industry Description

The healthcare sector is essential in the society. The facilities are not adequate to serve all humanity effectively [13]. There are techniques that have been developed to ensure all people receive adequate healthcare services [14]. This is an essential factor to consider in the management of different issues that arise [44]. Technology has been embraced in the healthcare sector and there are tremendous advancements in terms of delivering effective services in the [15]. Some of the technologies have enhanced the analysis of the human body to identify different problems that they have and treatment can commence [16].

Improvements in data security and information security systems has been one of the important factors necessary in the delivery of effective means through which IoT develops [17]. This is an essential factor to consider in the development of various systems that are necessary in

the management of different services in the healthcare system [18]. Blockchain technologies have been applied to ensure all transactions and data are safe in the application of IoT. Information security is one of the essential factors that should be used to deliver an effective IoT system and safeguard different sets of data from possible cyber-attacks [19].

Literature Review

The Internet of Things was used in 1999 for the first time. Different things had a digital identity where the identities could be used to ensure effectiveness is achieved in the communication between these devices and objects [20]. This was an important development in the society because it could be used for the delivery of an essential means through which different objects could be connected [45]. The internet played a vital role in developing IoT because it provided a platform on which the objects could communicate. People could communicate with objects and objects could communicate with each other easily to deliver different services [21]. The digital identities that are developed are used by the computer to manage the objects and that creates an effective means through which the devices can be used to deliver different forms of communication within the devices and between the devices and humans [46].

Today, the internet connects people but IoT connects objects. The available applications such as the ones used in smartphones are used to control the objects for effectiveness to be achieved in the delivery of different services [47]. IoT has led to the development of capabilities of sending data and different forms of information across a network [46].

Big data has become an essential asset in healthcare. Practitioners are able to diagnose people and develop effective interventions because they can access different data which creates effective information to be used in the delivery of healthcare services [22] [23]. Smart devices have been developed and they can give information about patients. Wearable devices are vital in

managing different healthcare issues because they monitor individuals' health statuses [24]. Monitoring the body is essential in identifying problems early and sending signals that medical attention is required for such individuals. This has been an essential factor in delivering healthcare services to people who otherwise would be having problems. [25] Technology has been embraced in the healthcare sector making it highly effective in managing [26]. The Internet of Things is likely to enhance the delivery of these services to the community [48].

Integrating technology in the healthcare sector has become an important aspect that will deliver a highly effective means through which different issues in the healthcare sector can be solved [27]. IoT is an important development in the sector where there is a need to deliver an effective means through which services are delivered in the [28]. The healthcare industry has developed over time because of technology. It is important for policy makers in various medical facilities to encourage the application of IoT in the management of different healthcare issues [29] IoT is important because the devices used in the medical field can communicate with each other and perform various analyses which are essential in managing different healthcare situations [30]. Developing solutions is made easier with these technologies in the sector. It is important to have highly effective means through which healthcare services can be delivered through engaging the effective technologies [49].

In business, most organizations are focusing more on IoT and that has an impact on how they deliver on the services that they provide in the different sectors. Customer relationship management has been made easier in business because it is through such a factor that different issues can be managed effectively (Ghazal et al., 2021) [50]. The internet of Things has served different businesses well by ensuring there is effectiveness in the way they handle different services. In the medical field, the technology has played a vital role in delivering various services

to individuals more effectively [51]. A lot of improvements have been experienced in the healthcare sector as a result of having highly effective means through which different issues are managed. Different IoT-based technologies have been developed for the healthcare sector and it is because of such developments that it has been essential in building a highly effective means through which the healthcare system can benefit from these developments in technology [31]. Applying IoT in medicine is vital in enhancing sustainable development in the healthcare sector.

Smart Health

The Internet of Things has a promising future for e-health. In fact, some technologies have been developed based on IoT and they are effective in managing different healthcare issues for patients. According to Aladwani (2019) [32] ongoing monitoring of people or patients is essential in the delivery of an effective means through which prevention of diseases can be achieved. Sharma and Tripathi (2020) [33] deduce that the devices used in monitoring people's health are essential in developing an effective means through which their quality of life improves. Verdejo et al. (2021) argue that the smart technology has been an essential factor in the healthcare sector since there are many different factors that can be used to communicate various issues regarding the patient needs [52]. Patients are empowered because they are able to develop a means through which they can access different medical services as a result of managing themselves. Chandy (2019) [34] argues that using IoT provides various platforms that can be used to deliver vital information for the management of various healthcare issues. When a patient has access to different forms of information, it becomes easy for them to manage themselves and achieve the most desired outcomes [35]. There are different services that are available for the IoT technology in medicine as discussed in subsequent sections.

Fall Detection – Patient falls are a common phenomenon. The application of IoT on patients who are at risk makes it easy for them to be monitored and managed effectively to mitigate the risk of falls. Patient falls can be mitigated through having effective technologies that will monitor incapacitated patients [36]

Sportsmen Care – Athletes' health is supposed to be monitored and that can be done through wearable devices which monitor their bodies and detect any anomalies. These devices are vital in managing different issues for effectiveness to be achieved [53].

Chronic Disease Management – Reducing the number of patients in the healthcare facilities is vital. This is achieved through remote management of chronic diseases where patients can monitor themselves and doctors can access information regarding their progress [37].

Indicators of IoT Sustainability in Healthcare

Sustainable development of the healthcare sector is vital because there is an increase in the need for these services [41]. The Internet of Things is the one that will be used to deliver an effective means of offering healthcare services which will be used to manage different issues in the healthcare sector [38]. The quality of life people lead is critical for the improvement of the quality of life they lead. The application of technology in the healthcare sector is a vital source of having a highly sustainable healthcare sector because it will ease the pressure on the healthcare facilities and enhance the performance of different healthcare service providers [39]. Technology is sustainable in all fields and the healthcare sector has to embrace it for sustainable development. Technology should be given top priority in the medical field because it is evident that improvements in the sector have come as a result of embracing technology [54].

Conceptual Model

The conceptual model chosen for the study which prioritizes the use of IoT for sustainable development of the healthcare sector is Fuzzy Analytical Hierarchy Process (FAHP).

Methodology

This study applied descriptive non-experimental research. The Fuzzy Analytical Hierarchy Process (FAHP) was applied in weighting the prioritization of IoT in the healthcare sector [40]. In the beginning, each of the economic prosperity, quality of life and environmental protection criteria were weighted. Various criteria were applied to develop an understanding of the healthcare environment. Comparison questionnaires were developed and applied to analyze the nature of the environment. The application of IoT in each of the healthcare sector was compared applying the different criteria. A decision matrix was then obtained from the analysis of the results. The statistical population comprised of experts who are aware of the applications of IoT in the healthcare system. The snowball method was then applied because of the limited number of experts that were used in this research.

Fuzzy Analytical Hierarchy Process (FAHP).

1. Fuzzy Analytical Hierarchy Process (FAHP). Is a multifactor decision making process that was developed by professor Saaty. This was an essential model to apply for this study because it covers various aspects of the parameters effectively. The process of applying FAHP is described below.
2. Evaluating literature to determine sustainability criteria and the use of IoT applications within the healthcare sector.
3. Forming a decision team to ascertain validity of questionnaire.
4. Distributing questionnaire and developing paired comparisons matrix.
5. Weighing of the criteria.

Table: 1. Ranking of the IoT usage in the healthcare sector using the FAHP method.

Intensity of importance	Fuzzy number	Definition	Membership function
9	9	Extreme importance	(8, 9, 10)
7	7	Very strong importance	(6, 7, 8)
5	5	strong importance	(4, 5, 6)
3	3	Moderate in importance	(2, 3, 4)
1	1	Equal importance	(1,1,2)

Analysis and Results

Determination of the weighting criterion was conducted after having several meetings for the purposes of filling the questionnaires. The paired comparison criterion was applied and using FAHP, weights were obtained and a decision matrix developed. Each option's weight was applied to deliver an effective means through which the matrix was developed.

Ranking of Options

Using the weights obtained for sustainable development criteria and decision matrix, the final rank for the application of IoT in each of the healthcare sector was achieved.

Table: 2. Weight of criteria sustainability

Economic Prosperity	**Quality of Life**	**Environment protection**
45.32%	31.05%	23.63%

Table: 3. Decision matrix as it was derived from average weights of each criterion.

Options	**Economic criteria of Prosperity**	**Quality of life**	**Environment protection**
Fall detection	0.109	0.096	0.14
Medical fridges	0.084	0.11	0.039
Sportsmen healthcare	0.069	0.0136	0.153
Patient surveillance	0.117	0.0954	0.121
Chronic diseases management	0.079	0.104	0.025
Ultra violet radiation	0.113	0.132	0.176
Hygienic hand control	0.098	0.094	0.12
Sleep control	0.068	0.143	0.059
Dental health	0.183	0.142	0.167

Table: 4. Scores according to priority

Options	**Ranking**	**Score**
Ultra violet radiation	1	0.0567
Dental health	2	0.0555
Fall detection	3	0.0374
Patient surveillance	4	0.0371
Hygiene hand control	5	0.0340
Sportsmen healthcare	6	0.0311
Sleep control	7	0.0297

Medical fridges	8	0.0271
Chronic diseases management	9	0.0247

Conclusions

According to the results of this study, it is evident that economic prosperity is one of the criteria that has the highest ranking with 45.32%. Investing more in IoT in this sector will lead to automatic improvement in the other sectors. Satisfaction of hospital personnel is key to the improvement of healthcare service provision. This is an important observation that should be followed in the delivery of effective healthcare services as IoT is implemented in the sector [42].

The application of IoT in the hospitals was done and from the analysis, it is evident that the use of technology is more observed in the hospital where ultraviolet radiation is used. This is one of the ways through which various examinations are carried out to detect diseases or anomalies in the body [43]. The order in which various applications of IoT are implemented in hospitals has been developed in table 4 and it shows the nature of investment that should be done in the healthcare sector to improve its performance.

Recommendations

The need for embracing IoT is evident and there is a need for policy makers to ensure there is effective management of resources to deliver an effective means through which the individuals can achieve various improvements in the healthcare sector. Embracing IoT in healthcare would be essential in achieving sustainable development of the sector. This is because there will be a reduction in the pressure that is exerted on the healthcare facilities. When patients can manage themselves remotely, it becomes easy for the healthcare facilities to attend to other critical cases more effectively.

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Data Mining Framework for Nutrition Ranking

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Abstract:

The goal of this research is to use the technology of Data Mining in a dataset for a ranking of three diets on the respondents and investigate such tools advantages and limitations such as large amount of manipulation before analysis replications with the same results from the analysis bias. Here we can see the ethical consequences of such programs in details.

Keywords—Data Science, Nutrition Assessment, Clustering Analysis

Introduction

Dietary nutrition tool is basically a software framework for the assessment and evaluation of different respondent's nutrition status. There is a classified database which is attached to this tools in order to investigate the group class and intake meal species.(H. M. Alzoubi, Alshurideh, et al., 2021; Koroušić Seljak et al., 2013) The operator of such tools should firstly select the specific group in which the respondent belong to, such as infant, children, pregnant woman, adult, people with illness, afterwards the gender, height, weight and other general conditions and the intake food class such as different kind of dietary conditions such as the amount within a certain intake time are specified.(M. A. Afifi, n.d.; Al Kurdi, n.d.; Alhamad et al., 2021; Batayneh et al., 2021; Hamadneh & Alshurideh, n.d.; Khan et al., 2021) The ultimate goal of this tool is to nutrition assessment on the patient in caring hospital. Anyway the tool can be applied for the healthy persons in schools, hotels, restaurants and other places as a reference model to help and structure them for a good eating habit.(Ali et al., 2021; Ghazal, Hasan, et al., 2021; Matloob et al., 2021; Nunes et al., 2015) The aim of this article is to use the Dataset on the between 78 respondents on different Data Mining Algorithms.(M. A. M. Afifi et al., 2020; Bennett, 1992) We would like also to visualize the results through different clustering and modeling into Heat Map Matrix for the better evaluation of the algorithm and understanding of the dataset. Therefore, the ultimate goal in this research is to finding out the possibility of Input variables age, height and weight and gender to rank the three Diet types included in the Dataset.(Al Shebli et al., 2021; Ali et al., 2021; Alnuaimi et al., 2021; Alzoubi, Vij, et al., 2021; Alzoubi & Aziz, 2021; Ghazal et al., 2020; Naqvi Rabab and Soomro, 2021)

Data clustering is simply the process of organizing (clustering) data into several clusters for easy, efficient and most effective use. A properly designed clustering algorithm makes data available for business use, in other words, it makes the data easy to retrieve and analyze for modeling. After importing the Dataset file named Project 2 - stcp-Rdataset-Diet.csv the first

visual records the 78 instances and 7 attributes. At the first glance it seemed that the number of instances for our evaluation is quite small.

DATASET DESCRIPTION

Since the Diet data analysis based on the ethical and subjective reasons behind the dietary status of the respondents it was more valuable to exactly watch the variable importance of the predictors of the analysis rather than just writing equations for gender, age or height and weight.(Alnazer et al., 2017; H. Alzoubi & Ahmed, 2019; H. M. Alzoubi et al., 2020) The following figure shows the distribution and some statistics on out raw dataset and we can see the normal distribution on the age, height and weight after 6 weeks.

.

Field	Graph	Measurement	Min	Max	Sum	Range
gender		Continuous	0	1	33	1
Age		Continuous	16	60	3054	44
Height		Continuous	141	201	13324	60
pre.weight		Continuous	58	103	5657	45
Diet		Continuous	1	3	159	2
weight6we...		Continuous	53.000	103.000	5357.100	50.000

Figure 1 - Statistical overview of the Raw Datasets

Now it seems not only the number of the total respondents are enough but also the type and the size of the predictors and attributes are inefficient. It can be seen that there is a correlation between the pre-weight and weight after six weeks of diets. This can be seen on the next figure too. In our view it shouldn't be catastrophic about this since were experimenting the ethical and ranking phenomena behind dietary and not the statistics.

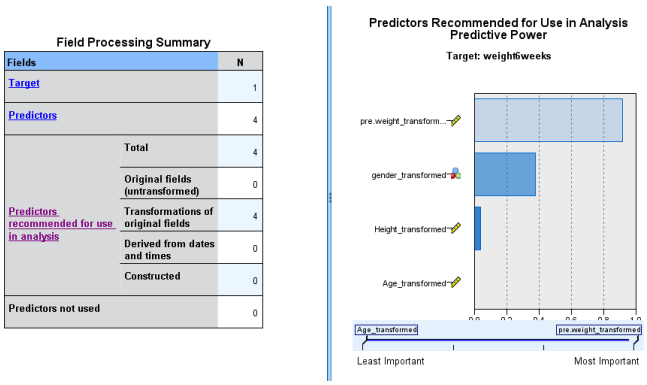


Figure 2- predictive power of the Dataset

Obviously the height, age and gender was not important attribute. We have reduced the attribute with a supervised clustering algorithms through different such as Kohonen, Two steps Cluster Node and K-Means where some of them resulted in different cluster number and size.

A Sihouette Ranker clustering selection is used to evaluate the clustering efficiency of the algorithm. This algorithm has no automatic way of normalizing the data interpretation. Preprocessing of the data is therefore a very important step when doing data classification using SPSS Modeler.

Use?	Graph	Model	Build Time (mins)	Silhouette	Number of Clusters	Smallest Cluster (N)
☑		Two...	< 1	0.573	2	33
☐		K-m...	< 1	0.484	5	2
☐		Koh...	< 1	0.282	11	1

Smallest Cluster (N)	Smallest Cluster (%)	Largest Cluster (N)	Largest Cluster (%)	Smallest/ Largest	Importance
33	43	43	56	0.767	0.749
2	2	22	28	0.091	1.0
1	1	14	17	0.071	0.995

Figure 3- Clustering Models used for Data Interpretation

The predictor importance result of the first and second clustering namely, TwoStep and K-Means are representented in figure 4. As it can be seen the results are in goof quality of clustering.

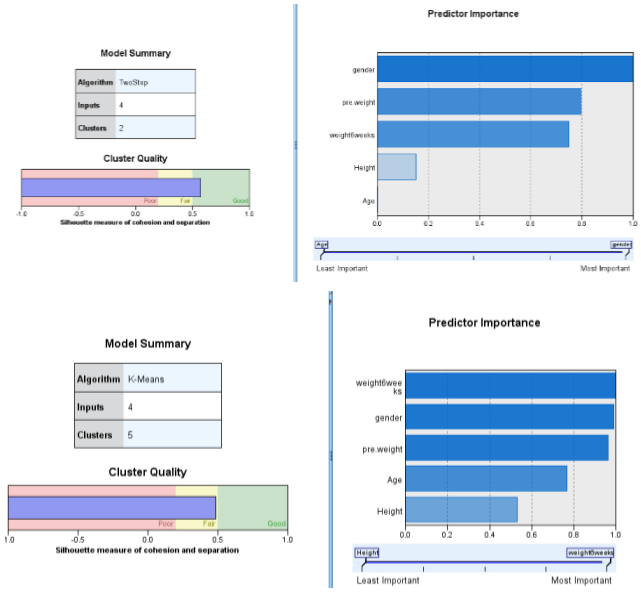


Figure4 - Graphical representation of clustering in accordance to the 6 weeks weight

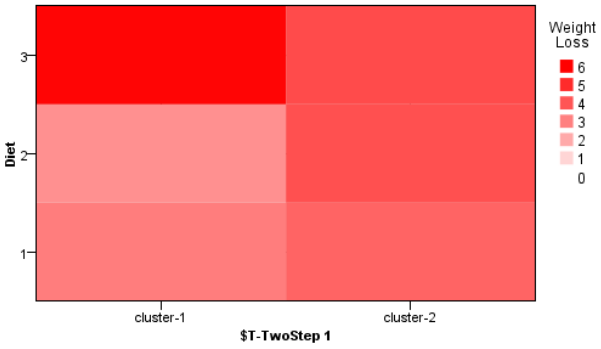
From the above results it is clear that in spite of better quality of the Two Step the K-Means clustering exhibits a better prediction power. In the two step method the Age and Height are not competent for the prediction. It should be furthermore noted that cluser 3 in K-Means are

outlier and can be excluded from other clusters. This result also confirm the K-Means can include the Age and Height into the model.

DATA MODELING

For the modeling of two clustering's, the derived node from the clustering 2 Steps imported to the dataset as a new filed. In addition to the variable diet type the new filed is also applied as splitting variable. Afterwards two variable height and age are excluded from the model and the Auto numeric node has been used to build 8 models. In the following figure the variable types are indicated . Furthermore, the difference between the Weight after 6 weeks and pre weight are calculated and created in the calculation. (The new created variable is called Weight Loss)(Bennett & Mangasarian, n.d.; Chapman et al., 2000)

Model	Build Time (mins)	Correlation	No. Fields Used	Relative Error
KNN Algor...	< 1	0.591	2	0.67
Neural Ne...	< 1	0.276	2	0.928
Regressi...	< 1	0.160	2	0.975
Generaliz...	< 1	0.160	2	0.975
SVM 1	< 1	0.072	2	0.998



Field	Measurement	Values
gender	Flag	1/0
Age	Continuous	[16,60]
Height	Continuous	[141,201]
pre.weight	Continuous	[58,103]
Diet	Nominal	1,2,3
weight6weeks	Continuous	[53.0,103.0]
$T-TwoStep 1	Nominal	cluster-1,c...
Weight Loss	Continuous	[-2.100000...

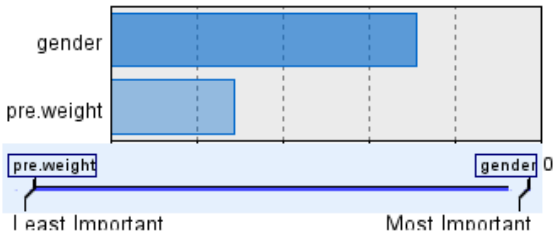
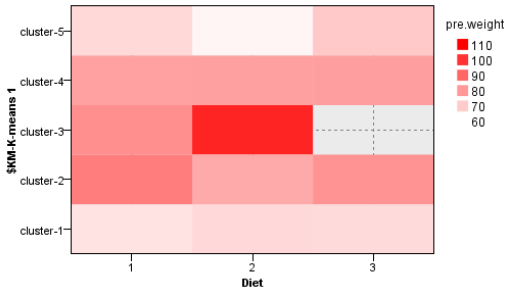


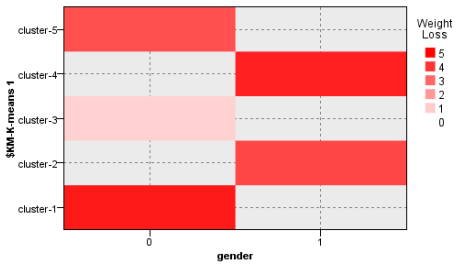
Figure 5- Results of estimation with twosteps clustering of weight Loss

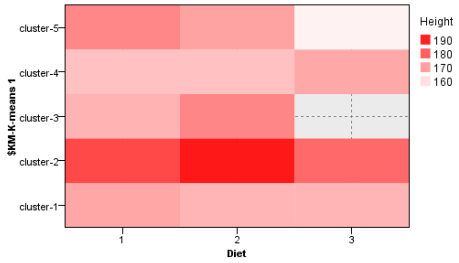
RESULTS

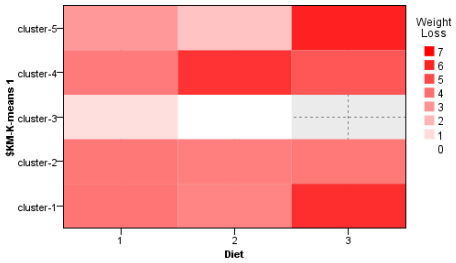
Results and error rates for the build model are shown. Accordingly, the Diet three is better than 2 and 1 in all clusters but it is still difficult to generalize this between diet 1 and 2. Since the relative error is high, and only gender is considered and still age and height were excluded this model is not efficient. Finally yet importantly, the effect of gender on this model outperforms the pre.weight variable.

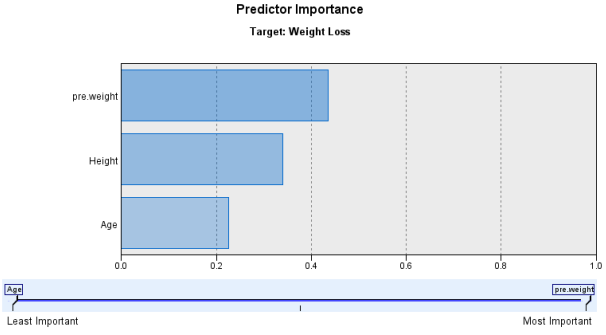
It is therefore important to test the other clustering.











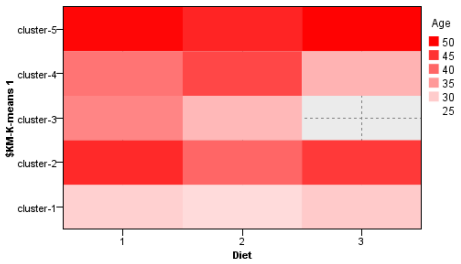
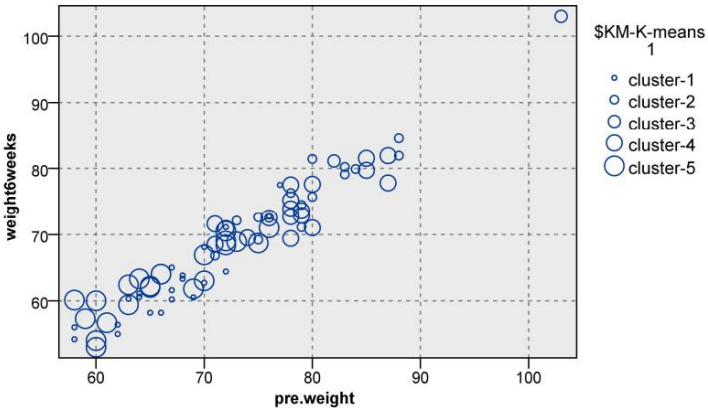
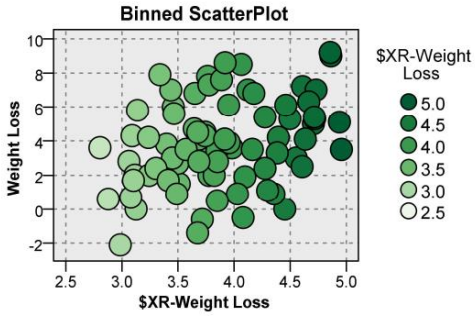


Figure 6 - Results of estimation with K-Means clustering of weight Loss

In spite of problem for the clustering with variable age, preweight and height can be distinguished from the above graph. It is also notable to check the comparison between diet 2 and 1 are clearer. However, the diet 3 outperform the other one with a good distance.

SPSS Modeller Bivariate Analysis)





Results for output field Weight Loss Overall Results Comparing $ E-Weight Loss with Weight Loss

Minimum Error	-4.906
Maximum Error	5.704
Mean Error	-0.0
Mean Absolute Error	1.809

Standard Deviation	2.306
Linear Correlation	0.428
Occurrences	78

Output field Weight Loss, splitting by field Diet = 1

Minimum Error	-3.829
Maximum Error	5.704
Mean Error	0.0
Mean Absolute Error	1.597
Standard Deviation	2.191
Linear Correlation	0.209
Occurrences	24

Comparing $ E-Weight Loss with Weight Diet = 2

Minimum Error	-4.906
Maximum Error	4.236
Mean Error	0.0
Mean Absolute Error	2.011
Standard Deviation	2.499
Linear Correlation	0.14
Occurrences	27

Diet = 3 Comparing $ E-Weight Loss with Weight Loss

Minimum Error	-4.231
Maximum Error	4.339
Mean Error	-0.0
Mean Absolute Error	1.796
Standard Deviation	2.293

Analysis **Standard Deviation** 2.293

Linear Correlation	0.289
Occurrences	27

Analysis Number of clusters: 5

Iteration	**Error**
1	0.247
2	0.134
3	0.116
4	0.024
5	0.037
6	0.048
7	0.027
8	0.0

DISCUSSION

To ensure the quality of documenting the results, CRISP-DM (CRoss-Industry Standard Process for Data Mining (CRISP-DM) methodology) has been used in this report to analysis the data. The whole processes of CRISP-DM are Data understanding, Data preparation, Modeling, Evaluation and Deployment.(Alshurideh et al., 2020; H. Alzoubi et al., 2020; Jevons et al., 2010; Rehman et al., 2021)

As mentioned strategical reflections and giving the solution for the nutrition evaluation tool is the subject of this research. We have experienced on vast methods of data mining for the dietary dataset to answer the questions of research. Are there any main factors effecting the quality of the information out of the 87 attributes? We have deduced from the results and finding and comparing the pair of data that supposed to have effect on the weight Loss but still some points and comparison remain unclear such as age and height. Most models confirm the pre weight as an explanatory variable for the ranking of the dietary nutrition.(H. M. Alzoubi & Yanamandra, 2020; Dr. Deepak Kalra Dr. Mohammed A. M. Afifi, 2020; Joghee et al., n.d.; Mehmood & Al-Gasaymeh, 2019; Sahi et al., 2017; Vallaster & von Wallpach, 2013)

We have searched the Internet and see the reflection of our work from the websites of some nutrition tools developed for the improvement of the eating habit. The ultimate goal of this tool is to nutrition assessment on the patient in caring hospital. Anyway the tool can be applied for the healthy persons in schools, hotels, restaurants and other places as a reference model to help and structure them for a good eating habit.(Ghazal et al., 2013; Ghazal, Alshurideh, et al., 2021; Ghazal, Said, et al., 2021; Hasan et al., 2021)

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