

Structural Model of Factors Relate to Service Quality in the Application of Artificial Intelligence Security Technology in UAE

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ABSTRACT

The aim of this paper is to presents a study on structural model of factors relate to service quality performance in application of AI security technology in UAE. The study adopted quantitative approach where the data was collected through structured questionnaire survey and the respondents were selected using sample purposive sampling technique. A total of 400 questionnaire were distributed however 326 sets of the structured questionnaires were received with valid data. These collected data were used in the development of the structural relationship model of Service Quality Performance of Artificial intelligence security technology in UAE. The structural model was developed using AMOS SEM software. Before it is developed all the constructs in the model were developed individually to form measurement model and was assessed using confirmatory factor analysis (CFA) of the software. It was found that all the measurement models achieved the fitness criteria, then these models were tied up to form structural model according to the formulated conceptual model. Then the developed structural model was assessed using path analysis of the software to decide the agreement with the hypotheses. It was found that the model has achieved it good of fitness with interpreted hypotheses reveal that six of the relationship between service quality performance and the Use AI security technologies are significant in UAE.

Keywords

Artificial Intelligence, Service quality, Performance, Security Technologies, AMOS SEM UAE

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Introduction

Artificial intelligence is one of the computer science branches which make machine like computer to behave like humans having automation of intelligent behavior. Artificial intelligence is used in developing games, expert systems, natural language, and robotics. Artificial Intelligence (AI) technology change human life with the invention of the first computer in the early 1940s [1]. Modern Artificial Intelligence started at the first conference on AI convened at Dartmouth College in New Hampshire in 1956. At this conference scientists discussed the possibility of computers that could behave intelligently [2, 3]. In the early 1980s, Fuzzy Logic techniques were implemented on Japanese subway trains and also in the production of Danish cement manufacturing system. The Expert System was started to be used in mid 1980s by large company [5]. By end of 1980s, Neural Networks was used in business applications [4]. Then AI applications keep progressing in the early 1990s in application such as automatic scheduling software, software to manage information for individuals, automatic mortgage underwriting systems and automatic investment decision makers. In the mid1990s, AI technology has improved and used in software to

predict daily revenues and staffing requirements for a business, credit fraud detection systems and decision support systems. It was then in late 1990s, AI was used in applications such as data mining tools, e-mail filters and web crawlers [7]. In this globalization era, service quality is considered a main factor for an organization success Industry experts acknowledged the important of service quality as an effective competitive approach in shaping the marketing and business strategy. This trending approach is being adopted through the setting up of customer relation department in most of the organizations. The role of this department is specifically to listen and entertain the customer needs which indirectly measure the level of service quality. Most of the organisations have the intentions of providing quality service to their customers/clients/stakeholders. For service industry, it promote 'best service wins' to stay competitive with others. Salespersons realized that competition is well managed through service quality. Hence, service quality is important in achieving competitive advantage for an organization. Deprived quality service will make the organization not competitive in this challenging era. With good service quality it helps

a company to stay competitive if it offer almost identical services such as security services. Then by establishing good quality service it will differentiate oneself to others and can yield a higher proportion of consumer's choices which resulted having better financial achievement [8].

With globalization and liberalization, it accelerates merger and acquisition of industry especially service sectors which included AI security industry. This cause intense competition among AI security companies in offering products and services. Due to this, the focus areas for organizations are changing from profit maximization to maximizing profits through increased customer satisfaction [9]. With the digitalization of information, customers nowadays are becoming more educated, well informed and more selective. Since UAE economy has becoming more knowledge based, the demand for high quality services increases with variety of customer's choices [10]. AI security service industry is among the pillars in contributing to the economy for UAE, this industry is urgently need to improve its services towards the customer. With high foreign investment in AI security into the market, industry players need to improve the operational efficiency in order to keep them sustainable and competitive through better service quality. The industry is required to re-engineer the operational systems so as to be more customers centric by improving the service to remain competitive. Quality service or product is basically judge by customers when they have used the product or received the service [11].

UAE government is increasingly aware and concerned about the level of security service receive by the public and organizations. Despite the importance of measuring service quality across industries and nationwide, little empirical research has been conducted in the delivery of service quality of AI technology on securing properties in UAE. Hence, the purpose of this paper is to present a study is to evaluate service quality of artificial intelligence on securing properties in United Arab Emirate. This research is therefore can give the factors related to the service quality of AI technology on security in United Arab Emirate.

Literature Review

Quality can be understood and interpreted in different manner depends on individual

perspective. Consumers and producers may have different perceptions about quality. From the consumers' point of view, quality product or service is the product or service that meets suit their needs. While from the producer/manufacturer, quality indicates the product or service that has been sold successfully. Whereas from the market segment, quality is the extent to which certain goods or services meet a particular customer in relation to identical goods or services offered by competition [12]. However the perspective of the customer or user of the service or product is one of the most important consideration defining the quality. Usually customer's perception consists of the following factors which are the quality of products or services; services provided by the institution; the employees; the image of the organization; the selling price of products or services; the total cost of the customer for the product or service [13]. The impact on the customer perception is important as it creates value to the product/service/organization. Distinctiveness of the product or service that affects the perception of the customer provides a large contribution to the creation of a complex construct of quality [14]. Basically, quality is free but low quality of service or product is costly because it needs to perform additional activities to improve it [15, 16]. Hence it is important to do the right job at the first time, in order to avoid negative consequences and increasing costs for repeating the process of producing products or services. The quality of services or products depends on customers' definition based on their actual experience with the product or service. The quality measured according to the customer expectations (*imposed or unspoken*), merely sensed or conscious, entirely subjective or technically operational (*presenting such a movable target in the highly competitive market*) [17,18].

Artificial Intelligence (AI) is a nonhuman intelligence that able to replicate human mental skills, such as pattern recognition, understanding natural language, adaptive learning from experience, strategizing, or reasoning. It can also mean a machine which can incorporate abstraction and interpretation into information processing and make decisions at a level of sophistication of that human intelligent. Computer syatem also applied AI where it able to perform tasks that normally require human intelligence for eaxmple

perception, conversation, decision-making. However, while human intelligence has been the common choice as a yardstick for benchmarking or assessing progress in AI development, there are also approaches that do not seek to recreate human intelligence or performance, but instead focus more on systems that approach an ideal-typical 'rational' performance [2, 4].

A security is an important issue for human, company environment, organization, community and country to maintain growth and stability. Security threat gives rise to several problems such as instability, economical setbacks, terror attacks causes loss of human lives, creates Un-safety feelings [2]. Security is a challenging task to human because of limitations and restrictions like analyzing and processing several information at a time. This is big drawback can be overcome by more practical manner with the help of artificial intelligence techniques integration. Examples of security system includes home affair security, intrusion detection system, DOS attack, cryptography, video vigilance system and others. Human processing ability integrated with AI will certainly increase the security at high level [4]. The integration of Artificial Intelligence will certainly improve the performance of the existing security system. Thus, the security system will alert the user before unwanted things happened. Security has becoming major issue around the world including in UAE. The government is focussing adopting AI in security technology to ensure the safety of the business and the people. Customers are seeking AI technology providers that can serve their satisfaction.

Conceptual Model

A conceptual framework/model is the apparent flow of relationship among the studied variables representing a diagrammatic form. The conceptual framework is a deduction made from the research theoretical framework which is generated from reviewed literature on the subject matter under investigation. It provides a clear explanation on the linkages or relationship that shows the hypothesis postulated for readers understanding without being bordered to read through the whole document. It is also a summary of how the variables of the study are connected to each other. For this study, the conceptual framework is about the relationship between services quality with the willingness to use AI security technology in

safeguarding the properties. The formulation of this framework is based on literature of services quality that resulted to the willingness to use AI security technology. Thus the framework is as figure 1



Figure 1 the conceptual model

Based on this conceptual mode, the hypotheses that can be derived from it are that all the 10 constructs of the independent variables are positive and significant toward the one dependent variable construct which is perceived impact of technology.

Research Methodology and Design

The study adopted quantitative approach where the data was collected through structured questionnaire survey and the respondents were selected using sample purposive sampling technique. A total of 400 questionnaire were distributed however 326 sets of the structured questionnaires were received with valid data. These collected data were used in the development of the structural relationship model of Service Quality Performance of Artificial intelligence security technology in UAE. The structural model was developed using AMOS SEM software. Before it is developed all the constructs in the model were developed individually to form measurement model and was assessed using confirmatory factor analysis (CFA) of the software. After all the measurement models had achieved the fitness criteria, then these models were tied up to form structural model according to the formulated conceptual model. Then the developed structural model was assessed

using path analysis of the software to decide the agreement with the hypotheses. Before the collected data can be used for the modelling, the data was examined at univariate level and multivariate level definitions of normality. The recommendation is that the skew and kurtosis values for measuring items should be between -1 and + 1 and that the results for all items should be within the acceptable range of -1 to + 1, which means that the hypothesis is fulfilled and does not imply any variance from the normality of the information. Multicollinearity occurs when the model is associated with two or more variables and provides repeated response information. Variance inflation factors (VIF) and sensitivity were used to calculate multicollinearity. There is an issue with multicollinearity on the off chance that the VIF value reaches 4.0, or by sensitivity under 0.2. The results found that all VIF values ranged from 1.037 to 1.289, and tolerance values ranged from 0.77 to 0.965, indicates that the data comply with multicollinearity analysis.

Analysis for structural equation modeling

Based on the conceptual model in figure 1, the analysis of the model is using covariance-based structural equation modeling (CB-SEM) technique using Analysis of Moment Structure (AMOS) software. It was done in two stages that are at measurement stage and at the structural stage. The model consisted of 10 independents constructs and 1 dependent construct which means there are 11 measurement model need to be analyzed. The analysis at measurement level was conducted using Confirmatory Factor Analysis (CFA) technique of the software for every measurement model until the model achieved the fitness criteria. The analysis followed the CB-SEM methodology prescribed in the number of multivariate literature [16, 17]. The analysis begin with

- Specification of the model;
- Model identification;
- Estimation of parameters;
- Assessment of goodness-of-fit and
- Finally model re-specification.

This procedure was repeatedly followed in the assessment of both the measurement models and the structural models until a valid model is achieved meaning that the model is fit. [16,17]; After all the measurement models achieved the acceptable level of fitness, the models are tied up

to form the structural model according to the formation of the conceptual model as figure 1. Then the analysis of the structural model was conducted until it achieved the fitness level. After that the model was evaluated using path analysis of the software to determine the achievement of the hypotheses that had been defined earlier [16, 17]. However for this paper it only show the structural model at the initial stage of the analysis as figure 2 and the final stage of the analysis as figure 3.

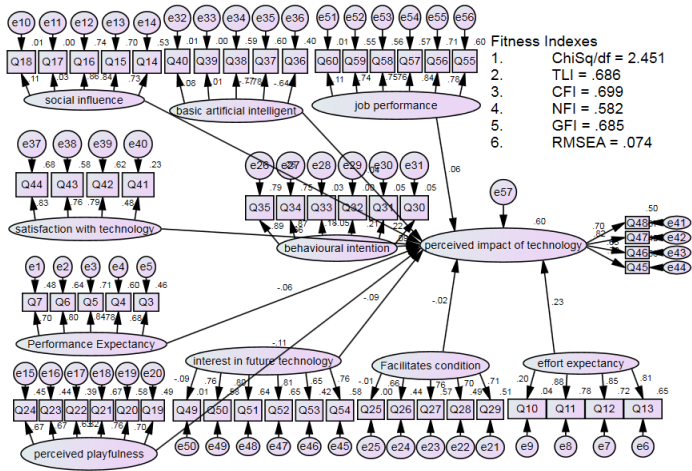


Figure 2 - Initial structural measurement model

As shown in Figure 2, certain fitness indexes for the structural measurement model do not attain the acceptable and required level of goodness-of-fitness indexes as in table 1. The observed factor loadings for the entire constructs were above 0.5, though, fitness indexes were not achieved.

Table 1: The Fitness Indices of structural model			
Name of Index	Level of Acceptance	Index Value	Comments
Chisq/df	Chisq/df ≤ 3	2.451	The required level is achieved
TLI	TLI ≥ 0.9 means satisfactory	0.686	The required level is not achieved
CFI	CFI ≥ 0.9 means satisfactory fit.	0.699	The required level is not achieved
NFI	NFI ≥ 0.80 suggests a good fit	0.582	The required level is not achieved
GFI	GFI ≥ 0.80	0.685	The required

	suggests a		level is not
	good fit.		achieved
RMSEA	RMSEA ≤ 0.08	0.074	The required level is achieved
Model fitness is not achieved			

Therefore the modification and re-specification of the model was reexamined in order to identify redundant items and they were correlated for the improvement of the model's goodness-of-fitness indexes. The modification processes continued until all the 11 items having low factor loading were deleted. The final structural model achieved the accepted threshold as figure 3.

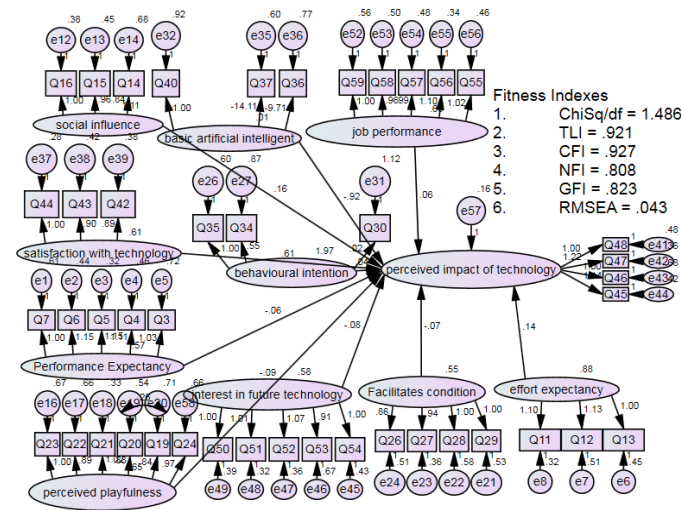


Figure 3 - Final structural measurement model

Figure 3 which shows the progressive improvement in the goodness-of-fitness indexes till acceptable level was achieved. Table 2 shows

Table 2 - The summary of the tested hypotheses in this research

Hypotheses of from the modelling	P-value	Result
Performance expectancy has a significant relationship with the Perceived impact of technology	***	Supported
Effort expectancy has a significant relationship with the Perceived impact of technology	.078	Not Supported
Social influence has a significant relationship with the Perceived impact of technology	***	Supported
Facilities conditions has a significant relationship with the Perceived impact of technology	0.081	Not Supported
Satisfaction with technology has a significant relationship with the Perceived impact of technology	0.031	Supported
Interest in future technology has a significant relationship with the Perceived impact of technology	***	Supported

that all the fitness criteria as being fulfilled and this indicate that the model is fit to assess the path strength.

Table 2: The Fitness Indices of structural model

Name of Index	Level of Acceptance	Index Value	Comments
Chisq/df	Chisq/df ≤ 3	1.486	The required level is achieved
TLI	TLI ≥ 0.9 means satisfactory	0.921	The required level is achieved
CFI	CFI ≥ 0.9 means satisfactory fit.	0.927	The required level is achieved
NFI	NFI ≥ 0.80 suggests a good fit	0.808	The required level is achieved
GFI	GFI ≥ 0.80 suggests a good fit.	0.823	The required level is achieved
RMSEA	RMSEA ≤ 0.08 mediocre fit.	0.043	The required level is achieved
Model fitness is achieved			

4.2 Testing of research hypotheses

In this hypothesis testing, path analysis of the AMOS software was used to determine the P value of each of the path. The results of the path analysis for the model are as in table 2.

Job performance has a significant relationship with the Perceived impact of technology	0.081	Not Supported
Perceived playfulness has a significant relationship with the Perceived impact of technology	***	Supported
Basic artificial intelligent has a significant relationship with the Perceived impact of technology	0.092	Not Supported
Perceived playful has a significant relationship with the Perceived impact of technology	0.021	Supported

Note: *** represents P-value is less than 0.05

The results from table 2 indicate that 6 out of 10 hypotheses are significant. However the 4 hypotheses that are not significant are due to the collected data are not strong to make the relationship significant as what supposed being hypothesized in the conceptual model. Therefore it could be said that as it has been proven that strategies improvement in service quality using causes constructs is effecting the use of AI technology in UAE.

Conclusion

The paper has presented a study on structural model of factors relate to service quality performance in application of AI security technology in UAE. The study adopted quantitative approach where the data was collected through structured questionnaire survey and the respondents were selected using sample purposive sampling technique. A total of 400 questionnaire were distributed however 326 sets of the structured questionnaires were received with valid data. These collected data were used in the development of the structural relationship model of Service Quality Performance of Artificial intelligence security technology in UAE. The structural model was developed using AMOS SEM software. Before it is developed all the constructs in the model were developed individually to form measurement model and was assessed using confirmatory factor analysis (CFA) of the software. It was found that all the measurement models achieved the fitness criteria, then these models were tied up to form structural model according to the formulated conceptual model. Then the developed structural model was assessed using path analysis of the software to decide the agreement with the hypotheses. It was found that the model has achieved it good of fitness with interpreted hypotheses reveal that six of the relationship between service quality

performance and the Use AI security technologies are significant in UAE.

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