



Influence of Innovative Digital Technology on Healthcare Service Performance

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DOI: <https://doi.org/10.30880/ijscet.2022.13.02.015>

Received 10 April 2022; Accepted 27 April 2022; Available online 09 May 2022

Abstract: This paper presents a study on innovative digital technology factors affecting UAE healthcare service practices performance. The innovative digital technology factors are clustered in four domains namely system development; IT base innovation; technology services and process integration. Data collection was conducted through questionnaire survey among healthcare employees from managers to operational workers in Dibba Hospital, Masafi Hospital, and Fujairah Hospital in UAE. The selection of respondents was carried out in two sampling approaches which are stratified sampling random sampling technique methods. A total of 300 questionnaire sets were distributed but only 281 sets of completed questionnaire were returned for the analysis. This represents the responses rate of 94%. Before conducting the ranking analysis, the collected data was characterised for its reliability and normality patterns and found that the data has achieved the reliability and normality criteria. The ranking analysis found that the most influential innovative digital technology factor is TS2 of the technology services domain. TS2 is concerning the *connectivity with an extranet*. The second factor is TS3 in the technology services domain which is *efficient human resource management system*. The third rank is SD2 system development domain which is *updates the technological features of existing system to improve healthcare services*. The fourth rank is BIN1 in IT base innovation domain which is *adds new capabilities to the existing system*. Finally, the fifth rank is BIN2 in IT base innovation domain which is *new features are often added to the existing system*.

Keywords: Innovative digital technology, healthcare system

1. Introduction

Investment in technologies and initiatives would have a positive effect on achieving the UAE government's policies and objectives to improve organisation competitiveness, so the UAE has always been concerned with technology and innovation (Mohamed et al., 2019). According to Zineddine (2012), the healthcare sector does not seem to be able to conduct adequate precautions without the UAE government's intervention. The UAE's healthcare authorities are working hard to build and strengthen the sector's standards by encouraging the use of innovative technology that can improve the performance of healthcare services, such as the Augmented Reality platforms that enable doctors in the UAE to contact the best specialists in other countries while doing operations. However, the utilisation of innovation technologies in healthcare sector in the UAE is still in the phase of development since hospitals and clinics are still need time to embrace such revolutionary healthcare technologies, which calls for the need of in-depth investigation of how to improve the use of innovation technologies to promote healthcare services.

Innovation technology healthcare services are expensive, complex, and critical because of their direct impact on economies and the quality of people's lives and their well-being (Danaher & Gallan, 2016). Healthcare vision has

currently evolved around people-centered and integrated care system that provides health services to people throughout their lives (WHO, 2016). Nevertheless, to achieve such vision, there is a need to understand the nature of services like digital service innovations in order to highlight the challenges and how to improve healthcare systems. Hence, investigating digital technology innovations in the area of healthcare and their impact on healthcare services is essential to support the healthcare vision of providing better services to people throughout their lives. Additionally, emerging healthcare service technologies are in constant enhancement, and this created a challenge of fulfilling the potential of new technologies and data solutions (Kellermann & Jones, 2013; Patricio et al., 2020), and these innovative technologies are usually associated with challenges and risks, including control, safety, privacy, and transparency (Safavi & Dare, 2018; Patricio et al., 2020). Therefore, digital technology innovations of healthcare services might not support the transformation of healthcare service and improving healthcare service performance.

One of the issues of healthcare services in the UAE is related to the lack of system development of healthcare services (Al-Neyadi et al., 2018). Despite the technological development in the health sector in the UAE, it is still facing many problems. One of the issues is the patients' long queues in many hospitals in United Arab Emirates (UAE) (Aburayya et al., 2020). Most of the times, especially during overload working hours, patients are crowded in front of the prescription counter. This issue shows the importance of system development in healthcare organizations, since this issue could lead many problems to patient dissatisfaction and hospital reputation and create an exhausting work environment for the healthcare workers (Keitel, 2012). Hence, the current study has focused on the effect of digital technologies on improving healthcare services in the UAE.

In terms of using information technology as an aspect of innovation technologies, their usage is associated with the hope to transform a health and social care sector that is increasingly struggling with the need to do more with less funding. Many healthcare providers are looking for opportunities to use technology to enhance services and cope better with the long-term demographic pressures of their service system. At the same time, there remains a great held belief that health and social care struggles to manage large-scale change including digital technology (Maguire & Honeyman, 2018). Technologies have a good effect on the corporate economy but the result of their use is vague and sometimes very expensive to achieve and it could reduce the prosperity of health organizations as it may take a long time and effort to implement innovation technology in healthcare organizations (Lee & Yoon, 2021). Besides, Lapão (2018) concluded that with the challenges meeting the health care sector from demographics to multiple diseases that have arisen with the growing demand for health services, modern technologies are the best thing to address these concerns, but solving these problems is not easy because digitizing health needs ensuring that the application is very accurate and correct and integrated with other procedures. The ability of this technology to make a clear difference in healthcare delivery and increase patient involvement depends on the effectiveness and quality of its design (Al-Sadan, & Al-Mitwali, 2015). In the context of the UAE, there is no clear evidence for any study that has investigated the use of digital technology innovations in order to highlight its impact on healthcare services, which is the main aim of the current study. Therefore, there is a need to investigate digital healthcare services in the UAE in order to highlight the use of innovation digital technologies in healthcare organizations and their impact on healthcare service performance.

In terms of the role of innovation technology in technology services, some systems fail to link hospitals with the patients' medical record, so you may find some patients are being treated in hospitals where they cannot find a previous medical record for the patient, and thus may endanger the patient's life due to the patient's medical information being repeated and the medical record multiplied for them (Rghioui, 2020). This might occur due to the lack of linking the processes among departments so that all the information of the patients are stored in the hospital system. Therefore, this research investigates the role of innovation technology in the improvement of the health sector, especially that the viewpoint of healthcare workers of the effectiveness of digital technology innovations will guide the study to propose a model to improve the effectiveness of healthcare services using digital technology innovations in healthcare organizations.

Another issue among healthcare service providers is the fragmentation into highly-divided subspecialties, internal and external laboratories, and competitive practices, resulted from the poor interdepartmental processes. This usually requires team work but a serious issue that might arise is the potential breakdown of communication and in the coordination to treat the patients, leading to less effective medical care (Hwang et al., 2013; Patricio et al., 2020). Digital technology innovations of healthcare service have the tendency of integrating and coordinating the workflow, and such integration has been the solution for this issue. However, the failure of using suitable digital technology innovations might not contribute to solve this issue (Patricio et al., 2020). Therefore, one of the elements of the current study is to assess the integration of innovative digital technologies to facilitate the workflow of healthcare services.

Organizational learning capacity has been shown in previous studies to be a predictor of organisation improvement, which in consequence is a determinant of effective technology implementation to enhance services (Uurlu & Kurt, 2016). The organizational learning capacity factor has a positive effect on the success of technological innovation implementation (Khamis et al., 2014). This understanding is in line with previous academic research, which found that organisational learning capacity is one of the most important factors driving the adoption of innovation technology to increase organisation performance across its services (Khamis et al., 2014). According to Lyman et al. (2019), more research is required to advance the area of organisational learning in healthcare organizations, and researchers need to assess the organisational learning process explicitly if they could develop ways to quantify the role

of empirical referents in organisations instead of indirect investigation through organisational outcomes. Therefore, there is a need for studies to investigate the role of organisational learning capacity in healthcare organisations. Besides, previous research has not specifically looked at the mediating role of organisational learning capacity in the relationship between healthcare innovation technology and service performance success, leaving a research gap. This study contributes to the literature in this field by filling a research gap through investigating the mediating role of organisation learning capacity on the relationship between technology innovation and healthcare service performance in the context of the UAE.

Finally, the focus of studying the use of innovation digital technologies in health sectors in the Middle East seems to be absent since most of the studies on innovation digital technologies on health section are carried out in the western countries. For this reason, the current study aims to investigate impact factors of digital technology innovations on healthcare service performance in the UAE, which is one of the leading countries in the Middle East.

2. Digital Technology and Healthcare Services

Healthcare technology improves the use of services such as medical services. Doctors use robotic surgery techniques in fields like gynaecology. Robotic surgery is a type of health intervention that helps physicians reduce the time and efforts involved in carrying out difficult processes and complex operations (Schreuder and Verheijen, 2009). Healthcare technologies could further reduce medical errors, get to know patients, guide members, increase safety and security, and enhance the quality of service provided (Holden, 2010; Chen et al., 2007).

In December 2012, the Secretary of State commissioned Price water house Coopers to conduct a high level of work highlighting the potential benefits that could be achievable through the more efficient and effective use of information and technology in the NHS and social care before any action is taken. The review was finished between the 17th December, 2012 and the 14th January, 2013. The review first drew together additional actions that could be taken by ambitious, proactive NHS organizations to better use information and technology. These actions were identified by reviewing existing NHS and private sector best practice, the review also drew on best practice from international health systems (including those in the USA, New Zealand and Canada) and other industry sectors. The review estimates the benefits to the NHS system and its service users that could be delivered, both financial and non-financial benefits were considered, the review did not find that there were significant benefits that could be delivered by the implementation of the actions. (PricewaterhouseCoopers, 2018).

2.1 Application of Digital Technology in Healthcare Services

Today, healthcare technology is the most important field in healthcare and job creation in healthcare. Technology sometimes interferes with healthcare, and new opportunities are emerging now as a result of the rapid growth in the fields of Internet of Things (IoT). Technology is one of the foundations of the development of health services little by little. Recently, emphasis has been placed on developing the hospital's structure, including modern technology and innovations, and their impact on patient safety and the provision of safe care for them. To avoid and reduce errors in the provision of health services, major changes in the environment, culture, processes, financial and non-financial resources are necessary for adaptation (Chen et al., 2020).

Technological innovation is constantly increasing, affecting all industries as they develop. In healthcare, technology has essential functions in all procedures and processes (patient records, data follow-up, laboratory tests and self-care materials, etc.) (Tuckson, 2017). Zhamardiy et al. (2020) stated that if healthcare services are not updated from time to time, and if they do not include new information technology, this will be ineffective and the patient will not trust them so the technologies must be constantly updated. This is also recommended

Phichitchaisopa and Naenna (2013) conducted a study concluded that health information technology enhances healthcare efficiency and performance when used in supply chain management, it is considered one of the best technologies used. The aim of their study is to set and examine the Unified Theory of Acceptance and Use of Technology (UTAUT) to study the factors that influence the use of information technology in healthcare. They developed an organized survey and submitted to many healthcare sectors in Thailand. 400 employees including doctors, nurses and others were taken into consideration, data were collected from them. The results indicate that there are several factors that have a significant impact (average performance, average effort, and conditions flexibility). Given the results, for healthcare information technology adoption in broad areas, healthcare officials must enhance the behaviors and attitudes of healthcare members and improve flexible conditions.

Alrahbi, Khan and Hussain (2021) identified the drivers that influence information technology implementation in new healthcare systems based on a case study in the UAE. The goal is to determine, study, and set in a hierarchical frame and to identify the drivers for the adoption of information technology in the main groups of healthcare stakeholders through the analytic hierarchy process (AHP) model. The findings showed that the primary motivation was government support followed by information exchange. The study promotes technology adoption in general, and in the UAE in particular. A small part of the study examined the collective opinions of stakeholders, and there is as yet no serious motivators for IT adoption in the healthcare sector in the UAE (Aldosari, 2014).

In a study conducted by Al-Hadban, Hashim and Youssef (2017) with the target of searching for factors that influence the utilization and application of Healthcare Information System (HIS) in many hospitals in Iraq and to take a deep understanding of the issues that associate to this system and have a pure and accurate idea of it, they applied a qualitative method and use semi-structured meetings to obtain the goal of the study, looked for many ideas for health care workers from many regions to look at the situation from different points and get a true, correct and valid image. They concluded that there are four different factors that influence health care personnel to use the HIT system (personal, technical, institutional, and environmental). Professionals should take into account all these dimensions provide when applying this system, that each of them performs a serious role in the application and development process.

In the context of healthcare medicine, the increase of free international trade and insufficient regulation of medicine has made the trade of fake medicines proliferated everywhere (Mackey & Nayyar, 2017). Pharmaceutical institutions use certain technologies to capture illegal medication in their supply chain. According to Mackey and Nayyar (2017), Technological protection is the best solution to obviate this problem, various technologies have emerged such as overt and covert, tracking and tracing technologies. This confirms exemplary technological properties, current anti-counterfeiting technologies, and their implementation in many countries. Developed countries such as the USA have used Radio-frequency identification (RFID) while the European trend is towards 2D barcodes. The Indian government is being educated about the scale of the problem and has drafted procedures enforcing bar codes to avoid this kind of problems (Bansal, Malla, Gudala, & Tiwari, 2013).

2.2 Digital Technology Innovations and Healthcare Service in the UAE

In 2014, Al Maktoum - Vice President and Prime Minister in the UAE - designed the National Innovation Strategy to make the UAE one of the most innovative countries in the world. He pointed out that this UAE strategy will pay much attention to the healthcare field. These plans encouraged innovations in Emirati institutions in all sectors, especially the healthcare sector, to evolve from the stages of work and look forward to major new innovations and technologies (Moonesar et al., 2019). Ahmed (2014) identified health information technology as the employment of computers for digital support by healthcare professionals such as electronic keeping of medical records, patient records, and health care provider orders.

The developments in smart phones and electronic devices allow to collect all kinds of medical and clinical data accurately and in a timely manner. Therefore, immediate data can be collected on a person's mood, perception, and actions, as well as information about his location, behavior and physiological condition (Marzano et al., 2015). There are many advantages of HIT to all healthcare professionals, for example, enhancing quality, effectiveness and time to transmitting health data in health sectors, reducing errors and minimizing the cost of preserving medical records (Wang et al., 2018). Health monitoring is one of the most important things to pay attention to in the healthcare sector. One of the technologies used for this is the wearable system, a portable electronic device that can be invisibly placed in a user's wears or can be worn (Iqbal et al., 2021). This technology can be used for old and unwell people as it has great ability to improve their independent quality of life. The technological progress of these sensory devices provides an appropriate way to live independently at home and promote the quality of patient's life.

Aziz, Atallah, Ismail and Tarapiah (2016) concluded that in recent years, health monitors have been developed and smart devices have been improved for the purpose of monitoring patient cases. In their research, they wanted to put the patient's blood pressure and body temperature on initial observation. They searched previous medical records and found that death rates from heart disease and hypertension were too high. Therefore, key measures to prevent hypertension must be applied to keep patients' lives in time, and this is a humanity principle.

Today, globalization requires creative countries, which have many features and inventions like government initiatives, smart transportation processes, healthcare innovations. For example, healthcare systems constantly monitor patients and enhance their healthcare. With certain devices, data can be saved and compared to data standards established by a patient-specific professional. In any emergency, a message is sent to the health professional's mobile phone with a value assessment. Moreover, GPS provides data about the location of the observed patient. Al-Ghani, Hussein, Jamali and Abu Al-Maati (2015) said that belief in the application of new innovations and technologies in the medical framework has a good effect on healthcare because it may replace human procedures in medical processes. With the development and advancement of e-services, healthcare offers various e-services. E-health has a good impact on healthcare outputs (Wildenbos et al., 2016). E-health services enhance efficiencies, provide good patient status data, and improve communication among healthcare workers (Antes et al., 2021).

Robotic pharmacies were like fiction 10 years ago, and today they're a fact. Over-the-counter robots evolved in the UAE for the first time in January 2017 when the Dubai Health Authority established a smart pharmacy in two Emirati hospitals, and more are predictable to develop later. Each robot can store approximately 35,000 medications and distribute 12 prescriptions in seconds. The waiting period for consumers will be shorter. Since robots do not handle recipes that were not an obvious bar code, the risk of human error is reduced (Kumar et al., 2018). Koornneef, Robin and Blair (2017) surveyed the evolution and results of changes in health systems in the United Arab Emirates. They found it unreasonable to confirm whether the change and reform of the UAE health system was active. They advise that the study continues in this domain but the study questions have to be determined more visible, with an emphasis on

results rather than procedures. Everywhere, individuals started to use small portable sensors, and new e-health and m-health technologies have evolved (Firouzi et al., 2018). AL-Hashmi et al. (2019) said that the ministries of the UAE lately considered the method of artificial intelligence to plan visions of all areas of work, especially in the field of healthcare in order to reduce the severe consequences of serious diseases affecting individuals. However, the prosperity of this innovation relies on the extent to which health professionals and healthcare consumers accept and utilize it. Hence, this study aims to investigate the digital technology factors influencing the healthcare system and the factors are as in table 1.

Table 1 - Results of reliability test

Groups	Factors code	Description of the factors
System Development	SD1	Improves the effectiveness of the existing system.
	SD2	Updates the technological features of existing system to improve healthcare services.
	SD3	Continuously corrects the identified defects.
	SD4	Modifies the existing system on a continuous basis to enhance its efficiency.
	SD5	Adopts new technology advancements to improve the organization processes.
IT Base Innovation	BIN1	Adds new capabilities to the existing system.
	BIN2	New features are often added to the existing system.
	BIN3	Automated storage and retrieval system.
	BIN4	Continuously improves the speed of the existing service system.
	BIN5	Focuses on the reliability of the service system.
	BIN6	Makes use of advanced technological functions in our service system.
Technology Services	TS1	Connected with an intranet.
	TS2	Connected with an extranet.
	TS3	Has an efficient human resource management system.
	TS4	Has an efficient customer relationship management system.
	TS5	Has an effective medicine distribution system.
	TS6	All the departments are connected with the organization technology system.
Process Integration	PIN1	Continuous online interaction between departments.
	PIN2	Efficient flow of information between functions and departments.
	PIN3	Online collaboration among departments is encouraged in the organization.
	PIN4	All departments have online functions to achieve the organization goals.
	PIN5	Electronic data interchange is widely practiced in the organization.

3. Methodology

The research employed a quantitative approach to focus on how technological advancement affects service performance at UAE healthcare providers. A data collection was conducted through structured questionnaire set where targeted respondents were requested to gauge the level of importance/influence of the innovative digital technology factors toward the healthcare service performance in UAE.

3.1 Sample Size

The target population is hospital managers and operational workers in Dibba Hospital (162), Masafi Hospital (152 workers), and Fujairah Hospital (726 workers) with total population of 1040 workers. According to Krejcie & Morgan (1970) table, the minimum sample size is 278 participants in order to get trustworthy results.

3.2 Sampling Technique

The study adopted two sampling techniques of collecting data. The first technique is stratified sampling method for deciding on health organisations. Stratified sampling is applied by dividing the population into smaller group that represent the whole population especially when the population has mixed characteristics, regarding overlapping, usually smaller groups arrange and classify by same characteristics such as age, gender, educational level and others. According to Etikan & Bala, (2017), with a large number of populations, so separating the population into subsets helps in obtaining more accurate and comprehensive statistical results regardless time consuming and tiresome while layering large population

While the second method is the probability random sampling technique. The probability random sampling technique is to derive the participants from the total population by giving the greatest chance to get a small group of people (sample) that truly representative of the existing population (Brophy & Joseph,1995). In other words, all the staff in the managerial and operational level has the chance to participate in the study.

3.3 Questionnaire Survey

The questionnaire survey has a cover letter to explain to the participants the nature of the study and its aims. It explains to the participants that their participation is voluntary and they have the right to withdraw from the participation. It also assures the participants that their responses will be confidential and will be used for research purposes only. The questionnaire was translated into Arabic because it is the mother tongue of the participants where it was checked by professional translators to reflect the same content of the survey factors and items.

The survey was conducted through face-to-face approach. Participants were given approximately twenty minutes to complete the questionnaire, and the cover letter provides them with the instructions on how to answer the items in each section to make it easier for them to answer the survey. Informed consent was taken from them first, then the components of the questionnaire were later explained, along with the method for answering the questions.

4. Data Collection and Analysis

The required sample size for this study is 278, then a total of 300 questionnaire sets were distributed but only 281 sets of completed questionnaire were returned for the analysis. This represents the responses rate of 94%.

4.1 Demographic of Respondents

The demography of the respondents of this survey is as described in figure 1

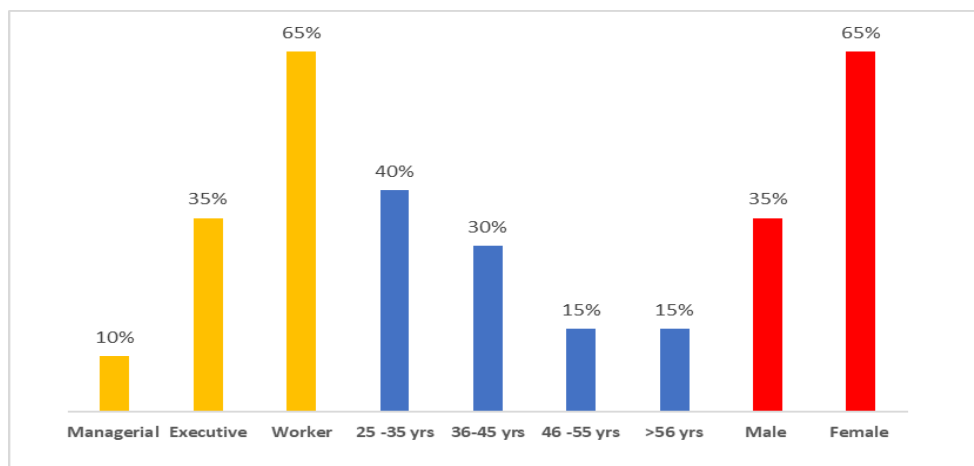


Fig. 1 - Demographic chart

The chart shows that most of the respondents are from the operational worker having 65% participation and followed by 35% participation from the executive personnel and finally 10% from the top management of the hospitals. While in term of respondents age range, most of the respondents are in the age of 25 to 35 years old, then followed by older staffs. Finally, in term of gender, most of the respondents are female with 65% and male with 35%. This respondent's demography indicate that younger and operational workers are mostly handled the digital equipment in ensuring the services offered by the hospital satisfied the customers.

4.2 Reliability of the Collected Data

The collected survey data is tested for reliability test. In order to check the internal consistency given by respondents based on the Likert scale scores. For the reliability test, Cronbach's alpha criterion by George & Mallery (2003) was adopted and the result of the test is as in Table 2.

Table 2 - Results of reliability test

Innovative Digital Technology Groups	No of factors	Cronbach alpha value
1. System Development	5	0.825
2. IT Base Innovation	6	0.821
3. Technology Services	6	0.818
4. Process Integration	5	0.870
Overall	22	0.834

Cronbach's alpha coefficient indicates the level of inputs' consistency given by the respondents on the factors with the range between 0 and 1 (where 0 is the lowest and 1 is the highest inside consistency). According to Sekaran & Bougie, 2016 and Souza et al., 2017, if the rates of Cronbach's alpha coefficient match or go beyond 70% (0.7), then the data is recognised as reliable. Based on the results in Table 1 of reliability test, it shows that the coefficients/values for four domains of factors with the average value 0.834 of which are exceeding 0.7, thus the collected data is reliable for further analysis.

4.3 Normality of the Collected Data

According to Hair et al. (2013) normal data distribution is based on the assumption that the data distribution has a bell shape. It is relevant to consider the data distribution when working with SPSS (Hair et al., 2013). The kurtosis and skewness of the distribution can be measured by the researcher to assess the normalization of the data. Kurtosis is the flatness or peakedness of the distribution along the Y-axis, whereas skewness is an indication that a variable's distribution is spread to the right or left along the X-axis (Hair et al., 2013). A data is said to have a normal distribution when its kurtosis and skewness values are both zero, but this rarely happens (Hair Jr et al., 2013). Hence, the guiding principle for normal distribution is to accept items whose skewness value is less than 2 and absolute kurtosis value is less than 3. The kurtosis and skewness values of all the items in this study are within the acceptable range, as seen in Table 3.

Table 3 - Results of normality test

Factors Domains	Factors code	Normality	
		Skewness	Kurtosis
System Development	SD1	-0.535	-0.706
	SD2	-1.058	0.275
	SD3	-0.321	-0.364
	SD4	0.205	-0.072
	SD5	-0.058	1.741
IT Base Innovation	BIN1	-0.167	-1.460
	BIN2	-0.492	-0.658
	BIN3	-0.437	-0.675
	BIN4	0.121	-0.438
	BIN5	-0.402	0.089
	BIN6	-0.205	-0.072
Technology Services	TS1	-0.108	-1.006
	TS2	-0.685	-1.032
	TS3	-0.719	-0.914
	TS4	-0.05	-0.699
	TS5	0.041	-0.841
	TS6	-0.106	-1.111
Process Integration	PIN1	-0.283	-0.58
	PIN2	-0.461	-0.544
	PIN3	-0.039	-0.472
	PIN4	0.005	-1.17
	PIN5	-0.142	-0.119

The skew and kurtosis value scores for measurement items should be between -1 and +1, according to Kline (2011) and the values for all items should be within the appropriate range of -1 to +1.

4.4 Level of Influence

This section presents the ranking analysis of the factors. The factors are ranked based on the mean score of each factor and if there are more than one factors having same mean score than standard deviation values are used to decide the rank. Factor having same mean score and lower standard deviation value is ranked higher than another factor. The results of the ranking analysis on the factors are as in table 4.

Table 4 - Results of ranking analysis

Factors Domains	Factors code	means	Standard deviation	Ranking [within group]	Ranking [overall]
System Development	SD1	3.370	1.204	2	11
	SD2	3.870	1.207	1	3
	SD3	3.000	0.933	4	21
	SD4	2.900	0.975	5	22
	SD5	3.030	1.194	3	20
IT Base Innovation	BIN1	3.830	1.036	1	4
	BIN2	3.770	0.888	2	5
	BIN3	3.670	1.045	3	6
	BIN4	3.300	1.126	5	14
	BIN5	3.470	1.123	4	8
	BIN6	3.100	1.077	6	17
Technology Services	TS1	3.500	1.154	3	7
	TS2	4.030	1.106	1	1
	TS3	3.900	1.105	2	2
	TS4	3.330	0.96	4	12
	TS5	3.030	1.141	6	19
	TS6	3.100	1.112	5	18
Process Integration	PIN1	3.330	1.125	3	13
	PIN2	3.430	1.186	1	9
	PIN3	3.230	1.214	5	16
	PIN4	3.400	0.935	2	10
	PIN5	3.230	1.125	4	15

Results from table 4, indicates that out of 22 factors, the most influential innovative digital technology factor is TS2 of the technology services domain. TS2 is concerning the *connectivity with an extranet*. The second factor is TS3 in the technology services domain which is *efficient human resource management system*. The third rank is SD2 system development domain which is *updates the technological features of existing system to improve healthcare services*. The fourth rank is BIN1 in IT base innovation domain which is *adds new capabilities to the existing system*. Finally, the fifth rank is BIN2 in IT base innovation domain which is *new features are often added to the existing system*.

5. Conclusion

This paper has presented the ranking analysis of 22 innovative digital technology factors which are clustered in four domains. Before conducting the ranking analysis, the collected data was characterised for its reliability and normality patterns and found that the data has achieved the reliability and normality criteria. The ranking analysis found that the most influential innovative digital technology factor is TS2 of the technology services domain. TS2 is concerning the *connectivity with an extranet*. The second factor is TS3 in the technology services domain which is *efficient human resource management system*. The third rank is SD2 system development domain which is *updates the technological features of existing system to improve healthcare services*. The fourth rank is BIN1 in IT base innovation domain which is *adds new capabilities to the existing system*. Finally, the fifth rank is BIN2 in IT base innovation domain which is *new features are often added to the existing system*.

Acknowledgement

Authors would like to thanks the Universiti Teknikal Malaysia Melaka for allowing to conduct this study.

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