International Journal of Psychosocial Rehabilitation, Vol. 24, Issue 02, 2020
ISSN: 1475-7192

Priority challenges and critical success factors for GIS in Al-Mansour Municipality

Assistant Professor: Firas Raheem Younis Alazzawi[1]

Abstract
This paper looks at the practical use of geographic information systems for municipal services development. CSFs also discuss, in particular, the difficulties of GIS implementing in order to assist in improving municipal services provided by Al-Mansour municipality. This allows GIS to provide a single service network information on destinations. For example, maps and geographical location details, property, roads, green areas, water networks, and sewage networks are available...etc. GIS also offers a catalog of future service operations and existing municipal procedures. This centralized knowledge network will facilitate public services and help decision making for managers in the future. This paper discusses CSFs and the obstacles to be faced in order to obtain GIS ability effectively. The critical contribution of this research is to establish a GIS challenge registry. The problems proposed were grouped into four critical combinations with other sub-fabrics for the characteristics of GIS as an information system. Challenges include HR (top management support, GIS experience, GIS training), data (i.e., data availability, quality of data, and maximum data protection) and software and hardware (i.e., use of suitable technology, quality software, and hardware). (i.e., sufficiently organization and preparation efforts) and enough assistance.

Keywords: *Geographical information systems (GIS), GIS challenges, critical success factors (CSFs), Al-Mansour Municipality, city of Baghdad.*

1- Introduction

Geographical Information Systems (GIS) was developed in the late 1960s at the High School of Design at Harvard and inspired the federal government to create Canada's GIS. After fifty years of progress, The GIS technological climate is now too sophisticated, and developments in computer operating systems, computer graphics, database management, computer-human interaction, graphical user interface are enabled and design object-oriented programming methodologies. Parallel to these technological advances. Parallel to the advances in technology, In terms of communication ties to other applications, GIS functions were identical, each with identical yet special functions (e.g., remote sensing, image processing, computerized design, spatial statistics, and modeling, etc.). Hardware prices have decreased substantially, mainly as a result of developments in computer technology. GIS product prices have also been slowly declining, but more moderately, as the functionality of each new version continues to increase.

Most importantly, it was digital during these 50th years. An information-based society has had time to grow and thrive in developing countries. This picture shows that GIS still undergoes a significant period of development, reaching the global space information technology capabilities of resource management applications and many dimensions and levels of land management and planning. However, there are gaps in the terrain, and it does not take too long to check for cavities. In certain instances, it is broad enough to consume the view that all users fulfill their needs. This makes use of GIS in developing countries, which are also known as emerging countries, low-income countries, southern countries and indirectly the Third World. No objective data are available to assess the penetration of the GIS in developing countries and to evaluate whether or not the use of the technology is successful and sustainable. This should first be tested on the basis of individual case studies and secondary sources. One such auxiliary source is the latest biennial survey from the UN Environment Program Global Resource Information Database on the usage of international information and image processing systems (Hall, 1999).

2- Literature review

2-1 What Geographic information systems are?

Geographic information systems (GIS) are commonly characterized as computerized systems for the integration and analysis of geographic data. (GIS). They can also define, interpret, and forecast patterns using mapping data and characteristic data. Measurement and definition of the spectrum of spatial relations are one of the main functions (Kirby et al., 2017). GIS applications for municipal management and planning services first came into existence at the beginning of the 1990s (Yianna & Poulicos 2011), suggesting that GIS is one of the state-of-the-art technological systems which has enhanced knowledge comprehension and

[1] *University of Baghdad / College of Administration and Economics*
Email: firas.alazzawi@coadec.uobaghdad.edu.iq

data presentation over the past 20 years. The introduction of GIS techniques has a great deal to benefit from the growth of municipal services. GIS can be used to handle the complex and detailed information required for local enterprises, analyze measures, and assist decision-making at planning, tracking, and assessment stages in general.

Nevertheless, as in other areas (Yianna & Poulicos 2011), the number of GIS applications for municipal services growth did not prosper (for instance, environmental management, public security, energy, healthcare, and agriculture). This research aims to explore possibilities for the implementation of GIS technology in the creation of municipal services and to explore possible challenges in its implementation. A GIS may provide a centralized information network on various types of data across municipal services. This includes maps and geographical location details, Accessible land, facilities, superstructure, and features. GIS also lists upcoming community activities and strategies suggested by community groups. GIS technology blends regular database operations with superior visualization of maps and spatial research such as queries and statistical analyzes. It makes it possible for users to incorporate a wide variety of data and, most significantly, helps non-professionals to make complicated queries (Lynx Information Systems, 2012). Spatial information, map data editing, and results can be analyzed by GIS users (Bunruamkaew & Murayama 2012). GIS is also an essential toolkit for the multi-disciplinary team to exchange data (Lynx Information Systems, 2012). GIS enables quick and effective data storage, processing, interpretation, and representation. Such capabilities of geographical information systems make them a promising tool for the production of public services to support management decision-making planning and support (Wu at el, 2006).

The next thing will be to investigate the possibilities of using spatial information systems in public services. A debate accompanies this on the possible challenges of successful GIS implementation. The methods of research and fieldwork are then discussed. Finally, the search results and their contents will be displayed. GIS is the most widely used decision-making aid for solving complex spatial problems. GIS is a computerized data system that collects, stores, retrieves, shares, manipulates, analyzes, and displays geographical information (Chang, 2013). A successful GIS is made up of five core components: hardware (equipment needed to support various GIS operations, from data collection to processing and sharing), software (different data manufacturing, editing, and processing GIS packages), data (center, spatial and non-spatial information classified), the structure of the organizations and the workers (well trained and professional personnel). GIS is well developed to deliver efficiency and improved organizational decision-making for different positions, including improved knowledge sharing and streams, more informed decision-making, increased competitiveness, better analysis and comprehension of problems, the rationale for decisions, improved viewing of data, cost savings, and increased effectiveness, and increased production quality (Corneliues & Carver 2011).

2-2 Critical success factors in implementing a geographic information system

Critical success factors (CSFs) are what a company has to do well to succeed. As far as information system projects (ISPs) are concerned, the crucial success factor is what the mechanism would do to achieve its goals. The proposed methodology for researching CSFs behind the application of information systems is very close to that used in several studies of research on IT implementation. Some of these factors are essential in other IT applications (Elmeziane et al., 2011). Many GIS studies have identified multiple GIS success factors. These studies address performance factors in multiple contexts. Most researchers and authors have stated that there is no general model of success in implementing GIS (Markus & Robey, 1988); (Alexander & Bischoff, 1997) have suggested that the amount of complexity involved differs from that of software engineering and conventional systems development. This is a thorough application, which was the subject of several studies. It is an enabler for a wide range of current and potential applications but has similar characteristics with other infrastructure projects such as corporate networks and ERP, and few studies have discussed progress in implementing such projects (Wixom & Watson, 2001). On the one side, there are GIS applications at the application level, which are close to IT applications. Project teams should learn and collaborate with recipients to meet expectations, choose and use effective implementation methodologies, and foresee and respond to problems. It is, therefore, rational to assume that the Critical success factors found in project execution will impact the success of the IS projects. The research model has seven essential factors related to the performance of data processing and included them: management support, leader, capital, user engagement, team skills, source systems, and technology (Wixom & Watson, 2001). Many researchers have proposed various lists and models of CSFs in the literature. Since the 1950s and project planning issues based on the premise that the implementation of the best technology contributes to better management, the successful execution of projects is primarily dependent on project management. Four different dimensions of these variables, which include GIS, contribute to the success of projects. The design is compatible with the goals that represent the contract negotiated with the other party, the overall advantage for the customer, the advantage of the organization, and the value that the organization's project has achieved, as well as the advantage to the national technical infrastructure and the technological infrastructure of the company involved. Combining all these aspects provides a specific measure of the project's progress (Ramlee et al., 2016). Four dimensions of success were also explored according to the timing of planned results: the first one is aimed at achieving the project goals, time and expense, and the second includes a middle target, that is to say, the term of success of the customer, the term of fulfillment of

technical requirements and the resolution of functional performance of the customer. The third has a long-term objective (business success) and a growing market share generated by projects that generate trust, satisfaction, and effects. Finally, this is a very long-term aim that should be built for new techniques, technology, goods, markets, etc. in the future (EIs et al., 2012). The researcher argues that while GIS is widely used, there is little emphasis on the actual decision to start using GIS in current research. This decision will be crucial, however, to understand why GIS is taken in some organizations and not in others by concepts like 'adoption' and 'dissemination', which relate technology application to organizational results. These concepts have proven useful in determining how technological change in the organizational environment it has developed emerges or disappears. Due to the value of the above approach at different levels, many factors help to embrace and apply it effectively – the triggers, explainable in Table (1).

Table (1) classifications of critical success factors for GIS implementing

(Authors, Year)	CSFs for GIS
(Friedman, 2000)	Executive sponsorship, senior management support, identifying information requirements, linking GIS content to the business sector, issuing the initial version quickly, developing the system according to user needs, GIS support staff, managing data, working closely with executives, managing user expectations, emerging development approach Initiation of cost-effective applications, operational sponsor, appropriate IS personnel, promotion of the GIS concept, appropriate hardware technology, management of organizational resistance, GIS support for operational staff, management of system development and deployment, appropriate software technology, cost considerations, provision of benefit disclosure, use of consultants.
(Sieber, 2000)	Senior management commitment, resource allocation, adequate training and understanding, GIS champion, system use, organizational communication/coordination, lack of resistance, volunteering, scarcity of resources, external funding sources.
(Wixom & Watson, 2001)	Management support, champion, resources, user engagement, team skills, resource systems, technological development.
(Birks et al., 2003)	The effort, top management support, user needs, and training.
(Nasirin & Birks, 2003)	Implementation Planning, Senior Management Support, GIS Champion, User Needs Analysis, Application Development, and Database Management.
(Deng & Gupta, 2005)	End-user satisfaction, organizational impact, project champion, change management.
(Hussein et al., 2007)	Decision-making structure, senior management support, alignment of goal, knowledge of management information technology, management style, resource allocation.
(Taleai et al., 2009)	Data, people and organization, GIS components, technology.
(Hussain & Johar, 2010)	Organizational context, individuals; Change and instability; Centralization and decentralization; A computer-based development case.
(Aziz & Salleh, 2011)	Motivation, Training/ Skill, Senior Management Support, Communication, Knowledge and Experience, Leadership / IT Leader, Preparedness for Change, Responsibility and Roles of IT Personnel, Organizational Culture, Commitment, Management Style, User Sharing Trends, Teamwork / Collaboration, Interest in Technology Information, employee behavior towards collaborative environment, awareness, focus and vision, trust, interrelationships, satisfaction.
(ELS et al., 2012)	People management (leadership and team, project manager, communication, stakeholder management), process (planning, scheduling, monitoring and control, quality management, risk management), and organization (organizational structure, financial resources, policy and strategy, learning organization, external environment), Contracting and technology (contracts and procurement, contractor, technology, Innovation).
(Lam et al., 2013)	Organization, People, Process, Technology, Project.
(Hung et al., 2014)	Information systems modification, administrative flow control, organizational resistance, support for senior management, the capacity of critical members, business process alignment, data harmonization, adoption outcomes, system quality.
(Miranda et al., 2014)	Senior management support, culture, communications, clear strategic goals, inter-departmental cooperation, motivation, modern technologies, system complexity, physical and software components, continuous monitoring, training, the impact of the new system, performance monitoring and evaluation, team capacity, specialization, project manager, data Reliable sourcing, maintainability and transparency, reliability in the information provided by the system.
(Eldrandaly et al., 2015)	Organization culture, organizational structure, clear vision and goals, support for senior management, external environment, strategic planning, skilled personnel, communication channels, user participation, training and learning, business process

	reengineering, hardware/software selection, software customization, data issues, perceived interest User skills, user experience.
(Alrwais, 2016)	Used GIS functions, Use of GIS products, GIS customization, basic operations, support operations, task complexity, business process reengineering, percentage of internal users out of total staff, percentage of departments out of entire departments using GIS, The extent of the use of GIS at the operational and tactical and strategic level management, the number of GIS contacts with external agencies, GIS vision, GIS strategic plan, the purpose of use, the pattern of use, awareness of GIS, the training, the coordination between departments with the presence of the GIS, the organizational structure, the role, the number of employees, the skill set, management style, Use of consultants.
(Gheni et al., 2017)	Motivated & committed team, internal communication, use of tools and infrastructure, goals and objectives, skilled project managers, skilled teams, risk analysis, project oversight, good judgment.
(Fayaz et al., 2017)	Management support, effective communication, training, effective monitoring, and control, leadership, clear objectives, requirements specification, risk management, budget support, user participation, project progress scheduling, team capacity, appropriate team, project duration, teamwork.
(Yatim et al., 2019)	User, business processes, tools, and system data.
(Alkatheri & Almandeel, 2019)	Change Management, BPR, Senior Management Support, Business Vision and Plan, Knowledge Management, User Engagement, Risk Management, Interdepartmental Dynamics, Communications, Process Alignment and Suitability, Package Selection, Expectations Management, Consultants, IT Resources and Infrastructure, Requirements Localization, organizational culture, project team, data related aspects, user training, and learning, project field, user promotion, financial management, partner relations, technical complexity, experience and skill in IT, industry environment, testing and troubleshooting, customization, project management, implementation strategy, project champion, authorized decision-makers, legacy system, project planning, national culture, settings, size of the organization.

2-3 GIS Challenges

Despite its potential gain, GIS implementations continue to be somewhat limited in municipal services (Yianna & Poulicos 2011). GIS researchers attributed this to many factors that threaten the successful use of GIS. These considerations are presented as follows: The level of knowledge, training, and trained staff of GIS managers (Farsari & Prastacos, 2003) are seen to be the main challenges for GIS. Researchers typically argue that organizations need professional teamwork consisting of GIS administrators, analysts, and system administration employees to build a GIS system (Tomlinson, 2007). The availability of trained coordination does not, however, guarantee the useful implementation of GIS. Examples of external factors that might impede GIS's performance are organized and assisted by top management and decision-makers. Decision-makers should develop GIS strategies (Tomlinson, 2007) and provide guidance, support, and information to employees during the implementation of GIS (Gatali, 2006).

While Many common problems also lead to GIS failure, and some of these problems can be reviewed as follows: Not defining the needs of users and involving them: All users in the organization who work in the operational GIS environment should be involved and even involved in identifying the system's needs. Failure to match the capabilities of GIS with their needs: In organizations, there is a wide range of geographic information systems and the equipment necessary to operate it, so it may sometimes be challenging to make the right decision about choosing what is the appropriate program that will achieve the required performance, as The performance of GIS implementation is especially sensitive to hardware and software choice. Failure to calculate actual costs: GIS acquisition costs are reasonably easy to quantify; however, they are a small fraction of GIS execution's overall costs. There are high ongoing costs, including hardware, software, employees, system administration, acquisition and upgrade of data, advanced software, and consultancy fees. The GIS development plan is rich in many technical and logistical questions and related costs. No experimental testing. Database architecture, data acquisition, maintenance, and regular operations are the most critical three concerns. The pilot research will allow detailed observations to be obtained provided they are adequately planned, thus allowing significant estimates of operational requirements. Giving responsibility for GIS implementation for other IT: Due to the distinct differences in GIS from traditional information technology systems, the GIS implementation team is best equipped for the types of processors that do not require data. At this stage, the advanced skills of a “GIS analyst” are essential. Moreover, it can only guarantee failure to rely on conventional information technology for people without these skills. No technology transfer consideration: Preparation and support for in-house and new employee continuous learning are necessary for effective implementation. The role of GIS in the company must be understood to all levels of staff. In addition to instruction, GIS knowledge can be learned only by continuous learning. Investment in hands-on training can never always be replaced by a GIS (Meaden, 2009).

Further, the task for GIS managers could be to gather spatial data and knowledge from GIS databases. Relevant, validated, and full information was required for GIS effectiveness (Dye & Shaw, 2007). GIS can provide high-quality content and expertise to help managers make better business decisions. Researchers argued. Therefore, the usefulness of the GIS application in the absence of municipal databases and the limits or inconsistencies in the data collected is essential (Kushwaha at el., 2011).

Further (Zhao 2010); (He at al., 2011) draws attention to possible negative consequences resulting from the absence of successful intellectual property laws. They suggested that GIS is vulnerable, without such legislation, to ambiguous activities (e.g., digital mapping, characteristics, electronic data collection, and GIS), causing loss of organizational financial rights (Zhao 2010). Consequently, the lack of IP safety rules may limit the development of complete or accurate spatial data and may, therefore, hurt GIS decision-making ability (He et al., 2011).

Considering the above attempts to understand the problems of GIS have so far been partial and incomplete. Few researchers have suggested fragmented factors influencing GIS efficiency, and no combined GIS research project is accessible. Numerous of the current GIS and municipal studies have explored the potential of GIS applications, although further understandings of the challenges and reasons for the low GIS growth in developing countries, in particular, remain essential.

3- Methodology

3-1 The research problem : GIS is one of the most widely used tools for decision-making, particularly for solving complex spatial problems by capturing, modeling, storing, retrieving, sharing, processing, analyzing, and presenting georeferenced data. It also enhances organizational decision-making in a wide range of functions by improving information exchange. It flows, making better-informed decisions, more analysis and understanding of problems, decision-making rationales, improved data visualization, cost savings, increased effectiveness, and improved quality of outputs. However, despite the increasing level of GIS implementation in the Baghdad governorate, especially in Al Mansour municipality, it appeared that it had faced priority challenges in GIS. Therefore, it was useful to research the factors that determine whether the implementation will be successful, as it provides the critical success factors necessary for GIS implementation that helps organizations complete their work successfully. This process helps the organization to identify an appropriate solution to eliminate challenges or avoid the most common causes of failure in GIS implementation. Based on the data as mentioned earlier, and what is indicated by the current reality of the challenges and GIS critical success factors in light of the digital development experienced by organizations of all kinds and forms, the necessity of the availability of the factors as mentioned earlier that contribute in one way or another to the successful implementation of the system as mentioned earlier and then to achieving the goals of decision-makers in the organizations contemporary. As for the field side, the problem of the research is that although the directorate in question has been and is still using GIS for several years, the progress in business performance has been below the standard, and no formal methodology is adopted in diagnosing the related challenges and arranging factors. The critical success of the successful implementation of the system, as the researcher senses, through his field experience and observations of the established practices, the adoption of the personal diligence of the administration in GIS implementing, and in some cases, the implementation of the said system is carried out under pressure and without any strategy or the use of specific success factors, and based on This crystallized a group of questions that represent an attempt to draw indicative features of the contents of the problem under consideration, as follows:

- What are the priority challenges that GIS faces in Al-Mansour Municipality?
- What is the role of CSFs related to GIS in the Al-Mansour Municipality?
- Is there knowledge on the part of the workers in the Al-Mansour Municipality about CSFs related to GIS?
- What are the priorities that will be CSFs for the GIS after identifying and addressing the priority challenges?

3-2 Research outline **:** The hypothetical research outline was formulated according to the literature related to GIS, and after conducting a broad review of recent research and studies in this field, the hypothetical research scheme was applied. Therefore, the research relied on its model design on the priority challenges and critical success factors for GIS through its main and sub-variables referred to by (Friedmanm, 2000); (Eldrandaly et al, 2015a) and (Eldrandaly et al, 2015b). They are (human characteristics, management attitude, technology, and organization characteristics), which represented:

- Success research for GIS is mentioned in the literature, mostly based on case studies or notes on GIS projects and practices.
- GIS failure research usually depends on the lessons learned from specific GIS projects but is often similar enough to generalize.
- Research on the implementation of GIS that dealt with (CSFs).

In order to address the research problem and achieve its objectives, the researcher adopted a hypothetical chart that reflects the main and sub-research variables, which included: CSFs for the GIS: These are the factors that are determined by the top management of each organization, on which the success or failure of the GIS in its performance of its activities in the organization depends These factors differ from one organization to another, according to its activity, size, method of performing its work, and other variables.

***3-3 Research methodology*:** The researchers have been able to use case research and field research to examine the opinions of managers in the senior departments of the directorate under consideration using field coexistence, notes, interviews, and access to documents and information obtained from records and documents since the research tends to have a deductive nature because it begins with theories A The preliminary data for the period August (2018) through June (2019) was therefore collected, and a suitable sample was identified of (40) senior managers, and the researcher used several measures previously applied in management literature characterized by stability and high credibility.

3-4 Validity and reliability of the research tool:

- ***The validity of the tool***: which is the process of ensuring that the paragraphs contained in the questionnaire lead to accurate data collection and that each dimension of the research is accurately represented by a set of questions that reflect it. Some paragraphs from the initial questionnaire, and some were deleted until the questionnaire became its final form.
- ***Tool reliability***: It means the stability of the results obtained using the (measuring tool) several times; that is, the results are not subject to change with the measurement conditions. Therefore, to verify the stability of the resolution, the Cronbach Alpha coefficient test was relied on for internal consistency, as it is one of the statistical stability tests. The task is to analyze the data for the statistical questionnaire (Al-Bayati, 2005). The Alpha Cronbach coefficient was reached for the paragraphs of the questionnaire, as shown in Table (2). These are values indicating acceptable stability in the administrative research of the questionnaire, as (George & Mallery 2003) referred to a rule for determining the acceptability of the Cronbach Alpha coefficient, which is as follows: (0.50) and below is unacceptable, (0.50 - 0.60) is weak, (0.60 - 0.70) acceptable, (0.70 - 0.80) good, (0.80 - 0.90) excellent (Al Kubaisi, 2012).

Table (2): Research instrument reliability coefficients

Rank	Sub-dimensions of GIS Challenges	Code	Internal consistency	Rank	The main dimensions of GIS Challenges	Code	Internal consistency
1	Top Management Support	TMS	0.683	1	People	P	0.738
	GIS Knowledge & Skill	GKS	0.889				
	GIS Training	GT	0.711				
2	Employee appropriate technology	EAT	0.554	2	Hardware and Software	H/S	0.665
	Quality hardware and software	QHS	0.719				
3	Adequate funding	AF	0.233	3	Adequate funding	AF	0.233
4	Quality & comprehensive information	QCI	0.843	4	Data	D	0.741
	Data availability	DA	0.774				
	Data security	DS	0.651				
5	Appropriate policies	AP	0.764	5	Procedures	Ps	0.756
	Coordinating efforts	CE	0.793				
Rank	Sub-dimensions of CSFs for GIS	Code	Internal consistency	Rank	The main dimensions of the CSFs for GIS	Code	Internal consistency
1	Expected Benefits	EB.	0.711	1	Human characteristics	HC.	0.724
2	Experience	Exp.	0.722				
3	Skill	Sk.	0.889				
4	Senior management	SM.	0.683	2	Management Attitude	MA.	0.788
5	Clear goals and vision	CGV.	0.676				
6	Strategic Planning	SP.	0.833				
7	communications channels	CC.	0.895				
8	Skilled employees	SE.	0.621				
9	User sharing	US	0.754				
10	training & Learning	TL.	0.711				
11	Reengineering	RE.	0.584				
12	hardware/	HW/	0.770	3	Information	IT	0.743

	software	SW			Technology		
13	Data issues	DI	0.741				
14	Software customization	SC	0.674				
15	culture	C	0.778				
16	Organizational Structure	OS	0.728	4	Organization Characteristics	OC	0.735
17	Organizational learning	OL	0.692				
Total							0.712

It is clear from the previous table that the Cronbach alpha coefficient is high, which indicates the possibility of relying on the questionnaire in conducting statistical analysis and testing research hypotheses.

4- Results

4-1 describe the results of the critical success factors for GIS

This part aims to know the results of using some descriptive statistical methods (arithmetic mean, standard deviations), which were adopted in describing the main and sub-research variables, according to the responses of the research sample members on the areas of the questionnaire represented by (human characteristics, management attitude, technology and organization characteristics). As shown in Table (3).

Table (3) the level of the research sample answers about CSFs for GIS

Rank	The main dimensions of CSFs for GIS	$\bar{X}$	SD	Sub-dimensions of CSFs for GIS	$\bar{X}$	SD
1	Human characteristics	3.744	0.102	Expected Benefits	3.000	0.245
				Experience	4.223	0.321
				Skill	4.009	0.119
2	Management Attitude	3.724	0.170	Aware Senior management	4.045	0.224
				Clear goals and vision	3.239	0.347
				Strategic Planning	4.001	0.416
				communications channels	3.054	0.447
				Skilled employees	3.957	0.257
				User sharing	4.941	0.364
				training & Learning	3.547	0.749
				Reengineering	3.008	0.557
3	Information Technology	4.213	0.087	Data issues	4.217	0.391
				hardware/ software	4.008	0.229
				Software customization	4.415	0.257
4	Organization Characteristics	3.706	0.165	Organizational learning	3.947	0.579
				Culture	3.117	0.513
				Organizational Structure	3.892	0.431
Total		3.801	0.158	Total	3.801	0.158

a- Human characteristics: The level of answers on the axes of essential human characteristics (perceived benefits, experience, skills) is evident as follows: All answers and all human characteristics axes were at a high level compared to the hypothetical mean (3). Based on the values of the means of the three axes, the human characteristics variable achieved a mean on the total level of (3.744) and a standard deviation (0.102). Therefore, the percentile weight represented a high weight for this variable and expressed a high level of agreement in the answers about its axes and paragraphs. The axes of human characteristics were ranked as follows: Experience ranked first, skills came second, and finally perceived benefit.

b- Management Attitude: The level of answers about the principal axes of the management position (awareness/support of senior management, clear goals, and vision, strategic planning, communication channels, skilled personnel, user participation, training and learning, reengineering) shows what follows: All the answers are in the axes of the management position All were at an above-average level compared to the adult hypothesis (3). Based on the values of the mean of the eight axes, the variable of management's position at the total level achieved a mean of (3.724) and a standard deviation (0.170). The axes of the management position were ranked as follows: user participation in the first rank, followed by awareness/support of senior management at the second rank, followed by strategic planning at the third rank, followed by skilled employees at the fourth rank, followed by training and learning at the fifth rank, followed by the exact goals and vision at the sixth rank. Communication channels at the rank Seventh. Finally, re-engineering.

c- Information Technology: The findings above show that the values of the mean of the technology axes differed as the three dimensions reached mean, that is, higher than the hypothesis of all, at a higher average level. The technical variable achieved a high-level arithmetic mean (4,213) and a standard deviation (0,087). The technology axes were classified as follows: first, the software assignment, second, and last but not least, the axis of selecting components of hardware and software.

d- Organization Characteristics: By the variable level of responses to the organizational characteristics, it becomes clear that the following: In the responses for paragraphs in each sub-variable in the responses of the sample participants, all sub-variables of the organizational characteristics variable have reached an above-average level. The overall organization characteristics were above average in the respondents ' answers, with the average (3,706) and a standard deviation (0,165). The characteristics of the organization were rated as follows: first was the organizational learning axis and second, the organizational structure axis, and finally, the cultural axis.

4-2 describe the results of the GIS challenges

This part shows the results of the GIS experience in Al-Mansour municipality. The challenges of implementing the GIS are addressed and the emerging relationship between these challenges. The findings show that while GIS technology is familiar to managers in Al-Mansour Municipality, they do not fully understand how they can support decision making in areas such as municipal services preparation, promotion, and sustainable growth. Many city managers depend mostly on traditional data collection and analysis techniques (e.g., Ms. Office). However, GIS application was first introduced following 2003 in the Municipality of Al-Mansour (GIS Unit Manager Interview, Municipality of Al-Mansour 2018). The staff has received a training program on the use of GIS. Nevertheless, the viability of such a modern GIS for sustainable public service provision is questionable. The Ministry of Construction, Housing, Municipalities, and Public Works has only one aim of developing its GIS to track municipal truth. The production of GIS and its successful use in sustainable public services is, therefore, still in the early stages. The results have shown that many internal and external factors can present the challenges of successful GIS implementation. From the interviews, the following general structures emerged. The organization of these systems has informed GIS as an information system of its general characteristics. Factors are divided into more abstract topics, procedures, and data relating to individuals, software, and hardware.

a- people Challenges

A number of the participants addressed the problems of GIS, including top managerial support and engagement, GIS expertise and skills for managers and employees, and sufficient funding and training for GIS. In various stages of GIS growth, the engagement and support of the top management in the municipal directorate have been critical as the decision-making processes, e.g., planning supporting policies, training, and adequate financing, are facilitated. Unlike in the application of GIS to establish sustainable municipal services, the GIS has obtained much support from the top management for monitoring municipal vehicles and is therefore being launched (after 2003). Interviewees are responsible for the lack of funding from the Ministry of Construction, Housing, Municipalities, and Public Works for many reasons, such as poor GIS management expertise and poor support policy, and training. The findings illustrate the vital importance that GIS expertise and skills are accomplished by offering management and workers training courses: "In Al-Mansour municipality we have strong GIS experts, but we need to train not only the system administrators but also administrators. Managers can optimize their GIS capabilities, but they must be conscious of how".

b- Software and Hardware Challenges:

The participants addressed to highlight the importance of the output GIS H/S. The Director of the GIS unit in Al-Mansur Municipality states that hi-tech hardware and software are given in the municipality to improve GIS implementation. He also maintains that the municipal GIS production costs approximately 15 million Iraqi dinars. Therefore, to minimize these costs, the Ministry makes certain improvements and updates on these programs from time to time. The provision of adequate funding is, therefore, related to the top management support and has a strong effect on the efficiency of the technologies implemented, as well as on the hardware and software used.

c- Data Challenges

Factors linked to GIS evidence have adversely affected the local government's successful implementation of GIS. The usability of, accuracy, and integrity of the GIS database includes these considerations. In this respect, two topics dominated the discussions of the interviewees. The first was the method of obtaining GIS data. Different types of spatial data are needed (e.g., geographical access, infrastructure type, and structures). The collection of these types of data requires careful cooperation between different public and private parties. Interviewees also acknowledged that the overall growth of municipal services in the Al-Mansour municipality is hampered by the coordination of public authorities' work. The second problem with GIS data was the precision and completeness of the data. One of the respondents argued that reliable resources were available. There was a concern about the possibility of providing Al-Mansur municipality with GIS information on the unique potential of certain sights like parks, centers, streets. And so forth. And so on. The influence of people on the visited sites can be measured. He commented, "The type of information that you are referring to is not usually present in the municipality, I think that this information is not accessible in the municipality, and this may need further thought in future. Results indicate no digitally displayed data and maps, and even paper maps are obsolete or do not cover all locations.

d- Procedures Challenges

Procedures in this research concern policy governing GIS implementation to facilitate spatial data use, management, and production. It guides the involvement and cooperation of various public and private sector organizations in promoting data sharing. Although the Ministry of Construction, Housing, Municipalities and Public Works and Baghdad Municipality has a GIS center, which uses GIS technology for managing

certain municipal activities, Al-Mansour municipality lacks much information about such a system or vision of how such a project is to be benefited. The results showed that the Municipality needs to organize its efforts to establish GIS applications in public services to ensure that work is not duplicated. The results revealed that Al-Mansour Municipality needs appropriate policies to efficiently enforce GIS for the organization of the spatial data acquisition, exchanging information between the various governmental authorities, and ensuring data protection. Data protection policies may reduce security concerns that – to some degree – hinder the development of GIS.

e- Adequate funding Challenges

However, providing adequate funding is not one of the general IS components on which the organization of GIS challenges has been organized in this research. However, it is added as a separate factor as it is highly referenced during interviewees' discussions. Many of the field research participants mentioned the importance of adequate funding as a challenge that might negatively influence the application of GIS in many areas such as providing adequate training, acquire appropriate hardware, software, and new technology.

To conclude, in Al-Mansour Municipality, many of the technical requirements (e.g., quality of hardware and software, GIS expertise) for effective GIS-based municipal services development programs already exist, and the incentives to use these tools, especially in the areas of supporting municipal services decision-making is growing (e.g., top management support). However, significant challenges in the successful use of GIS are twofold: first, Al-Mansour Municipality has to make general and detailed policies, rules, and procedures to use, manage and produce GIS spatial data effectively and to coordinate efforts of different authorities; and second, it must facilitate access to quality and comprehensive data and control the fears of data exchange due to reasons of security.

5- Discussion

Depending on the opinions of the sample participants, the general findings of CSFs for GIS were of great interest. The concentration of attention was on the technical side and, first, on the mean (4,213), followed by the interest in human characteristics, second with a mean (3,744), and followed by management, third with a mean (3,724). Half of the organizational characteristics were the last place (3,706). The standard deviation values reached, whether at an aggregate or a sub-level, confirm the very articulate mean values. This is because the default values are few compared to (40) persons.

The findings of this research provide a picture of the challenges that significantly influence effective GIS sustainable municipal services in the Al-Mansour Municipality. The empirical findings suggest that several internal and external environmental challenges can hinder the effective implementation of GIS. These challenges have been grouped under four factors as prompted GIS as an IS by its general characteristics. These four groups are people, hardware and software, data, and procedures. The research argues that the understanding of and tackling these challenges can help realize the most benefits out of GIS applications. The results of this research were found to be consistent with several GIS works of literature, e.g. (Farsari & Prastacos 2003; Tomlinson 2007; Yianna & Poulicos 2011; Kushwaha et al., 2011).

a- People Challenges: in this research, the results show that a shortage in appropriate GIS knowledge and skills constitutes a critical factor that negatively influences the effectiveness of GIS. The experience of GIS in Al-Mansour Municipality has revealed that there is a need for managers and staff, who can deal effectively with the system, to have an adequate IT/IS knowledge and skills in order for an effective GIS to be developed. The findings also found a relationship between the support provided by top managers and their GIS knowledge. Similarly, (Tomlinson, 2007). To create the GIS system, the organizations had to have the skilled teamwork of GIS managers, analysts, and staff. Also, (Gatali 2006) asserted that IT/IS knowledge and skills are essential key issues for GIS effectiveness. He also added that the lack of appropriate GIS skills could hinder the implementation of useful GIS applications. Relatively, this research shows that training is one of the GIS challenges. Training has to be provided to decision-makers and top-level managers. This is to increase awareness and improve knowledge on how to use GIS in supporting decision-making effectively. Approving the result of this research, (Farsari & Prastacos, 2003) and (Oppong & Ofori-Amoah, 2012) argued that creating GIS awareness among managers of top-level through the provision of training programs can increase the support of top management.

b- Adequate funding and H/S Challenges: based on the empirical findings, this research argues that adequate funding is a significant factor facing the practical application of GIS, particularly for acquiring hardware and software technology and providing appropriate training. This argument is supported by several researchers such as (Elwood 2006); (Poplin, 2010); (Gmen & Ventura 2010). For example, (Sreejit & Katiyar, 2011) maintained that the high cost of commercial software hinders GIS growth. Also, the results of (Farsari & Prastacos, 2003) research suggested that the accessibility of a stable long term funding is critical for data creation and continuing maintenance of the system.

c- Procedures Challenges: the experience of the Egyptian GIS highlights the positive impact of producing appropriate procedures on applying effective GIS. It is of interest to note that GIS procedures have not been dealt with in literature as one of the GIS challenges, except when (Zhao 2010) asserted the crucial need to create suitable policies guarantee and organize the intellectual property rights. They mention that lacking such policies may deter the production of complete and accurate data. Inadequate data supply can naturally trouble the role of GIS in supporting decision-making. In this research, two facets of the

significance of GIS procedures and policies have emerged; policies to coordinate data exchange among different public and private sector organizations and policies to encouraging productive usage, management, and data creation. Therefore, it was essential to include procedures as one of the GIS challenges that need to be considered for practical GIS applications.

d- Data Challenges: the importance of quality, updated, and comprehensive data to effective GIS has been recognized in the literature, supporting the findings of this research. Researchers, e.g. (Dye & Shaw, 2007); (Kubik & Iwaniak, 2010); (Kushwaha et al., 2011), have recognized the collection of quality data as a challenge. Further, the evidence collected by this research confirms the negative influence of the security concerns regarding the data exchange. Security concerns that have adversely affected the quality of GIS data and hence the efficiency of GIS production.

6- Conclusions

Despite its importance, there is no sufficient or combined work to understand the challenges of GIS. There have been limited efforts to present fragmented barriers that researchers have encountered in the research of GIS application and potential. Insights have been developed by an interpretative approach to explore the GIS application in the development of municipal services. The current use of GIS in municipal services is examined in this research. It also examines the challenges of implementing GIS and CSFs in municipal services. This research explores the challenges of deterring practical GIS application and categorizes it into four structures, each with sub-factor factors. The systems are People challenges (e.g., top management support, GIS know-how, GIS training), data challenges (e.g., data access, data protection, consistency, and comprehensiveness), software & hardware challenges (e.g., technology use, software, and consistency software) and Procedures Challenges (e.g., effective policy and coordination efforts). The results show possible links between GIS challenges. However, future research is still needed on aspects of relationships and levels of influence. This research provides insight into the importance of the research of GIS challenges. The research of GIS experience in the municipal field can help us understand the general challenges of GIS. In this case, researchers from this research do not claim the generalization of results because they apply exclusively to the context of municipal services when the case is examined (internal generalization). Besides, the research may also inspire examining GIS applications (external generalization) in other countries. Research on GIS challenges is generally still at the beginning. Other researchers are advised to make this a step forward by exploring the challenges of effective GIS use in municipal services, the interconnections between GIS challenges, and the various ways of tackling these complex challenges. The high capacity of GIS also encourages researchers, companies, and destinations to explore the various potential of municipal services in areas such as municipal planning, promotion, decision-making, and environmental assessment. Further research is also advisable to consider more detailed case studies to add or modify the results of this research. Although research has moved on to examine a list of CSFs and challenges or GIS from an interpretative perspective, further steps must be taken.

References

1- Alkatheri, Safaa & Almandeel, Seita (2019), An Exploration of Critical Success Factors for Enterprise Resource planning system implementation , The international journal of humanities & social studies, Vol.(7), No.(2), pp. (10-18).

2- Al-Kubaisi, Salah Al-Din Awad, (2012), The Impact of Strategic Thinking on Human Resources Management Strategies: An Analytical Field Study of the Views of a Sample of Managers in the Iraqi Ministry of Health, Journal of Economic and Administrative Sciences, Vol. (18), Issue (67). College of Administration and Economics / University of Baghdad.

3- Alrwais, Omer Abdulaziz (2016), Towards a New GIS Maturity Model: An Organizational Usage Perspective, Scholarship @ Claremont, A Dissertation submitted to the Faculty of Claremont Graduate University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate Faculty of the Center for Information Systems and Technology, Claremont, California.

Aziz, Nur Mardhiyah & Salleh, Hafez, (2011), People critical success factors of IT-IS Implementation: Malaysian perspectives, International Journal of Information and Communication Engineering, Vol. (5), No.(8), pp. (940-947).

4- Birks, David F. & Nasirin, Syed & Zailani, S.H.M. (2003), Factors influencing GIS project implementation failure in the UK retailing industry, international journal of information management, Vol.(23), pp.(73-82).

5- Bunruamkaew, K. & Murayama, Y. (2012), "Land Use and Natural Resources Planning for Sustainable Ecotourism Using GIS in Surat Thani", Thailand Sustainability, 4(3), pp. (412-429).

6- Chang, K. (2013), Introduction to Geographic Information Systems, 7th ed., McGraw-Hill, Singapore.

7- Corneliues, I. Heywood, S. & Carver, S., (2011), an introduction to geographical information systems, 4th ed., Pearson, London.

8- Deng, Hepu & Gupta, Pramila (2005), Critical Success Factors for information systems implementation: An end – user perspective, Idea Group publishing, pp. (80-83).

9- Dye, A.S. and Shaw, S.L. (2007), "A GIS-Based Spatial Decision Support System for Tourists of Great Smoky Mountains National Park", Journal of Retailing and Consumer Services 14(4), pp. (269-278).

10- Eldrandaly, Khalid Aly & Naguib, Soaad Mohammad & Hassan, Mohamed Monier (2015), Evaluation of critical success factors for GIS implementation using Analytic Hierarchy process, international journal of computing academic research, Vol.(4), No.(3), pp.(132-143).
11- Elmeziane K., Chuanmin S., and Elmeziane M., (2011). The importance of critical success factors of enterprise resources planning implementation in China, Bus. Manage. Dynamics, 1, pp. (1-10).
12- Els, M. & Van der Merwe, M.F & Hauptfleisch, A.C. (2012), Critical Success Criteria and Success factors in project Management: A quest to enhance generic professional practice, ICEC2012 – 36, pp. (1-15).
13- Farsari, Y. and Prastacos, P. (2003), "GIS Contribution for the Evaluation and Planning of Tourism: A Sustainable Tourism Perspective", Proceedings of the International Leisure and Tourism Symposium, ESADE, Barcelona, pp. (1-16).
14- Friedman, David Joseph, (2000), Identifying and evaluating critical success factors in the implementation of a geographic information system (GIS): a local authority case study, Master of Science in Engineering, University of Cape Town, pp. (107-110).
15- Galati, S.R. (2006), Geographic information systems demystified, Illustrated Edition, Artech House Publishers, Singapore.
16- George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference 11.0 update (4th ed.). Allyn & Bacon, Boston.
17- Gheni, Ali Yahya, & Jusoh, Yusmadi Yah; Jabar, Marzanah A. & Ali, Norhayati Mohd, (2017), The Critical Success Factors(CSFs) for IT Projects, Journal of Telecommunication, Electronic and Computer Engineering, Vol. (9), No. (3-3), pp. (13-17).
18- Gmen, Z. Aslgl & Ventura, Stephen J., (2010) Barriers to GIS Use in Planning, Journal of the American Planning Association, 76:2, pp. (172-183).
19- Hall, G Brent, (1999), GIS Education and Infrastructure Challenges and Problems in Emerging Countries, Transactions in GIS, 3(4), pp. (311-317).
20- Hung, Shin- Yuan & Chen, Charlie & Wang, Kuan-Hsiuaug (2014), Critical Success Factors for the implementation of integrated healthcare information systems projects: An organizational fit perspective, Appalachian state University, Vol.(34), No.(39), pp. (1-23).
21- Hussain, Mohd Ramzi Mohd & Johar, Foziah (2010), The socio-tecnical factors in the use of gis at the planning departments of the kuala lumpur city hall, journal of the Malaysian Institute of planners, Vol. (7), pp. (69-103).
22- Hussein, Ramlah & Abdul Karim, Nor Shahriza & Mohamed, Norshidah & Ahlan, Abdul Rahman (2007), The Influence of Organizational Factors on Information Systems Success in E-Government Agencies in Malaysia, EJISDC, Vol. (29), No. (1), pp. (1-17).
23- Kirby, Russell S. & Delmelle, Eric & Eberth, Jan Maria, (2017), Advances in spatial epidemiology and geographic information systems, Journal annepidem, Vol. (27), No. (1). Pp. (1-9).
24- Kubik, T. and Iwaniak, A.(2010), "Building and maintaining metadata repositories with the aid of ontology tools and technologies", GSDI (Global Spatial Data Infrastructure Association) 12 world conference.
25- Kushwaha, A., Chatterjee, D. and Mandal, P. (2011), "Potentials of GIS in Heritage and Tourism", Geospatial world forum, 18-21 January, (online), Retrieved 5 January 2013 from: http://www.geospatialworldforum.org/ 2011/proceeding/pdf/Avantika.pdf
26- Lam, Jiwat & Corkindale, David & Wu, Ming-Lu, (2013) , Implementation critical success factors (CSFs) for ERP: Do they contribute to implementation success and post–implementation performance?, journal homepage: www.elsevier.com/locate/ijpe, pp. (1-18).
27- Lynx information systems, (2012), "GIS services", (online), Retrieved 5 January 2013, from: http://www.lynx-info.com/gis.html
28- Meaden, Geoffery J. (2009), Geographical Information Systems (GIS) in Fisheries Management and Research, ResearchGate Publishing, pp. (93-120).
29- Miranda, Paula & Isaias, Pedro & Costa, Carlos J.(2014), From information systems to e- learning 3.0 systems critical success factors: A Framework proposal, International Conference on Learning and Collaboration Technologies, Vol. (1), pp. (180-191).
30- Nasirin, Syed & Birks, David F. (2003), DSS implementation in the UK retail organization: a GIS perspective, Information and Management, Vol. (40), pp. (325-336).
31- Oppong, J.R. and Ofori-Amoah, B. (2012). "Ghana: Prospects for Secondary School GIS Education in a Developing Country", International Perspectives on Teaching and Learning with GIS in Secondary Schools, pp. (115-123).
32- Poplin, Alenka Krek, (2010), Methodology for measuring the demand geoinformation transaction costs: Based on experiments in Berlin, Vienna and Zurich, International Journal of Spatial Data Infrastructures Research 5 (5), pp. (168-193).
33- Ramlee, N. & Tammy, N.J. & Raja Mohd Noor, R.N.H & Ainun Musir, A. & Abdul Karim, N.& Chan, H.B. & Mohd Nasir, S.R. (2016), Critical Success Factors For Construction Project, 18th International Congress on Project Management and Engineering, pp. (1-7).

34- Sieber, R.E. (2000), GIS Implementation in the Grassroots. Journal of URISA, Vol. (12), pp. (15-29).
35- Taleai, Mohammed & Mansourian, Ali & Ali Sharifi, Mohammad (2009), Surveying general prospects and challenges of GIS implementation in developing countries: A SWOT-AHP approach, Journal of Geographical Systems, Vol.(11), No.(3), pp.(291-310).
36- Tomlinson, R., (2007). Thinking about GIS: Geographic information system planning for managers. ESRI press.
37- Wixom, Barbara H & Watson, Hugh J. (2013), An Empirical Investigation of the Factors Affecting Data Warehousing Success, MIS Quarterly Research Article, Vol.(25), No.(1), pp. (17-41).
38- Wu, Q., Li, H., Wang, R., Paulussen, J., He, Y., Wang, M., Wang, B. and Wang, Z. (2006), "Monitoring and Predicting Land Use Change in Beijing Using Remote Sensing and GIS", Landscape Urban Plan, 78(4), pp. (322-333).
39- Yatim, Fazilah Mat; Majid, Zulkepli & Amerudin, Shahabuddin, (2019), The key success factor of geographic information system re-implementation in tenaga nasional berhad distribution, malaysia: a case study of cheras tenaga nasional berhad distribution station, International Journal of Built Environment & Sustainability, Vol.(6), No.(1), pp.(111-119).
40- Yianna, F. and Poulicos, P., (2011)" GIS Contribution for the Evaluation and Planning of Tourism: A Sustainable Tourism Perspective", (online), Retrieved 5 January 2013 from: http://www.gipsynoise.gr/HellasGI/KoinonikesPraktikes/papers/Farsaki.pdf
41- Zhao, Y. (2010), "Regulation of Remote Sensing Activities in Hong Kong: Privacy, Access, Security, Copyright, and the Case of Google", Journal of space law, pp. (36, 547-566).