

Cost-Effectiveness and Organizational Performance Impact of Management Information System in Albader Tower Contracting in the Kingdom of Bahrain

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Abstract - Albader Tower Contracting is a contracting company that provides services like renewable energy and deals with building and construction projects like civil, electrical, plumbing, and mechanical projects to its clients in the Kingdom of Bahrain. It has sought the significance of improving its resources and has done developments and improvements in its administrative and operational processes to lever its organizational performance and benefits. It has planned and initially employed innovative technologies to effectively and efficiently deal with these developments and continuously seek to improve its organizational growth by increasing its investment to this technology. Hence, this research aimed at identifying, analyzing, and evaluating the cost effectiveness of the employed trigger in its developments and improvements – the Management Information System. Further, this study aimed at analyzing and evaluating the organizational performance impact of information system towards expected organizational benefits for Albader Tower Contracting. The collected data were organized, analyzed, compared, and interpreted by using the statistical tools mean, standard deviation, and variance. The identified indicators that were carefully identified, selected, and validated as organizational performance impact variables were categorized into organizational, technological, and people characteristics and further grouped into two main factors perceived usefulness and user satisfaction and statistically derived means, standard deviation and variance were analyzed, compared, and interpreted into the levels of impact. Moreover, to validate data, the researcher used Sampling Validity, Criterion Validity. Penultimately, the derived value of MIS determined by the cost-effectiveness analysis using the method Incremental Cost-Effectiveness Ratio (ICER), and the determined levels of organizational performance impact of MIS were used to finally determine the organizational benefits. Finally, findings, conclusion, and recommendations were drawn out from the outcomes gotten from the tools used in this study to answer the formulated research questions.

Keywords: Cost-Effectiveness, organizational performance, management information system

INTRODUCTION

It has been proven over time that information is power, and having it could definitely affect any organization or company performance. Nowadays, companies are competing aggressively to present their strength in market as powerful. technology companies are moving fast and companies requirements are change with new development and the need to become the best is required to survive. In the past, the concept of using management information system was only to simplify the work but in present time, the concept has changed to insure quality level of the company, simplify work and environment stability. Albader Tower Contracting business is located in the Kingdom of Bahrain and deals with construction, maintenance services and trading. Primary service has been upon providing renewable energy, building & construction for local individuals and businesses in Bahrain. Al Bader is actively involved in renewable energy and

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building construction exclusive projects all over the country. The company has completed several projects such as civil, electrical, plumbing, mechanical and renewable energy.

Al Bader Tower Contracting is dedicated to provide quality in services and maintenance to customers by maintaining the highest level of safety, integrity and innovation. Grow by continually providing useful and significant services and renewable energy solutions to market to expand into new areas that build on competencies and customer interests. The Company's vision is to be the leader in services within chosen markets. To become a company that customers want to work with, and employees are proud to work for. Al Bader Tower Contracting aims to provide highest standard of quality in services, giving clients the best satisfaction. The business operates in a traditional way such as counting stocks availability manually, following projects coming and accomplished manually and manual registration attendance.

The purpose of the research was to determine the cost effectiveness of management information system to the company. management information system which consists of people, machines, procedures, database and data model as its main components. The system gathers data from within and outside of the agency, processes these data and comes up with the necessary reports essential for management towards its decision-making process. There are many potential benefits of having and using management information system (MIS) in the business and it pays off for the agency in many ways such as supports core quality, enhances distribution channel management, builds brand quality, boosts production process, and allows flexibility and leverage output at its maximum level (Nicholas, 2015).

LITERATURE REVIEW

There are many studies that agreed on positive effect of management information system on technology information expense to trading value. On 2016 a study has given the effort to find out the effectiveness and qualitative of management information system in financial trade organizations. Among many companies, it has been chosen two managers to present their opinion on the impact of management information system on financial management to run business effectively. Most of the questionnaires confirm with their answers that the positive impact of management information system is greater on financial management. On the other side there are significant ratio do not know whether management information system can assist managers in dealing with financial operations effectively and efficiently. Therefore, it can be concluded that most of organizations are using management information system to increase the efficiency and effectiveness financial management. The result has pointed that most of organization managers agree and accept that management information system reserve with efficiency and effectively financial reports and procedures in making decisions for manager's assistance in taking effective decisions. It is pointed as well to management information system as enhancement of ability to schedule and forecast in operating works and can assist business leaders to create competitive environments.

Management information system provide frame to merge operations functionality and financial resources to reach information and data's fast and in better way as it is required, which assist managers to take correct decisions in suitable time. To enter financial data at management information system, it is must consider and analyze all operations and collect required information to design a suitable system (Akram & Iqbal, 2016). Many reports that financial management information system should provide to smooth taking decisions and activities in organizations financial management, it is supposed to be to present reports monthly invoiced, account receivable, account payable, expenses, payment, cash status, analyze recoveries for trust, price and returns decisions based on investment analysis. Therefore, management information system can be more effective and qualitative, when it has the ability to provide and establish reports in financial management to assist financial managers to guide investment activities and place strategies to achieve financial goals to specific institutions (Sonawane & Madhulika, 2016; Akram, Murugiah, & Arfan, 2017).

In American federal government, it is require making analysis procedure to analysis of alternatives to invest in large resources. It been presented framework execution analysis of alternatives in context of project management information technology federal, is combination of methodical with management practice and supervision, that able to enhance transparent and questions of management general sector to information technology projects. The framework of analyzing of alternatives able to adjusted and expand. The framework of analyzing of alternatives provide answers to resulted stress of verify groups of environment factors such as defense behind panels, federal politics or cycle technology noise with conclusions can defense it (Bhatti, Waqas, Abid, & Malik, 2018). The merge shows "first cloud" complete ability to meet federal government direction strategy for information system. The analysis of alternatives framework provide evaluation research getaway point, because the framework address methodical and document steps that general managers of the sector take to reach the analysis of alternatives. Evaluation commitment has become possible due to the framework, in the end shapes and performance drivers through natural liability. In so the value of analysis of alternatives support project management of information technology that can defense it (Espinoza & Sofia, 2018).

This literature has displayed the important role of management information system in making decision enhancement within organization (Mahesar, Malik, Ahmad, Shah, & Wahiddin, 2014). Information system sees as comprehensive

system for the user by providing information to support process of management and functionality of making decision through different level of organization. The organizations are aware that management information system is a system for specific object and useful for organization management goals. The study has highlighted that management information system has to provide the access by providing suitable information with high quality from generation to users.

The supervisor's executives has approved that information system has positive impact on organization efficiency. The study has adopted with research design quantitative and advance statics techniques such as connection, ANOVA and regression. The study has found that information system has an impact on making decision and the most variable willing to use in OKS group. The factor connection links between efficiency of information system speed and employees' performance in positive way 0.556. Which it is obvious that information system has impact in making decision, where it has positive impact on employee speed. More analysis been done on linear regression step by step and regression result has revealed, the model is important, where zero's (null) hypothesis been rejected and point of limitation R2 for regression is 0.310. Result of regression has pointed to variance in employee's performance clarify it the impact of information system on making decision (Thakkar, Jatin, Jain & Meghna, 2016; Akram, 2017).

Management information system is an important element for business organizations, that provide accurate information and in suitable time for business managers and assist them to make decision. With technologies management alter, there is new program to be used in information system that lean to provide information in time manner and fast (Akram, Abrar-ul-Haq, & Surjit, 2018). However, organizations must face the challenges of cost of executions and employees' resistance to the alter, server problem and learn new systems and updated information and etc. it is very important for any organizations to succeeds with information system need to plan properly because without planning nothing can be accomplish, as well the harmony of the project and unity of the organization it is required (Yadeta & Gerbi, 2016 Akram et al., 2018). The success of implementation and the integration of financial management information system enables organizations to reach their goal which is to generally manage financial matter. However, this is not stopping being fraud and corruption in government institutions; in addition, the united information administration received should assist in defining transactions or un-usual activities and investigate through it, which increase the ability of government to distinguish corruption (Abrar ul Haq, Mahtab, & Ullah, 2015). The continued success of implication the integration of financial management information system depend on effectiveness and sustainability of strategies as well repairing effectiveness execution of public financial management such as reviewing public financial management of country law, review financial statement operation input and adding calculation measurement plan and etc. Politician clear leadership commitment and suitable resources build capacities and alter strategies management should support with this. Implication of financial management information system behold as comprehensive repairer to all operations of public financial management other parallel (Abrar ul Haq, Ayub, & Ullah, 2015). It is effect the general goal of public financial management and it is considering as worthy instrument to make decision in public sector. Even though, it is paramount government to understand that there are no solution suits everyone that is related to implication of integration financial management system (Qasim et al., 2018). All countries are significant by its own uniqueness therefore; there is a need to solve specific requirement system as well the need of information and users.

Finally, the study has deduction the important factors and there was average level in executing the integration of financial management information system in public organizations. Training/ building capabilities, employee's commitment, human resource accessibility, support top-management, infrastructure technology, government system, report responsibility, rewarding framework and implemented legal frame has an impact on integration of financial management information system in Rwanda. Integration of financial management system formalize a part from the practice of financial management correction in developed countries around the world. It is carry significant qualifications such as effective control on public financial enhance transparency, responsibilities and work as defense shell for corruptions and fraud (Harelimana & Jean, 2017).

For many researches it has been noted the benefit of management information system to organizations operations from different side views. Also it been noticed that the clear impact of management information system from its contribution in making decision. Many researches has been done about the relation of management information system in making decisions and results came out positive during the analysis. The management information system role is to support and enhance decision-making, however the research is poor in defining the importance of management information system deceive information speed and its quality in supporting making decision role (Ali et al., 2015). The study did not define and analyze the problem to smooth the administration role of management information system and even the study did not comprehensive the satisfaction of decision maker, information component and type of ways to reach information. Therefore, following methodology of previous studies and defining required variables, the study aim to analysis the impact of management information system in making decision (Abdulatif & Ahmed, 2016).

It has been understood that management information concept with its impact in many ways is known with name of decision maker based on computer. To make decision required specific information, documented with time management and related. Management information system provide suitable information in suitable time to speed up process of making decision and organizations ability to keep up with organized activities (Murtaza et al., 2015).

The researcher discovered that information system is the best way to limit problems and provide possible solutions to decision makers. In addition to that, the system assists in supporting decision, also information system assist on making collective decision effectively in organization. The study discusses decision support system based on its impacts with management information system process (Islam & Mohammed, 2018). Management information system is remarkable part of work, which provide accurate information with suitable time for business managers as will contribute in taking suitable decisions (Shah, Haq, & Farooq, 2015). Management information system is different from usual information system, because the prime goal of these systems is to analyze the other systems that deal with operated activities within organization. In this way management information system, consider as group subset of planed activities and comprehensive control that covers human implementation, technicalities and institutions procedures (Mahmood, Shah, Waqas, & Bhatti, 2014).

In field of science administration, most likely design management information system to match with automation or support human decision-making. Management information system facilitate the access for organizations to specify suitable information for specific person within managed time during the enhancement of interaction between organization individuals and collective data's to various specified information systems technology and used procedures (Bhati, Shah, Waqas, Abid, & Malik, 2013). It is combination of primary data's, that is gathered from deferent work field of organization which is good for limited functions such as accounting, it is not self-provided information that is can be used to make decisions. With organizations growth, management information system provides the facility to transfer between fields of jobs and administrations immediately and that reduce that need of facial connections between employees and that increase the respond of organization (Mekonnen & Amenta, 2017).

Although from positive connection of management information role in making decision operation, there are some challenges that is being believed that limit the effectiveness of management information system. Such as: The dynamic environment for management information system that make it difficult to some organizations to keep up with principles, strategies suggestions or thoughts. Different situations require different decisions that lays challenges to management information system viewers, because some of management information system lean to be unadaptable. To add institution character requires program, monitoring and evaluation of management information system need lots of experience and that come down many of organizations (Abrar ul haq, Jali, & Islam, 2019). Operating management information system program tend to be expensive ratably for some organizations especially the small ones that is not financially well supported. Management information system consider as more in scientific field, while business directed to art. Therefore, finding middle solution to connect both is difficult for some people. Most of organizations there is no clear system to make decision. Wherefore, even when using information system tool their achievement is very few in matter of enhancing decision-making operation (Devaraju, 2016).

(Amal, 2016) the extent of the availability of information systems, administrative control and oversight in Jordanian public and private institutions, an analytical and comparative study, administrative science studies. The study aimed to explore the availability of information systems and control in Jordanian public and private institutions, and the extent to which these institutions benefit Available systems. The study showed the low level of availability of information and control systems in public sector institutions that turned out to be interested in information and control systems in a manner that increased their contribution to achieving their goals (Akram et al., 2019). The study also showed a significant relationship between the degree of availability of systems and their ability to achieve their goals and the systems themselves. Soares and Marcelo (2015) of the Centro Universitário de Maringá Stated in his published journal that systems that aim at cost reduction strategies might lead to applications development the various areas of the company.

Nima (2015), Information system and its relationship with technology and leadership behavior, an experimental case study, Journal of University Studies, Humanities. The study aimed to answer the following question: Does change in technology lead to a change in the information system? Does the leadership behavior respond to the state of change in the information system? The study sample consisted of 25 managers belonging to the financial and development organizations in Iraq. The study concluded that the change in technology does not necessarily lead to the change in the information system. Adeeb (2015), the impact of the use of computers on administrative information systems. This study aimed to explain the concept of computer information system and what it is, its benefits and what are the stages of its construction and explain the relationship between the computer information system on the one hand and management on the other hand from the point of view of administrative thought, From the perspective of the administrative process. The researcher has reached the following results: The introduction of the computer and building the computer information system will support the administrative process in planning, organizing, controlling, directing, coordinating,

and taking decisions. The changes in the organizational structure .on computer input and building information system, and the introduction of the need to develop technical skills in order to be able to take advantage of computer services and information system and the introduction of the computer and build a computer system information provides a great opportunity for the simple mandate.

Sabsayachi, and Antoine (2015) wrote that the performance impacts of information technology (IT) investments in organizations have received considerable attention in recent years and according to (Malik et al., 2019) (Saxena, 2017), “information systems have been continuously going through the process evolution and have not just limited to scheduling, planning, and resource management. They have evolved to extent where they can play vital role in decision making, productivity and efficiency improving, complex problem solving to controlling the cost.” The idea has been supported by author (Alhanof ,2016) who explained that information systems have transformed the way business organizations perform their operations in the modern times. This transformation is as a result of the contemporary technological advancement that is enabling people to communicate, transfer data and store information with ease in a cost-effective manner (Abrar ul Haq, Nawaz, Akram, & Natarajan, 2020).

Yin and chang (2017) aimed at discovering changes in the company's performance as a result of the impact of the dimensions and intensity of industrial technology (Abro et al., 2020). The study reached the following results: First: The organization that uses advanced industrial technology with intensity High in order to improve performance must contain a structure with a collaborative direction, that is, the structure must be based on a philosophy of few rules and effective participation Secondly: that specialized workers do not interact sufficiently with the strategy of advanced manufacturing technology and therefore must focus on the ways of teams rather than individual skills III Necessity and atmosphere D is a compatible structure in industrial organizations before adopting any new technology in them, where the study community was represented in 500 industrial companies in the American states, and the postal survey method was approved for study questionnaires, 101 approved answers were retrieved with a return rate of 20.2%, where the questionnaires were distributed to the study sample and they are the managers Factories, operations, and production managers of accredited companies 7. Comment on previous studies: After previous studies have been presented, several aspects of those previous studies are noted, topics covered, tools and samples used and what results they can achieve in the following: 1- Diversity of RASAT in terms of studies researcher is guided by some of the references and sources that did not allow the researcher to know and see them before, and the curriculum that is used by each study and the sample type and study community. 2- While other studies aimed to identify the role of information systems in raising efficiency in governmental or private institutions, whether economic, services or commercial. 3- With regard to a goal: The current study differs with previous studies in the goal as it aimed at information systems and their relationship to administrative creativity and were also in departments. 4- As for the tool: The present study was similar to the studies used in the descriptive approach. 5- With regard to the study sample: the current studies were similar to previous studies in using a specific sample that all previous studies were similar to the study.

METHODOLOGY

This study used the descriptive method of research. The study describes the use of cost-effectiveness analysis (CEA) tool particularly that of Incremental Cost Effectiveness Ratio (ICER) method in the determination of information system's value. On the other hand, the study also describes the examination and evaluation of organizational performance impact measures of management information system by assessing the selected internal stakeholders' perceived impact of the system's usefulness and user satisfaction factors. Literature review was also used to identify and define these key indicators, their purposes, and uses in the determination of the organizational benefits of Management Information System. Further, the assessment included the analysis of data, used of statistical tools and treatment, rendered distributed results, their interpretations, and presentation. Moreover, the study explicates the results of the survey research and the derived mean, standard deviation, and variance of the identified measures, and finally, significantly presents descriptively the overall findings and recommendations of the study that answered the research questions stated therein (Abrar-Ul-Haq, Jali, & Islam, 2018).

Research Instrument

This section describes the instruments used in this study. This research study was composed of six research questions and employed two different types of instruments in two separate processes. For the first three research questions, the instrument or tool used was the prepared template in identifying and analyzing the essential administrative and financial data and documents needed for cost-effectiveness analysis. For the other three research questions, a survey questionnaire was utilized. A 5-Point rating scale instrument as shown in Table1 was used for data collection to obtain the respondents' perception using the 24 key indicators pertaining to the determination of the level of organizational performance impact of management information system. The survey questionnaire was referenced to a published survey instrument used in a study conducted by Simon Bordeau et al (2018). It has been modified to suit to the purpose and needs of the study.

The instrument was composed of 24 questions representing each of the key indicators and are categorized into three (3) characteristics as performance measures and further categorized into two (2) main factors leading towards the determination of the level of organizational performance impact which were finally and appropriately described using the 5-point rating scale (Raza et al., 2018) found in Table 2.

Table 1: The 5-point Likert Scale

| Scale | Range | Description |
|-------|-------------|---------------------------|
| 1 | 1.00 - 1.80 | Strongly Disagree |
| 2 | 1.81 - 2.60 | Disagree |
| 3 | 2.61 - 3.40 | Neither agree or disagree |
| 4 | 3.41 - 4.20 | Agree |
| 5 | 4.21 - 5.00 | Strongly agree |

Table 2: The 5-point Likert Scale

| Scale | Range | Description |
|-------|-------------|-------------------|
| 1 | 1.00 - 1.80 | Small Extent |
| 2 | 1.81 - 2.60 | Some Extent |
| 3 | 2.61 - 3.40 | Moderate Extent |
| 4 | 3.41 - 4.20 | Great Extent |
| 5 | 4.21 - 5.00 | Very Great Extent |

RESULTS AND DISCUSSION

Table 3: Estimated Organizational Resources Cost

| Area | Resource | Cost (in BHD) |
|------------------------|--|---------------------|
| Operational Management | Direct execution facilities | 2,400.00 |
| | Contract developments | 40,000.00 |
| | Administrative | 7,000.00 |
| | Human Resources | 15,000.00 |
| | Finance & Accounts | 45,000.00 |
| | Supporting Facilities | 24,000.00 |
| | Contractors, workers, architects and engineers | 4,500,000.00 |
| | Planning division | 565,000.00 |
| | Operational Resources: | |
| | Training Materials & Venue | 5,500.00 |
| | Equipments | 25,000.00 |
| | Site materials and instruments | 19,000.00 |
| | Others | 2,500.00 |
| Estimated Total | | 5,250,400.00 |
| Support System | Designs and Researches | 7,500.00 |
| | Logistics | 25,500.00 |
| | Engineering Support | 35,000.00 |
| | Learning & Development (L&D) | 8,500.00 |
| | Legal Relations | 13,000.00 |
| | Internal Control | 4,500.00 |
| | Major Stakeholders | 25,000.00 |
| Estimated Total | | 5,421,400.00 |

Table 4: Information Technology Resources

| Area | Item | Total Cost |
|------|------|------------|
|------|------|------------|

| | | |
|------------------------|--|-------------------|
| General Manager | Hardware: | |
| | Window Server | 900.00 |
| | Office workstation | 1,500.00 |
| | Site Inventories | 26,000.00 |
| | Software: | |
| | Specifications and Drawings | 25,000.00 |
| | Monitored electrical and mechanical designs system | 32,000.00 |
| | In place blueprints foundation | 1,800.00 |
| | Printer, telephones, forms | 7,500.00 |
| | Network and design structural elements | 1,900.00 |
| | Field construction services, equipment and materials | 12,000.00 |
| | Others | 650.00 |
| Estimated Total | | 109,250.00 |
| Executive Secretary | Hardware: | |
| | Window Server | 900.00 |
| | Office workstation | 1,500.00 |
| | Software: | |
| | Specifications and Drawings | 25,000.00 |
| | Monitored electrical and mechanical designs system | 32,000.00 |
| | In place blueprints foundation | 1,800.00 |
| | Printer, telephones, forms | 7,500.00 |
| | Network and design structural elements | 1,900.00 |
| | Field construction services, equipment and materials | 12,000.00 |
| | Others | 650.00 |
| Estimated Total | | 193,150.00 |
| Administration | Hardware: | |
| | Window Server | 900.00 |
| | Office workstation | 1,500.00 |
| | Software: | |
| | Specifications and Drawings | 25,000.00 |
| | Monitored electrical and mechanical designs system | 32,000.00 |
| | In place blueprints foundation | 1,800.00 |
| | Printer, telephones, forms | 7,500.00 |
| | Network and design structural elements | 1,900.00 |
| | Field construction services, equipment and materials | 12,000.00 |
| | Others | 650.00 |
| Estimated Total | | 277,050.00 |

Operationally, Table 4.1 shows that the organization has support departments that assist and facilitate the needs of the organization in its entire operations and specifically in IT management through the direct execution facilities, contract development and project management, administrative (procurement, sales, inventory management, design and marketing), finance and accounts, supporting facilities, planning, human resource management, and support system (which includes designs and researches, logistics, engineering support, learning and development, legal relations, and internal controls) functions. Financially, the organization's allocation of resources and their expenditures to the different resources showed a capacity and capability to acquire and maintain such resources. Therefore, the company presents a financial stability and support towards establishment of a Management Information System.

Presented below in Table 4.3 is the estimated Management Information System Budget:

Table 5: Estimated Management Information System Budget

| 1 | HARDWARE REQUIREMENTS: | SPECIFICATIONS | COST (in BHD) |
|---|--|--|---------------------------------------|
| a | Servers | servers for system, files, database | 7,000.00 |
| a | Workstations | Deployed to different departments and units | 6,800.00 |
| b | Laptop | Management use | 500.00 |
| c | Others | Peripherals, EDIs, etc. | 3,000.00 |
| | Estimated Total | | 17,300.00 |
| 2 | SYSTEM AND SOFTWARE REQUIREMENTS: | | |
| a | System Development Cost | | 5,000.00 |
| b | Software (System Software, Applications, Utilities) | | 7,000.00 |
| c | Attendance Timekeeper | Biometric Attendance | 4,500.00 |
| d | System updating and revision | Timely coordination of work progress | 5,000.00 |
| e | Electronic Resource Platforms | quick and automated electronic commodity services | 12,000.00 |
| f | Source mode cost controls req. | associated with productivity over scheduled vs actual progress | 2,300.00 |
| | Estimated Total | capacity vector | 35,800.00 |
| | CONNECTIVITY/NETWORK/DATA COMMUNICATIONS REQUIREMENTS: | | |
| 3 | a | Network infrastructure | 7,000.00 |
| | b | Internet Data Centers (IDC) | faster network connectivity and paths |
| | c | Others | 5,000.00 |
| | Estimated Total | | 2,500.00 |
| | Estimated Total | | 14,500.00 |
| 4 | PROJECT MANAGEMENT/MANPOWER REQUIREMENTS: | | |
| | Establishment of the following resources for : | | 20,000.00 |
| | Team for inspection of work before covering-up | | |
| | Management of outstanding works prior to taking over | | |
| | Completion of outstanding works and performance during defects liability period | | |
| | Time control management/scheduling | | |
| | Quality control, site meetings and record keeping | | |
| | Estimated Total | | 20,000.00 |
| 5 | IMPLEMENTATION AND OPERATIONAL REQUIREMENTS INCLUDING MAINTENANCE: | | |
| | Kick-Off site meeting, methods for giving effective approvals, instructions and variation orders | | 6,000.00 |
| | Monitor high performance and progress based on program, discuss problems and coordinate issues | | |
| | Estimated Total | | 6,000.00 |
| 6 | TRAINING REQUIREMENTS | | |
| | Includes training work optimization of projects assigned for heavy progress photographs and mobilization | | 2,500.00 |
| | Estimated Total | | 2,500.00 |
| | OVERALL TOTAL | | 96,100.00 |

In the second research question, "What are the intervention activities of the company as assessed into value of MIS that leads to improvement in organizational performance equated into organizational benefits?", the following are the results:

The organization as illustrated in Table 4.4, is actively indulge in the organizational activities in support to the aimed improvement of its organizational performance in terms of administration, training, planning, media and production of information, education and communication for its products and services; supervision, and social mobilization. The company financially allocate financial resources to execute and realize these activities for the furtherance of the business organization.

Table 6: Annual Intervention Activities of Albader Tower Contracting Related to its Administrative and Operational Functions

| ACTIVITY | DESCRIPTION | COST (in BHD) |
|--------------------------------|---|------------------|
| a1. Administration | Overseeing and managing improvement site procedures and internal controls | 28,000 |
| | Ensuring compliance with approved contracts | |
| | Coordinating all resources to complete projects | |
| b1. Planning | Strategic planning such as systematic way of making key business decisions | 180,000 |
| | Scheduling and allocating budget for construction projects | |
| | Designing plan and specifications converted to physical structures and facilities | |
| | Operation Optimization and Utilization | |
| c1. Training | Continuing skills development in delivering the services | 2,500 |
| | Conduct training related to performance development activities required for standard of quality and performance of work executions | |
| d1. Media and IEC | Marketing strategy enhancement toward clients satisfaction as outcome and choose you above other contracting companies. | 35,000 |
| | Media exposed into branding and quality maintenance facilities | |
| e1. Monitoring and Supervision | Supervising and monitoring job transactions for completeness as planned | 28,000 |
| | Ensuring safety of work and high performance-based of quality service | |
| f1. Social Mobilization | Motivating and educating the public, and marketing business-related interventions through local markets; provide job opportunities to local residents | 18,000 |
| | Provide guidance and advisory on the correct use of items/services | |
| | Continue advertising and promoting activities, seminars, technical support to employees and clients | |

In the third research question, "How cost-effective is the Management Information System in Al Bader Tower Contracting?" the following are the results: It is evidenced that management information system is cost-effective in Albader Tower Contracting. As depicted in Table 4.5 which pertains to the regular annual intervention activities of the business organization, the estimated costs of administration (overseeing and managing the company resources, improving site procedures, ensuring internal controls, ensuring compliance with approved contracts, and coordinating of all resources to complete projects) amounted to BD28,000; planning includes strategic planning such as systematic way of making key business decisions, scheduling and allocating budget for project constructions, designing plans and specifications and converting them to physical structures and facilities, and operations optimization and utilization amounted to BD180,000; training which includes continued skilled development in delivering the services efficiently and effectively and trainings related to required standard of quality and performance of work executions totaled BD2,500; media and information, education and communication production specific to marketing strategy development and implementation and media exposure of company products and services, and branding and quality assurance summed up to BD35,000; monitoring and supervision comprised of facilitating, supervising and monitoring all job and contracting transactions as per functional and operational plan and ensuring safety of work and high performance-based of quality service amounted to BD28,000; and social mobilization and corporate social responsibility which includes motivating and educating the public through marketing and corporate social responsibility interventions in local markets providing jobs, guidance and advisory to constituents, and facilitating advertising and promotion activities, seminars, technical support which amounted to BD18,000. These intervention activities have been performed by Albader Tower Contracting for the period of five (5) years since it started operating.

In calculating and determining for the cost-effectiveness of management information system at Albader Tower Contracting, the researcher employed one of the tools of using Generalized Cost-Effectiveness Analysis (GCEA), Tan (2016) which was the Incremental Cost-Effectiveness Ratio (ICER). The process to derive the derived the result is presented in following formula:

$$ICER = \frac{\text{Incremental costs}}{\text{Incremental effectiveness}} = \frac{\text{Cost}_A - \text{Cost}_B}{QALY_A - QALY_B}$$

$$= \text{Cost per 1 QALY}$$

$$\text{Quality Adjusted Life Years (QALY)} = \left(\frac{\sqrt{1^2 + \text{utility}^2}}{1.4142} \right) \times \text{time}$$

Where: utility = cost, time = actual length of life

Table 6: QALYs corresponding to different utility values when Time is set to be constant (1 year)

| Time (years) | Utility | QALY* |
|--------------|---------|--------|
| 1 | 1.00 | 1.0000 |
| 1 | 0.95 | 0.9753 |
| 1 | 0.90 | 0.9513 |
| 1 | 0.85 | 0.9280 |
| 1 | 0.80 | 0.9055 |
| 1 | 0.75 | 0.8839 |
| 1 | 0.70 | 0.8631 |
| 1 | 0.65 | 0.8434 |
| 1 | 0.60 | 0.8246 |
| 1 | 0.55 | 0.8070 |
| 1 | 0.50 | 0.7906 |
| 1 | 0.45 | 0.7754 |
| 1 | 0.40 | 0.7616 |
| 1 | 0.35 | 0.7492 |
| 1 | 0.30 | 0.7382 |
| 1 | 0.25 | 0.7289 |
| 1 | 0.20 | 0.7211 |
| 1 | 0.15 | 0.7150 |
| 1 | 0.10 | 0.7106 |
| 1 | 0.05 | 0.7080 |
| 1 | 0.00 | 0.7071 |

As shown in the figure below, the QALYs as corresponds to the utility or cost values when the time is set to the constant value of 1, depicts the two connected variables in a v-shape lines which means that as the utility or cost increases, the QALY significantly increases also. With the values provided in Table 4.5, the researcher made a prerogative to come up with the estimated percent increase in the costs of each intervention activity in support to the implementation of Management Information System in the company as estimated costs of the entire system has been calculated. As hypothetically analyzed, the percent increase was based on the total contribution attributed to the developments and improvements that the MIS would render for two periods of improvement (for the first three years and followed by another two years as deemed understood that hardware resources need to be upgraded after three years. Follow up improvement happens for the next two years after implementation.

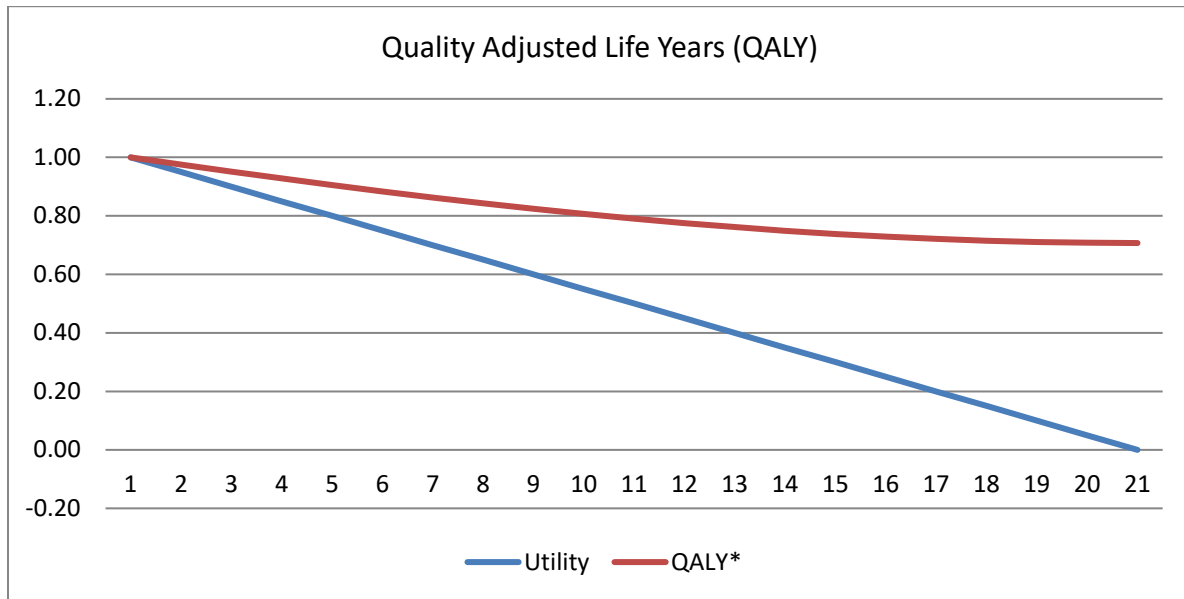


Figure 1: QALYs corresponding to different utility values when Time is set to be constant (1 year)

In such case, the calculated Incremental Cost-Effectiveness Ratio (ICER) for the interventions as presented in Table 4.6 below for the first three years and then another two years respectively, are: intervention a1 has (a2) 0.1685 and (a3) 0.0878; intervention (b1) with (b2) 0.1719 and (b3) 0.1295; intervention c1 with (c2) 0.1767 and (c3) 0.0844; intervention d1 with (d2) 0.1779 and (d3) 0.0337; intervention e1 with (e2) 0.1685 and (e3) 0.0503; and intervention f1 with (f2) 0.1779 and (f2) 0.0332. The calculated ICERs are the percent increase every time unit for the number of time acquired as benefits in implementing the MIS. Therefore, the interventions as cost of investment to MIS yield more benefits than no applied intervention at all.

Table 7: Incremental Cost-Effectiveness Ratio (ICER) Calculation

| Intervention | Cost | QALY | ICER/QALY | ICER |
|--------------|---------|---------|-----------|--------|
| a1 | 28,000 | 1.00000 | - | - |
| a2 | 33,600 | 2.18670 | 4,718.97 | 0.1685 |
| a3 | 36,960 | 3.55300 | 2,459.20 | 0.0878 |
| b1 | 180,000 | 1.00000 | - | - |
| b2 | 216,000 | 2.16330 | 30,946.45 | 0.1719 |
| b3 | 248,400 | 3.55300 | 23,314.38 | 0.1295 |
| c1 | 2,500 | 1.00000 | - | - |
| c2 | 3,000 | 2.13180 | 441.77 | 0.1767 |
| c3 | 3,300 | 3.55300 | 211.09 | 0.0844 |
| d1 | 35,000 | 1.00000 | - | - |
| d2 | 42,000 | 2.12400 | 6,227.76 | 0.1779 |
| d3 | 46,200 | 3.55300 | 1,179.98 | 0.0337 |
| e1 | 28,000 | 1.00000 | - | - |
| e2 | 33,600 | 2.18670 | 4,718.97 | 0.1685 |
| e3 | 38,640 | 3.57500 | 1,407.60 | 0.0503 |
| f1 | 18,000 | 1.00000 | - | - |
| f2 | 21,600 | 2.12400 | 3,202.85 | 0.1779 |
| f3 | 23,760 | 3.60550 | 596.96 | 0.0332 |

As calculated above, an example of ICER derived value could be equated to financial benefits like:

Intervention a2 which has an ICER of 0.1685 means an incremental increase likewise in the financial benefits derived of using an MIS. As this point, as presented in the above table, the company decided to invest on MIS which is allocated

as an increase to the cost equivalent to 25% more as an intervention activity on administration activity – a desired improvement in its operations. The 25% investment cost increase from BD28,000 to BD33,600 which is equal to BD5,600 is equivalent to 4,719 ICER/QALY or the benefit over QALY- an added value as benefit from using MIS in operations, e.g., $1,867 \times 4,719 = 10,318.97$ in 3 years). Table 4.7 below displays the estimated assigned percentage increase to each intervention based on the calculated cost of Management Information System as attributed to the contribution of benefits derived from the system:

Table 8: Assignment of percent increase as estimated benefit of MIS in the first three years and two years of implementation in the calculation of QALY and ICER

| Intervention | % Increase in investment cost equated as expected benefit | Intervention | % Increase in investment cost equated as expected benefit |
|--------------|---|--------------|---|
| a1 | | d1 | |
| a2 | 25% | d2 | 5% |
| a3 | 10% | d3 | 10% |
| b1 | | e1 | |
| b2 | 20% | e2 | 25% |
| b3 | 20% | e3 | 15% |
| c1 | | f1 | |
| c2 | 10% | f2 | 5% |
| c3 | 10% | f3 | 20% |

Note: Percent increase denote assumed benefit over utility or cost per intervention. First intervention used 3 years as time over change in cost and 2 years was used in the second intervention as time over change in cost.

To calculate the ICER/QALY in Table 4.6, the following are the derived solutions:

$$\begin{aligned}
 a2 &= (33,600 - 28,000) / (2.1867 - 1.0000) \\
 a3 &= (36,960 - 33,600) / (3.5530 - 2.1867) \\
 b2 &= (216,000 - 180,000) / 2.1633 - 1.0000 \\
 b3 &= (248,400 - 216,000) / 3.5530 - 2.1633 \\
 c2 &= (3,000 - 2,500) / (2.1318 - 1.0000) \\
 c3 &= (3,300 - 3,000) / (3.5530 - 2.1318) \\
 d2 &= (42,000 - 35,000) / (2.1240 - 1.0000) \\
 d3 &= (46,200 - 42,000) / (3.5530 - 2.1240) \\
 e2 &= (33,600 - 28,000) / (2.1867 - 1.0000) \\
 e3 &= (38,640 - 33,600) / (3.5750 - 2.1867) \\
 f2 &= (21,600 - 18,000) / (2.1240 - 1.0000) \\
 f3 &= (23,760 - 21,600) / (3.6055 - 2.1240)
 \end{aligned}$$

In the fourth research question, "What is the level of organizational performance impact of MIS when indicators are grouped as to (a) technological characteristics, (b) organizational characteristics, and (c) people characteristics as perceived by internal stakeholders?", the following are the results: As evidenced in Table 4.8 and Figure 2.3, the compared means and the level of organizational performance impact of management information system at Albader Tower Contracting when grouped according to technological characteristics describes that indicators usability averaged 3.565 ("Agree"), interoperability with a mean of 3.870 ("Agree"), functionality with a mean of 3.913 ("Agree"), flexibility with a mean of 3.565 ("Agree"), sophistication with a mean of 3.870 ("Agree"), content averaged of 3.913 ("Agree"), format earned a mean of 3.957 ("Agree"), reliability with 4.217 ("Strongly agree"), responsiveness with an average of 4.304 ("Strongly agree"), assurance with a mean of 3.913 ("Agree"), and empathy which garnered a mean of 4.348 ("Strongly agree"). The eleven indicators in this characteristic earned an overall mean of 4.196 which signifies that the level at this category is of "Great Extent".

Table 9: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped into technological characteristics

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|---------------------|--------------|----|----------------|--------------|---------|---------|
| Usability | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Interoperability | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Functionality | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Flexibility | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Sophistication | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Content | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Format | 3.957 | 23 | .8779 | .771 | 2.0 | 5.0 |
| Reliability | 4.217 | 23 | .9980 | .996 | 2.0 | 5.0 |
| Responsiveness | 4.304 | 23 | .7029 | .494 | 3.0 | 5.0 |
| Assurance | 3.913 | 23 | .9493 | .901 | 2.0 | 5.0 |
| Empathy | 4.348 | 23 | .7751 | .601 | 3.0 | 5.0 |
| Overall Mean | 4.196 | | 0.8560 | 0.748 | | |

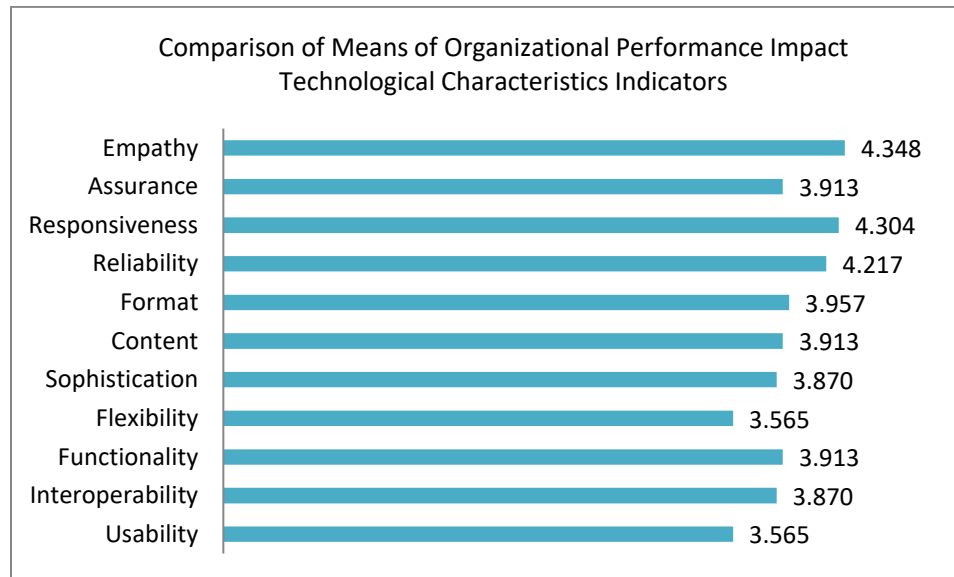


Figure 2: Comparison of means of organizational performance impact – technological characteristics indicators

As shown in the Table 10, the level of organizational performance impact of management information system at Albader Tower Contracting when grouped according to technological sub-characteristic MIS Quality describes that indicators usability averaged 3.565 (“Agree”), interoperability with a mean of 3.870 (“Agree”), functionality with a mean of 3.913 (“Agree”), flexibility with a mean of 3.565 (“Agree”), and sophistication with a mean of 3.870 (“Agree”). Overall, this sub-characteristic has earned an average of 3.757 and has achieved the level of impact of “Great Extent”.

Table 10: Level of organizational performance impact of Management Information System at Albader Tower Contracting when grouped according to technological characteristics under the sub-characteristic mis quality

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|---------------------|--------------|----|----------------|--------------|---------|---------|
| Usability | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Interoperability | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Functionality | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Flexibility | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Sophistication | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Overall Mean | 3.757 | | 0.880 | 0.785 | | |

Table 11 shows the compared means and the level of organizational performance impact of management information system at Albader Tower Contracting when grouped according to technological sub-characteristic Information Quality shows that indicators content averaged of 3.913 (“Agree”), format earned a mean of 3.957 (“Agree”), reliability with 4.217 (“Strongly agree”), responsiveness with an average of 4.304 (“Strongly agree”), assurance with a mean of 3.913 (“Agree”), and empathy which garnered a mean of 4.348 (“Strongly agree”). The eleven indicators in this characteristic earned an overall mean of 3.935 which signifies that the level at this category is of “Great Extent”.

Table 11: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when grouped according to technological characteristics under the sub-characteristic information quality

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|--------------|-------|----|----------------|----------|---------|---------|
| Content | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Format | 3.957 | 23 | .8779 | .771 | 2.0 | 5.0 |
| Overall Mean | 3.935 | | 0.889 | 0.791 | | |

As depicted in the Table 11 below, indicators content averaged of 3.913 (“Agree”) and format earned a mean of 3.957 (“Agree”). The level of organizational performance impact of management information system at Albader Tower Contracting when grouped according to technological sub-characteristic Information Quality has reached a mean of 3.935 which signifies the level of “Great Extent”.

Table 12: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped according to technological characteristics under the sub-characteristic service quality

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|----------------|-------|----|----------------|----------|---------|---------|
| Reliability | 4.217 | 23 | .9980 | .996 | 2.0 | 5.0 |
| Responsiveness | 4.304 | 23 | .7029 | .494 | 3.0 | 5.0 |
| Assurance | 3.913 | 23 | .9493 | .901 | 2.0 | 5.0 |
| Empathy | 4.348 | 23 | .7751 | .601 | 3.0 | 5.0 |
| Overall Mean | 4.196 | | 0.856 | 0.748 | | |

As illustrated in Table 12, Service Quality sub-characteristic’s indicators reliability got an averaged of 4.217 (“Strongly agree”), responsiveness earned a mean of 4.304 (“Strongly agree”), reliability with a mean of 3.913 (“Agree”), and empathy which garnered a mean of 4.348 (“Strongly agree”) reached the level of organizational performance impact of management information system at Albader Tower Contracting “Great Extent” for an overall mean of 4.196.

Table 13 and Figure 3 illustrate the comparison of organizational performance impact of management information system at Albader Tower Contracting organizational characteristics indicators. Indicators in this category includes perceived IT importance with a mean of 4.087 (“Agree”), IT productivity with a mean of 4.043 (“Agree”), effort expectancy indicator which rated with a mean of 4.043 (“Agree”), and performance expectancy indicator with a mean of 4.000 which is rated “Agree”. Overall, this category’s level of organizational performance impact with a mean of 4.043 is given an appraisal of “Great Extent”.

Table 13: Compared means of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped according to organizational characteristics

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|-------------------------|-------|----|----------------|----------|---------|---------|
| Perceived IT Importance | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| IT Productivity | 4.043 | 23 | .8779 | .771 | 3.0 | 5.0 |
| Effort Expectancy | 4.043 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Performance Expectancy | 4.000 | 23 | .9045 | .818 | 3.0 | 5.0 |
| Overall Mean | 4.043 | | 0.863 | 0.747 | | |

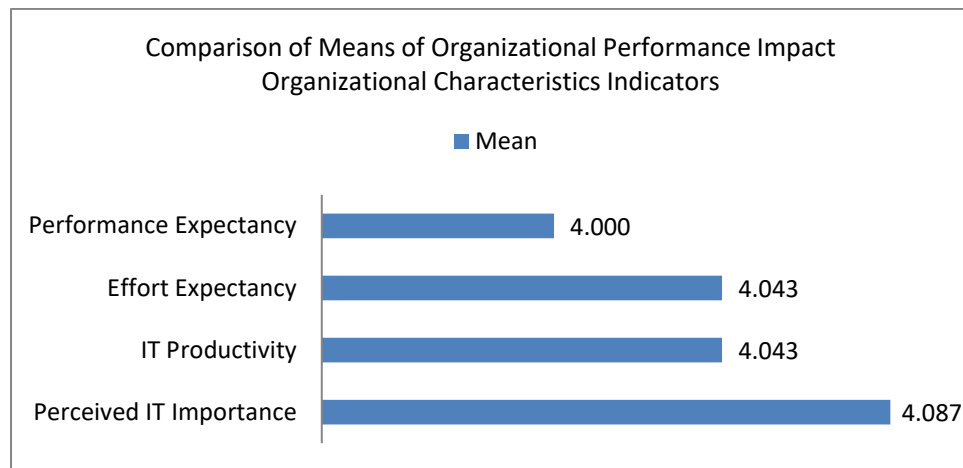


Figure 3: Comparison of means of organizational performance impact – organizational characteristics indicators

Table 14 as illustrated below has indicators perceived IT importance with a mean of 4.087 (“Agree”) and IT productivity with an average of 4.043 (“Agree”). This category’s mean garnered 4.065 and has achieved the level of organizational performance impact rated as “Great Extent”.

Table 14: Compared Means and level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped according to organizational characteristics under the sub-characteristic top management support

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|-------------------------|-------|----|----------------|----------|---------|---------|
| Perceived IT Importance | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| IT Productivity | 4.043 | 23 | .8779 | .771 | 3.0 | 5.0 |
| Overall Mean | 4.065 | | 0.889 | 0.791 | | |

The following Table 15, shows that indicators effort expectancy earned an average of 4.043 and rated as “Agree” while indicator performance expectancy garnered a mean of 4.000 which is rated “Agree” also. Overall, this category’s level of organizational performance impact with a mean of 4.022 is assessed with a level rating of “Great Extent”.

Table 15: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped according to organizational characteristics under the sub-characteristic end-user training

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|------------------------|-------|----|----------------|----------|---------|---------|
| Effort Expectancy | 4.043 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Performance Expectancy | 4.000 | 23 | .9045 | .818 | 3.0 | 5.0 |
| Overall Mean | 4.022 | | 0.836 | 0.704 | | |

As evidenced in the following Table 16 and Figure 4, under the people characteristic, indicators under this category describes that computer knowledge averaged 4.435 rated as “Strongly agree”, computer skills with a mean of 4.391 (“Strongly agree”), usability with a mean of 3.957 (“Agree”), accessibility with a mean of 4.043 (“Agree”), desirability with a mean of 4.304 (“Strongly agree”), usefulness averaged of 4.087 with a rating of “Agree”, valuability earned a mean of 3.826 (“Agree”), findability with 4.261 (“Strongly agree”), and credibility with an average of 4.261 (“Strongly agree”). This characteristic earned an overall mean of 4.174 which signifies that this category is of the level “Great Extent”.

Table 16: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped according to people characteristic

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|--------------------|-------|----|----------------|----------|---------|---------|
| Computer Knowledge | 4.435 | 23 | .8958 | .802 | 2.0 | 5.0 |
| Computer Skills | 4.391 | 23 | 1.0762 | 1.158 | 1.0 | 5.0 |
| Usability | 3.957 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Accessibility | 4.043 | 23 | .5623 | .316 | 3.0 | 5.0 |
| Desirability | 4.304 | 23 | .7648 | .585 | 2.0 | 5.0 |
| Usefulness | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Valuability | 3.826 | 23 | .8341 | .696 | 2.0 | 5.0 |
| Findability | 4.261 | 23 | .7518 | .565 | 3.0 | 5.0 |
| Credibility | 4.261 | 23 | .8100 | .656 | 3.0 | 5.0 |
| Overall Mean | 4.174 | | 0.818 | 0.686 | | |

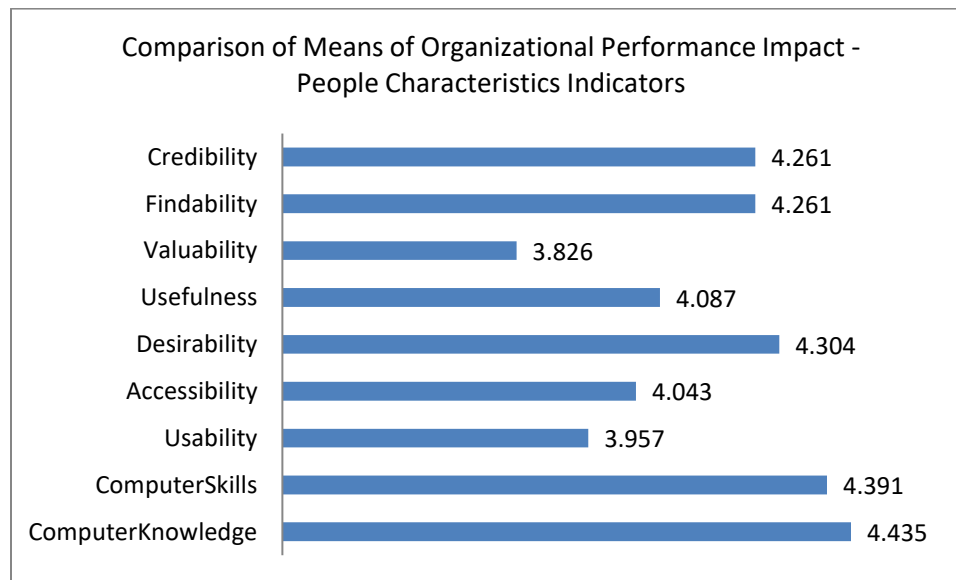


Figure 4: Comparison of Means of Organizational Performance Impact – People Characteristic Indicators

As depicted in the following Table 17, under the sub-characteristic computer self-efficacy, indicators under this category describes that computer knowledge averaged 4.435 rated as “Strongly agree” and computer skills with an average of 4.391 (“Strongly agree”) which entirely averaged 4.413 has achieved the level of “Very Great Extent”.

Table 17: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when grouped according to people characteristics under the sub-characteristic computer self-efficacy

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|--------------------|-------|----|----------------|----------|---------|---------|
| Computer Knowledge | 4.435 | 23 | .8958 | .802 | 2.0 | 5.0 |
| Computer Skills | 4.391 | 23 | 1.0762 | 1.158 | 1.0 | 5.0 |
| Overall Mean | 4.413 | | 0.986 | 0.980 | | |

Indicators below as portrayed in Table 18 indicates that usability earned a mean of 3.957 (“Agree”), accessibility with 4.043 mean and described as “Agree”, desirability with a mean of 4.304 (“Strongly agree”), usefulness averaged of 4.087 with a descriptive rating of “Agree”, valuability earned a mean of 3.826 (“Agree”), findability with 4.261 (“Strongly agree”), and credibility with an average of 4.261 (“Strongly agree”). This sub- characteristic earned an overall mean of 4.148 which indicates that this category has reached the level “Great Extent”.

Table 18: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped as to people characteristics under the sub-characteristic user experience

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|---------------|-------|----|----------------|----------|---------|---------|
| Usability | 3.957 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Accessibility | 4.043 | 23 | .5623 | .316 | 3.0 | 5.0 |
| Desirability | 4.304 | 23 | .7648 | .585 | 2.0 | 5.0 |
| Usefulness | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Valuability | 3.826 | 23 | .8341 | .696 | 2.0 | 5.0 |
| Findability | 4.261 | 23 | .7518 | .565 | 3.0 | 5.0 |
| Credibility | 4.261 | 23 | .8100 | .656 | 3.0 | 5.0 |
| Overall Mean | 4.148 | | 0.812 | 0.662 | | |

In the fifth research question, "What is the level of organizational performance impact of MIS when indicators are grouped as to (a) perceived usefulness and (b) user satisfaction as perceived by internal stakeholders?", the following are the results: In Table 19, for the factor "Perceived Usefulness" which is measured by all the indicators collectively with derived means as clearly mentioned above, overall, all the indicators of the organizational performance impact averaged 4.148 which represents an achievement of the level of impact "Great Extent".

Table 19: Compared means and level of organizational performance impact of Management Information System at Albader Tower Contracting when grouped according to the factor perceived usefulness

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|-------------------------|-------|----|----------------|----------|---------|---------|
| Usability | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Interoperability | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Functionality | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Flexibility | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Sophistication | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Content | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Format | 3.957 | 23 | .8779 | .771 | 2.0 | 5.0 |
| Reliability | 4.217 | 23 | .9980 | .996 | 2.0 | 5.0 |
| Responsiveness | 4.304 | 23 | .7029 | .494 | 3.0 | 5.0 |
| Assurance | 3.913 | 23 | .9493 | .901 | 2.0 | 5.0 |
| Empathy | 4.348 | 23 | .7751 | .601 | 3.0 | 5.0 |
| Perceived IT Importance | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| IT Productivity | 4.043 | 23 | .8779 | .771 | 3.0 | 5.0 |
| Effort Expectancy | 4.043 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Performance Expectancy | 4.000 | 23 | .9045 | .818 | 3.0 | 5.0 |
| Computer Knowledge | 4.435 | 23 | .8958 | .802 | 2.0 | 5.0 |
| Computer Skills | 4.391 | 23 | 1.0762 | 1.158 | 1.0 | 5.0 |
| Usability | 3.957 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Accessibility | 4.043 | 23 | .5623 | .316 | 3.0 | 5.0 |
| Desirability | 4.304 | 23 | .7648 | .585 | 2.0 | 5.0 |
| Usefulness | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Valuability | 3.826 | 23 | .8341 | .696 | 2.0 | 5.0 |
| Findability | 4.261 | 23 | .7518 | .565 | 3.0 | 5.0 |
| Credibility | 4.261 | 23 | .8100 | .656 | 3.0 | 5.0 |
| Overall Mean | 4.148 | | 0.812 | 0.662 | | |

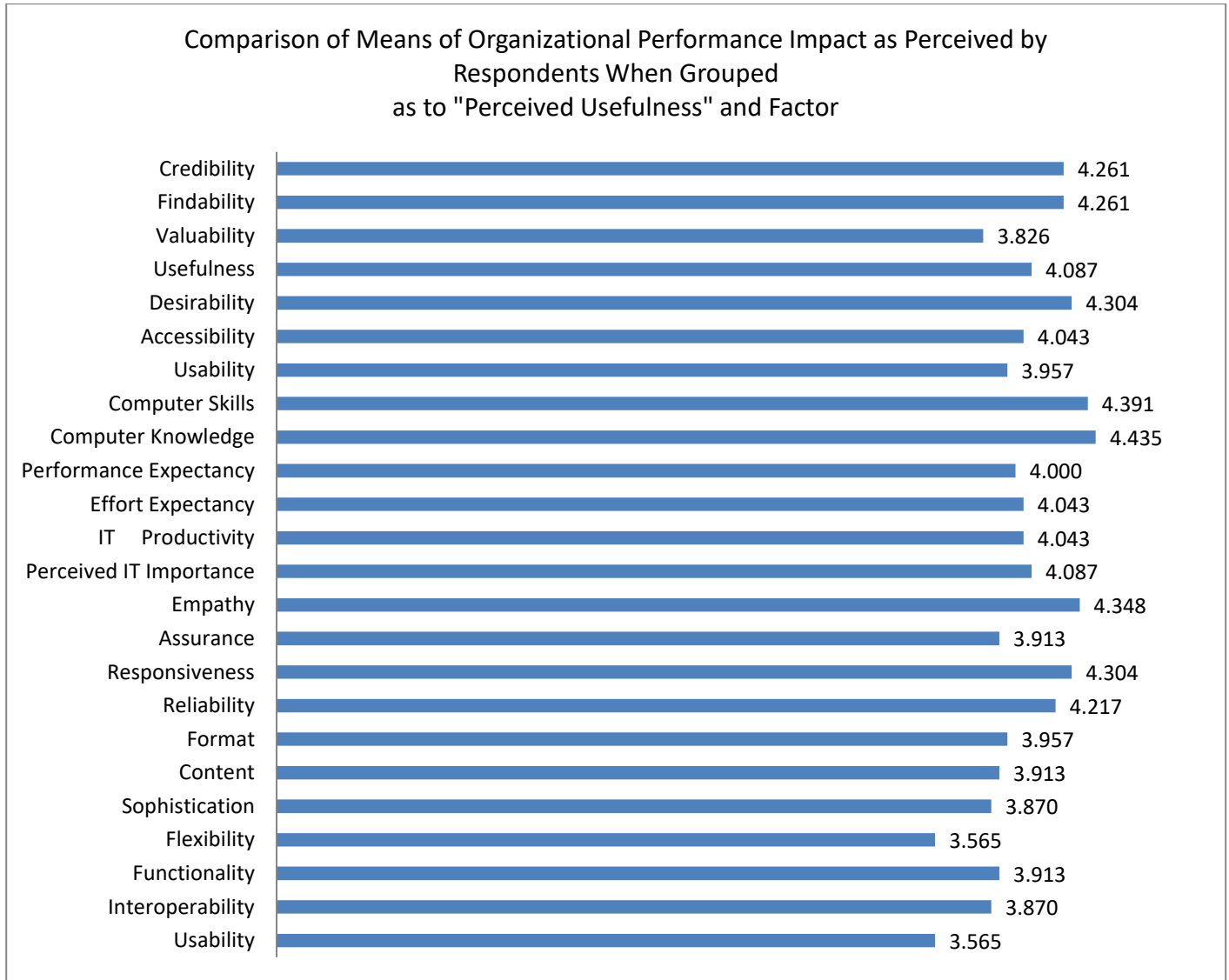


Figure 5: Compared Means of the Organizational Performance Impact as Perceived by the Respondents When Grouped as to "Perceived Usefulness" Factor

For the factor "User Satisfaction" as shown in Table 20 which is likewise measured by the derivative of all indicators (it is cross-referenced to all the same indicators) and as also mentioned individually above, has made an overall average of 4.148 which significantly denotes the same level of extent – the "Great Extent".

Table 20: Level of organizational performance impact of Management Information System at Albader Tower Contracting when indicators are grouped as to factor user satisfaction

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|------------------|-------|----|----------------|----------|---------|---------|
| Usability | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Interoperability | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Functionality | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Flexibility | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Sophistication | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Content | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Format | 3.957 | 23 | .8779 | .771 | 2.0 | 5.0 |
| Reliability | 4.217 | 23 | .9980 | .996 | 2.0 | 5.0 |
| Responsiveness | 4.304 | 23 | .7029 | .494 | 3.0 | 5.0 |

| | | | | | | |
|-------------------------|-------|----|--------|-------|-----|-----|
| Assurance | 3.913 | 23 | .9493 | .901 | 2.0 | 5.0 |
| Empathy | 4.348 | 23 | .7751 | .601 | 3.0 | 5.0 |
| Perceived IT Importance | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| IT Productivity | 4.043 | 23 | .8779 | .771 | 3.0 | 5.0 |
| Effort Expectancy | 4.043 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Performance Expectancy | 4.000 | 23 | .9045 | .818 | 3.0 | 5.0 |
| Computer Knowledge | 4.435 | 23 | .8958 | .802 | 2.0 | 5.0 |
| Computer Skills | 4.391 | 23 | 1.0762 | 1.158 | 1.0 | 5.0 |
| Usability | 3.957 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Accessibility | 4.043 | 23 | .5623 | .316 | 3.0 | 5.0 |
| Desirability | 4.304 | 23 | .7648 | .585 | 2.0 | 5.0 |
| Usefulness | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Valuability | 3.826 | 23 | .8341 | .696 | 2.0 | 5.0 |
| Findability | 4.261 | 23 | .7518 | .565 | 3.0 | 5.0 |
| Credibility | 4.261 | 23 | .8100 | .656 | 3.0 | 5.0 |
| Overall Mean | 4.148 | | 0.812 | 0.662 | | |

In the sixth research question, "What is the level of organizational performance impact of MIS when indicators are taken entirely?", the results is as follows: Overall, combining the assessment outcomes of the two factors "Perceived Usefulness" and "User Satisfaction", the level of organizational performance impact of Management Information System at Albader Tower Contracting with an achievement of 4.117 mean, indicates that "Great Extent".

Table 21: Level of organizational performance impact of Management Information System at Albader Tower Contracting when taken entirely

| Indicator | Mean | N | Std. Deviation | Variance | Minimum | Maximum |
|-------------------------|-------|----|----------------|----------|---------|---------|
| Usability | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Interoperability | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Functionality | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Flexibility | 3.565 | 23 | .9921 | .984 | 2.0 | 5.0 |
| Sophistication | 3.870 | 23 | .7570 | .573 | 2.0 | 5.0 |
| Content | 3.913 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Format | 3.957 | 23 | .8779 | .771 | 2.0 | 5.0 |
| Reliability | 4.217 | 23 | .9980 | .996 | 2.0 | 5.0 |
| Responsiveness | 4.304 | 23 | .7029 | .494 | 3.0 | 5.0 |
| Assurance | 3.913 | 23 | .9493 | .901 | 2.0 | 5.0 |
| Empathy | 4.348 | 23 | .7751 | .601 | 3.0 | 5.0 |
| Perceived IT Importance | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| IT Productivity | 4.043 | 23 | .8779 | .771 | 3.0 | 5.0 |
| Effort Expectancy | 4.043 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Performance Expectancy | 4.000 | 23 | .9045 | .818 | 3.0 | 5.0 |
| Computer Knowledge | 4.435 | 23 | .8958 | .802 | 2.0 | 5.0 |
| Computer Skills | 4.391 | 23 | 1.0762 | 1.158 | 1.0 | 5.0 |
| Usability | 3.957 | 23 | .7674 | .589 | 2.0 | 5.0 |
| Accessibility | 4.043 | 23 | .5623 | .316 | 3.0 | 5.0 |
| Desirability | 4.304 | 23 | .7648 | .585 | 2.0 | 5.0 |
| Usefulness | 4.087 | 23 | .9002 | .810 | 2.0 | 5.0 |
| Valuability | 3.826 | 23 | .8341 | .696 | 2.0 | 5.0 |
| Findability | 4.261 | 23 | .7518 | .565 | 3.0 | 5.0 |
| Credibility | 4.261 | 23 | .8100 | .656 | 3.0 | 5.0 |
| Perceived Usefulness* | 4.148 | 23 | 0.812 | 0.662 | 1.0 | 5.0 |
| Overall Mean | 4.117 | | 0.822 | 0.678 | | |

Perceived Usefulness factor is a derived outcome of all indicators in its category.*

In the seventh research question, "What are the expected benefits of Management Information System in Al Bader Tower Contracting?", the following are the results: Based on the calculated value and overall mean of the level of organizational performance impact of management information system in Albader Tower Contracting, it is very apparent that the implementation of the Management Information System in the organization is cost-effective and in the level of impact "Great Extent".

CONCLUSION AND RECOMMENDATION

With the provided solution to each of the research question, the deemed importance of Management Information System has been proven legitimately. The data analyzed and interpreted results for each inquiry in this thesis have been given answers. The cost-effectiveness equals "value of MIS" and the derived "Great Extent" level of organizational performance impact of Management Information System in Albader Tower Contracting has proven true to its sense and has been taken into consideration as a significant insightful findings and recommendation for the organization towards the furtherance of its growth and development. The benefits as expected though need to be realized to some extent as can proven by another research study opens another venue for further investigation.

As manifested in the summary of findings and with the derived conclusion of this research study, the following are the recommendations:

1. Based on the readiness and adequacy of IT Infrastructure and organizational resources of the company in establishing a Management Information System in the business organization, Albader Tower Contracting should consider the proposed adoption of Management Information System;
2. As identified, analyzed and assessed intervention activities of the Albader company towards improvement on organizational performance, costs and time data can be derived from these activities which could help the company and others business organizations manage the same.
3. The use of cost-effectiveness analysis in determining the cost-effectiveness of Management Information System in Al Bader Tower Contracting has been proven right. Hence, it is recommended for those who are planning to establish an information system in their organization to apply the method.
4. The identified characteristics technological, organizational, and people as indicators significantly determined the level of organizational performance impact of MIS. It is likewise recommended for those who are planning to venture in the same research field of endeavor;
5. Factor-variables "perceived usefulness" and "user satisfaction" have proven to be appropriate and strong indicators to determine the level of organizational performance impact of MIS in an organization. It is therefore recommended to be used for by those who aim the same.
6. In its overall significance as the final outcome has been derived through the tools used – the cost-effectiveness analysis (CEA-ICER (previously taken as only suitable for health-related issues)) and level of impact of organizational performance, one can use this study as a guide towards the same direction of research.
7. Finally, the identified and recognized expected benefits of Management Information System in Al Bader Tower Contracting are true organizational values derived in using a management information system in its operations. It is therefore recommended that for those who would want to experience the same benefits, it is a right decision to buckle up your organization with the same tool.

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