

Management Information Systems in Public Institutions in Jordan

An Eye on Implementation Success Factors and their Relationship with Organizational Performance

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Abstract—Six constructs were utilized in this study to explore the factors affecting MIS implementation in Jordanian public institutions and to investigate the impact of MIS implementation on organizational (operational) performance. They were human factors, organizational factors, technological factors, environmental factors, MIS implementation components and organizational performance. The required data were collected using a valid and reliable questionnaire developed based on the literature review. Human factors were conceptualized as users' computer skills and experience, IS usefulness and IS ease of use. Organizational factors were assessed using three sub-indicators, which were top-management support, user training and IS confidentiality. Technological factors were evaluated by systematic quality, information quality and service quality. The overall industry, industry environment and external pressure were three indicators used to measure the environmental factors. Two variables were selected to measure MIS implementation: IT/IS capability and technological aspects related to information service quality. Since the current study tackled public institutions, the indicators of organizational performance were limited to operational ones. The questionnaire was distributed to 125 informants from IT/IS departments. The findings of the study indicated the acceptance of the hypothesis that the factors in question are significantly and positively related to MIS implementation, which in turn, when measured by IT/IS capability and information service quality, significantly and positively affect organizational performance. The main contribution provided by this study is that MIS implementation is not limited to information technology and systems capabilities and usefulness. Other factors should be considered, particularly when examining the impact of MIS implementation on organizational performance.

Keywords—*management information systems; adoption success factors; organizational performance; public institutions*

I. INTRODUCTION

Researchers have propounded a number of reasons behind the importance of management information systems (MISs). Lipaj and Davidavičienė [1] and Kharuddin et al [2] indicated that one of these reasons is related to the role that MISs play in business performance enhancement. Although many organizations have adopted MISs, not all of them have achieved the presumed benefits [3]. Hence, considerable attention has been paid to the factors that play a critical role in the successful implementation of MIS. Two lines of research

have been merged. The first one focuses on the factors affecting the implementation of MISs in different industries, while the other addresses the relationship between MISs and organizational performance.

On the one side, Al-Mamary et al [4] performed a study to explore the factors affecting the successful implementation of MISs in Yemeni organizations. They categorized these factors into technological factors, people factors and organizational factors. In 2015 Al-Mamary et al [5] found a positive relationship between these factors and organizational performance (OP). Using a sample consisting of 100 French organizations, Bacha [6] highlighted the significance of top-management and employee attitudes in the implementation of MISs. In Kuwait Alshawaf and Khalil [7] identified four success factors of information systems (ISs): information systems' strategy and resources, end-user support, information systems' sophistication and information systems' organizational level and user involvement.

In the United States, Kearns [8] studied the relationship between two major factors' impacts on IS planning and implementation, namely top-management support of ISs and management participation in IS planning. The results indicated that these two variables significantly reduced IS implementation problems. Farzandipur et al [3] sorted the factors affecting the implementation of MISs in hospitals into human factors (computer skills, IS usefulness and IS ease of use), managerial and organizational factors (IS project management, IS cost, training, user participation and IS confidentiality) and technological factors (support, safety, development and communication). Rahimi et al [9] brought user participation in the development stages of IS to light as a critical factor that affects the development of ISs in hospitals. According to them, users can take part in four stages of IS development: analysis, design, implementation and evaluation.

Fu et al [10] listed three main factors that influence the adoption of ISs by small and medium-sized enterprises in Taiwan. Those factors are technological factors, organizational factors and environmental factors. Each group of them relates to three types of objectives. Specifically, technological factors are related to the system function, technology trust and cognition benefit; organizational factors are interconnected to organizational characteristics, the organization's readiness and the partners' willingness and

abilities; and, finally, environmental factors are linked to the overall industry, industry environment and external pressure. Detailed criteria levels for these factors can be seen in Table 1. However, the authors deemed six out of these factors to be critical success factors.

On the other side, Al-Gharaibeh and Malkawi [11] carried out a case study of the Ministry of Planning to investigate the relationship between MISs and OP. Three dimensions of MISs were used: hardware and software components, networks, and individuals and procedures. According to their results, MISs have an impact on organizational performance in Jordanian public settings. Analysing data collected from thirteen countries, DA Silveira and Cagliano [12] explored and confirmed the relationship between inter-organizational information systems (computerized networks used for information exchange) and operational performance. Batra [13] hypothesized an impact of information technology (IT) on organizational effectiveness. The findings pointed out that IT has an impact on the overall organizational flexibility, which in turn influences the organizational performance of organizations and hence their organizational effectiveness.

Building on the above-mentioned literature, the purpose of this study is twofold: first, to explore the factors affecting the implementation of MISs in Jordanian governmental institutions; and second, to explore the relationship between MIS components and organizational performance in those institutions.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A. MIS Definition, Requirements and Dimensions

Management information systems (MISs) are one of the five types of information systems. The other four types are office information systems (OISs), transaction-processing systems (TPSs), decision support systems (DSSs) and executive support systems (ESS) [1]. MISs have been defined by researchers in terms of their ability to provide information with good characteristics on which organizations depend to enhance their performance [5]. Other definitions have tackled MISs with regard to their functions, such as collecting, recording, storing and rearranging data [14]. Given that the first major aim of this study is to identify the factors affecting MIS implementation in Jordanian governmental institutions, a literature review was conducted. Examples of those factors are presented in Table 1.

TABLE I. FACTORS THAT AFFECT MIS ADOPTION AS DEPICTED IN THE LITERATURE

MIS requirements	Reference (s)
<ul style="list-style-type: none"> • Technological factors: - System quality - Information quality - Service quality • Organizational factors: - Top management support - User training • People factors: - Computer self-efficacy - User experience. 	Al-Mamary et al. [Error! Bookmark not defined.]
<ul style="list-style-type: none"> • Information systems strategy and resources. • End user support. 	Alshawaf and Khalil [Error! Bookmark not defined.]

<ul style="list-style-type: none"> • Information systems sophistication. • IS organizational level and user involvement. 	Bookmark not defined.]
<ul style="list-style-type: none"> • Internal environment factors - Top-management support - Managers' participation in IS planning 	Kearns [Error! Bookmark not defined.]
<ul style="list-style-type: none"> • User participation in IS development: - Analysis. - Design. - Implementation. - Evaluation. 	Rahimi et al. [Error! Bookmark not defined.]
<ul style="list-style-type: none"> • Human factors: - Computer skills. - IS usefulness. - IS ease to use. • Managerial and organizational factors: - IS project management. - IS cost. - Training. - User participation. - IS confidentiality. • Technological factors: - Support. - Safety. - Development. - Communication. 	Farzandipur, et al. [Error! Bookmark not defined.]
<ul style="list-style-type: none"> • Technological factors: System function, technology trust, and cognition benefits. • Organizational factors: organization characteristics and readiness, and partners' willingness and abilities. • Environmental factors: overall industry, industry environment, and external pressure. 	Fu et al. [Error! Bookmark not defined.]

Consequently, the current study categorized the factors that have an influence on the adoption of ISs in organizations into four groups: human factors, organizational factors, technological factors and environmental factors. Regarding MIS components, Zhu and Nakata [15] argued that the most important components of MISs are IT capability and information service quality. Benitez-Amado and Walczuch [16] conceptualized IT capability in their study as a dependent variable that represents an organization's ability to use IT resources. Table 2 shows the major components of MISs in the literature. The current study focuses on IT capability and information service quality in addition to hardware and software components.

TABLE II. MAJOR COMPONENTS OF MISS FOUND IN THE LITERATURE

MIS components	Reference (s)
<ul style="list-style-type: none"> • IT capability: - Information storage. - Information processing - Information communication • Information services quality: - Service timeliness. - Service appropriateness - Information reliability. 	Zhu and Nakata [15]
<ul style="list-style-type: none"> • IT capability: organizations ability to use IT resources 	Benitez-Amado and Walczuch [16]
<ul style="list-style-type: none"> • Hardware and software components • Networks • Individuals and procedures 	AL-Gharaibeh and Malkawi [11]
<ul style="list-style-type: none"> • Timeliness • Scope • Aggregation 	Naranjo-Gil [17]

• Integration	
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B. Organizational Performance

According to Al-Tit and Hunitie [18], OP can be defined as a measure employed to identify organizations’ efficiency and effectiveness in achieving their goals. In general, two types of measures were used to evaluate organizational performance: financial and non-financial measures [19]. Table 3 presents the different indicators used in the literature to measure OP. Given that this study was conducted on public institutions, OP was measured in terms of operational dimensions, that is, non-financial measurements.

TABLE III. OP DIMENSIONS DEPICTED IN THE LITERATURE

OP dimensions	Reference (s)
<ul style="list-style-type: none"> • Internal process performance: <ul style="list-style-type: none"> - Internal process simplification. - Data validity improvement. - Internal communication efficiency. • Financial performance: <ul style="list-style-type: none"> - Sales increase. - Inventory turnover reduction. - Receivable turnover increase. - Profit margin growth. 	Lipaj and Davidavičienė [1]
<ul style="list-style-type: none"> • Financial measures: <ul style="list-style-type: none"> - Cost of funds - Non-interest income - Earnings per share - Capital structure - Return on investment - Loan yield - Market ratios - Liquidity - Cash flow from operations - Relative market share and position - Operating income - Revenues - Customers’ profitability • Non-financial measures: <ul style="list-style-type: none"> - Customer-employee-based performance: Responsiveness, personnel development, no. of customer’s complaints, accessibility, delivery speed flexibility, customer satisfaction, on-time service, employee skills, communication, competence, productivity, efficiency, availability, courtesy and quality. - Innovation-based performance: Performance of individual innovations, performance of the innovation process, research and development, new product development, volume flexibility, and specification flexibility. 	Salleh et al. [20]
<ul style="list-style-type: none"> • Work efficiency • Work effectiveness • Decision making 	Alshawaf and Khalil [7]
<ul style="list-style-type: none"> • Sectoral excellence 	Benitez-Amado and Walczuch [16]
<ul style="list-style-type: none"> • Satisfaction of employees 	Gil-Padilla and Espino-Rodríguez [19]

C. Factors Affecting the Adoption of MISs

Fu et al [10], Al-Mamary et al [5] and Farzandipur et al [3] suggested four groups of factors that have an influence on the adoption of MISs: human factors, organizational factors, technological factors and environmental factors. Following these recent studies, the current study applied the same factors. Therefore, the following hypotheses were posed:

- H01: Human factors significantly advance MIS implementation.*
- H02: Organizational factors significantly elevate MIS implementation.*
- H03: Technological factors significantly support MIS implementation.*
- H04: Environmental factors significantly improve MIS implementation.*

D. Relationship between MISs and OP

Al-Mamary et al [5] carried out a study on the relationship between the success factors of MISs and the organizational performance in the telecommunication industry in Yemen. Their hypotheses were supported. That is, technological (system quality, information quality and service quality), organizational (top-management support and user training) and people factors (computer self-efficacy and user experience) were positively related to organizational performance. In their work on information systems’ success factors and the organizational performance of public and private organizations, Alshawaf and Khalil [7] found significant differences between public and private organizations with regard to end-user support, top management and information systems management in IS financial decisions in favour of public organizations. They also found significant differences in terms of IS resource availability, top-management involvement in the IS strategy, end-user involvement in IS development and end-user training on information technology in favour of private organizations. The study revealed no significant differences between private and public organizations in Kuwait with respect to the age of IS units, IS organizational levels, IS sophistication or the perceived obviousness of the IS strategy. Ravichandran and Lertwongsatien [21] found a positive relationship between IS human capital (IS skills and specificity), IT infrastructure flexibility (networks’ and applications’ sophistication), IS partnership quality (internal and external partnership quality) and organizational performance (operating and market-based performance) of different organizations from numerous industries such as banking, insurance, financial services, retail, manufacturing and services, transportation and utilities in the United States. As a result, the following hypothesis was postulated:

- H05: MIS implementation has a positive impact on organizational performance.*

III. STUDY MEASUREMENT MODEL

Figure 1 displays the measurement model of the study, in which four constructs (human factors, organizational factors, technological factors and environmental factors) were

assumed to have an impact on OP. Hypotheses 1–4 postulated significant relationships between those factors and MIS implementation in Jordanian public institutions. Hypothesis 5 presumed that MIS adoption has a significant impact on the overall OP of public institutions as measured by internal process performance, customer satisfaction, employee satisfaction and work efficiency and effectiveness.

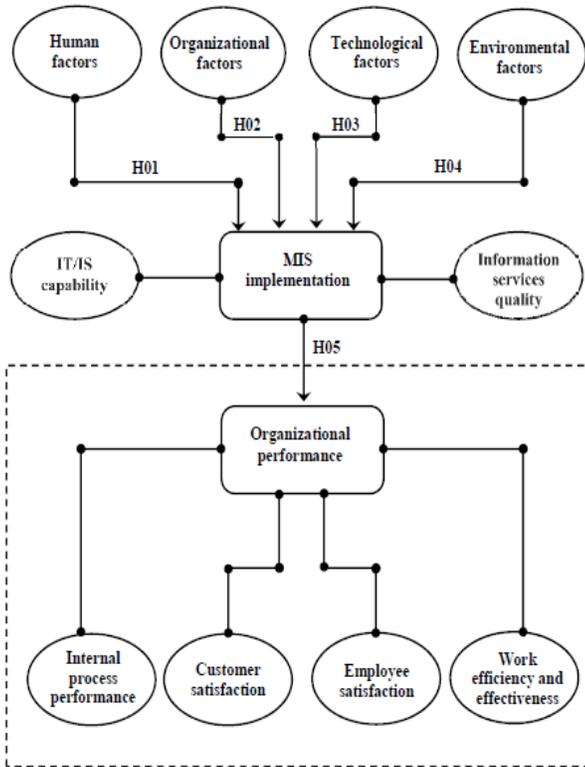


Fig. 1. Study measurement model

IV. METHODOLOGY

A. Sample and Data Collection

The current study was conducted in Jordanian public institutions. A sample consisting of 25 governmental institutions in Amman was selected to collect the required data. The analysis unit used comprises managers as well as employees working in IT/IS departments. A 5-point questionnaire was developed based on related work on IS implementation and organizational performance. It was anchored at “strongly disagree” for responses of 1 and “strongly agree” for responses of 5. A total of 125 questionnaires were distributed to the participants, out of which 73 were returned, which means a 58 per cent response rate. This rate is judged to be high, since the responses are limited to IT/IS departments.

B. Measures

The factors that might affect MIS implementation in public institutions were measured by the human factors, organizational factors, technological factors and environmental factors adapted from Fu et al [10], Al-Mamary et al [5] and Farzandipur et al [3]. Seven items based on Zhu and Nakata [15] and Al-Gharaibeh and Malkawi [11] were

used to measure MIS implementation (IT/IS capability and information service quality). Organizational performance was measured using eight items concerning internal process performance, customer satisfaction, employee satisfaction, work efficiency and effectiveness. The dimensions used to measure OP were adapted from Lipaj and Davidavičienė [1], Salleh et al [20], Alshawaf and Khalil [7] and Gil-Padilla and Espino-Rodríguez [19]. Table 4 shows the study constructs, codes, indicators and number of items.

TABLE IV. STUDY CONSTRUCTS, CODES, INDICATORS AND NUMBER OF ITEMS

Constructs	Code	Indicators	No. of items
• MIS Factors	MISF		12
- Human factors	HUF	HUF1 - HUF3	3
- Organizational factors	ORF	ORF1 - ORF3	3
- Technological factors	TEF	TEF1 - TEF3	3
- Environmental factors	ENF	ENF1 - ENF3	3
• MIS implementation	MISI		7
- IT/IS capability	ISC	ISC1 - ISC4	4
- Information service quality	ISQ	ISQ1 - ISQ3	3
• Organizational performance	ORP		8
- Internal process performance	IPP	IPP1 & IPP2	2
- Customer satisfaction	CST	CST1 & CST2	2
- Employee satisfaction	EMS	EMS1 & EMS2	2
- Work efficiency and effectiveness.	WEE	WEE1 & WEE2	2

C. Validity and Reliability

Two types of validity are tested in this section: content validity and convergent validity. Five academic experts evaluated the content validity. The convergent validity was assessed using the average variance extracted (AVE). On the other hand, two coefficients were used to rate reliability: Cronbach’s alpha coefficients and composite reliability coefficients. The results of the validity and reliability tests summarized in Table 5 indicate that the scale used in this study is valid and reliable, as all the values of AVE are greater than 0.6 [], all the Cronbach’s alpha coefficients are above 0.7 [8] and all the coefficients of composite reliability are above 0.6 [].

TABLE V. RESULTS OF VALIDITY AND RELIABILITY TESTS

Variable	AVE	Cronbach’s alpha	Composite reliability
Human factors	0.64	0.73	0.65
Organizational factors	0.66	0.81	0.77
Technological factors	0.73	0.87	0.73
Environmental factors	0.69	0.76	0.80
MIS implementation	0.71	0.89	0.69
Organizational performance	0.74	0.88	0.82

D. Pearson’s Product-Moment Correlation Coefficient

The Pearson’s matrix shown in Table 6 illustrates the significant relationships between the factors affecting MIS implementation and MIS implementation as measured by IT/IS capability (ISC) and information service quality (ISQ). It appears that human factors (HUFs) are significantly correlated with both dimensions of MIS implementation ($r = 0.57$ and $r = 0.61$, $p < 0.05$). Additionally, organizational

factors (ORFs) are significantly correlated with both dimensions of MIS implementation ($r = 0.50$ and $r = 0.55$, $p < 0.05$), along with technological factors ($r = 0.61$ and $r = 0.43$, $p < 0.05$). Finally, environmental factors (ENFs) are significantly correlated with ISC ($r = 0.39$, $p < 0.05$) and ISQ ($r = 0.31$). The results also revealed a significant correlation between the two dimensions of MIS implementation.

TABLE VI. CORRELATIONS BETWEEN MIS FACTORS AND MIS IMPLEMENTATION

	HUF	ORF	TEF	ENF	ISC	ISQ
HUF	-					
ORF	0.44	-				
TEF	0.51	0.48	-			
ENF	0.46	0.37	0.45	-		
ISC	0.57	0.50	0.61	0.39	-	
ISQ	0.61	0.55	0.43	0.31	0.47	-

V. DATA ANALYSIS

A. Descriptive Statistics of the Factors Affecting MIS Implementation

Frequencies, percentages, mean scores and standard deviations were extracted, as shown in Table 7, to identify the frequencies and percentages of the responses to the scale points. The results obtained were used to categorize the factors affecting MIS implementation according to their importance.

TABLE VII. MEAN SCORES OF THE FACTORS AFFECTING MIS IMPLEMENTATION

MISF	N(%)	5	4	3	2	1	Mean	SD
• HUF	73(100)	-	-	-	-	-	4.04	1.070
- HUF1		33(45)	17(23)	11(15)	7(09)	5(07)	4.15	0.877
- HUF2		29(40)	16(22)	9(12)	11(15)	8(0.1)	3.99	0.965
- HUF3		27(39)	18(25)	12(16)	9(12)	7(09)	3.97	1.000
• ORF	72(99)	-	-	-	-	-	3.92	0.682
- ORF1		24(33)	11(15)	28(39)	4(06)	5(07)	3.94	0.714
- ORF2		30(42)	18(25)	17(24)	6(08)	1(01)	3.92	1.100
- ORF3		22(31)	17(24)	10(14)	13(18)	10(14)	3.90	0.594
• TEF	71(97)	-	-	-	-	-	3.72	0.416
- TEF1		20(27)	21(29)	13(18)	12(16)	7(09)	3.89	0.947
- TEF2		19(26)	24(33)	11(15)	7(09)	12(16)	3.85	0.721
- TEF3		15(21)	19(26)	20(27)	12(16)	7(09)	3.77	0.605
• ENF	73(100)	-	-	-	-	-	3.27	0.819
- ENF1		11(15)	16(22)	20(27)	18(25)	8(0.1)	3.67	0.700
- ENF2		15(21)	37(51)	2(03)	9(12)	10(14)	3.66	0.601
- ENF3		25(34)	14(19)	16(22)	7(09)	11(15)	3.37	0.814

It was concluded, based on the results in Table 7, that human factors are the most important factors in MIS implementation ($M = 4.04$, $SD = 1.070$), followed by organizational factors ($M = 3.92$, $SD = 0.682$), then technological factors ($M = 3.72$, $SD = 0.416$) and finally environmental factors ($M = 3.27$, $SD = 0.819$).

B. Structural Model

The results of the confirmatory factor analysis (CFA) established the goodness of fit of the data: the comparative fit index (CFI) = 0.931, the normalized chi-square (χ^2/df) = 1.66, the goodness of fit index (GFI) = 0.913 and the root mean square error of approximation (RMSEA) = 0.051. Consequently, the overall fit was supported, as illustrated in Figure 2. Grounded on the path coefficients of the structural model, the associations between human factors (H01), organizational factors (H02), technological factors (H03) and environmental factors (H04) and MIS implementation are

significant and positive. In other words, the model supported all the concerning factors affecting MIS implantation. Still, for hypothesis 5 a significant impact of MIS implementation, measured by IT/IS capability and information service quality, on the organizational performance was found.

C. Multiple Regression Analysis

Hypothesis 5 supposed that MIS implementation has a significant impact on organizational performance. Multiple regression analysis was conducted to test this hypothesis. The independent variable was MIS implementation and the independent variable was organizational performance. The regression findings displayed in Table 8 indicate that the MIS implementation dimensions have a positive and significant impact on the organizational performance of public institutions. MIS implementation explained 40% of the variance in the organizational performance. The F (33.16), β (0.514), t (5.106) and P values (0.000) verify this result.

TABLE VIII. REGRESSION RESULTS FOR MIS IMPLEMENTATION AND ORGANIZATIONAL PERFORMANCE

Model summary		ANOVA		Coefficients		
r	R ²	F	P	β	t	P
0.631	0.40	33.16	0.000	0.514	5.106	0.000

D. Final Model

Founded on the previously mentioned results, the final model of the study shown in Figure 2 demonstrates a positive correlation between human factors ($r = 0.59$), organizational factors ($r = 0.53$), technological factors ($r = 0.52$) and environmental factors ($r = 0.35$). Human factors ranked first as the most correlated factors in MIS implementation from the respondents' perspective ($M = 4.04$), followed by organizational factors ($M = 3.92$), then technological factors ($M = 3.72$) and environmental factors ($M = 3.27$). The significant and positive impact of MIS implementation on organizational performance was supported using the current data ($\beta = 0.514$, $t = 5.106$, $P = 0.000$).

VI. DISCUSSION AND CONCLUSION

The aim of this study was to explore the factors affecting MIS implementation in Jordanian public institutions. Four major factors were identified based on the literature: human factors, organizational factors, technological factors and environmental factors. On the other hand, the study aimed to investigate the impact of MIS implementation on organizational performance.

The results revealed that human factors, organizational factors, technological factors and environmental factors are significantly related to MIS implementation. That is, users' skills and experience, IS usefulness, IS ease of use, top-management support, user training, IS confidentiality, system quality, information quality, service quality, overall environment, institutional environment and external pressure are all factors that contribute to the success of MIS implementation. In line with these findings, Al-Mamary et al [4], Bacha [6], Alshawaf and Khalil [7] and Kearns [8] found similar results.

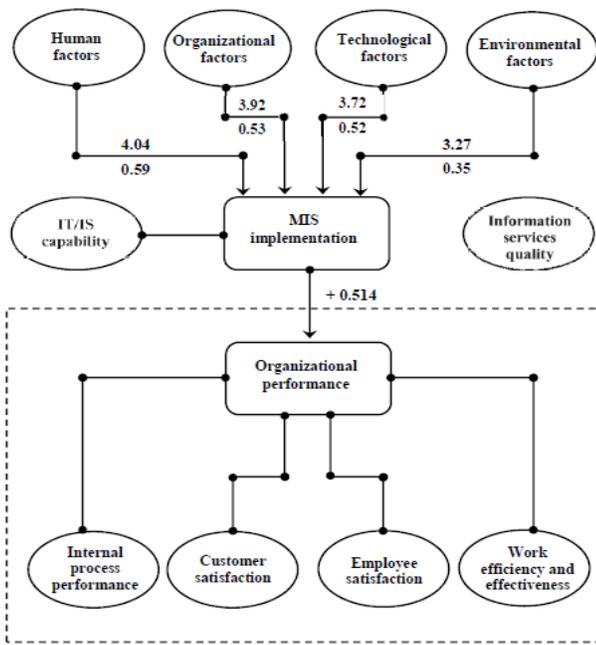


Fig. 2. Study final model

Concerning the relationship between MIS implementation and organizational performance, the findings pointed out that MIS implementation, when measured by IT/IS capability and information service quality, has a significant and positive impact on organizational performance, when measured by internal process performance, customer satisfaction, employee satisfaction, work efficiency and effectiveness. Ravichandran and Lertwongsatien [21] found similar results. In conclusion, four factors representing twelve characteristics identified by this study play a central role in MIS implementation. Those factors have a direct effect on MIS implementation in Jordanian public institutions by enhancing the utilization of IT/IS capabilities and the quality of both information and services. MIS implementation, in turn, plays a positive role in improving organizational performance.

A. Implications for Management and Research

This study contributes to both management and research by exploring the factors affecting MIS implementation as well as the impact of MIS implementation on organizational performance. Information technology capabilities related to information storage, processing, communication and their attendant aspects are insufficient in the absence of human, organizational and technological factors, since these factors are in charge of management. The current study concluded that the investigation of the relationship between MIS implementation and organizational performance should consider the factors that might affect MIS components. Future studies can extend the proposed model using new factors and MIS constructs to understand the potential mediation role of MIS components in the relationship between MIS implementation and MIS performance. The study was conducted using a small sample selected from public institutions; the responses were restricted to managers and employees of IT/IS departments. Hence, a larger sample size

and more informants might result in more generalizable results.

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