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Investigating the Moderating Role of Environmental Uncertainty between Institutional Pressures and ERP Adoption in Jordanian SMEs

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Abstract: Small and Medium Enterprises (SMEs) are struggling to survive in the present competitive environment. Enterprise resource planning (ERP) technologies have great potential to facilitate firms in achieving sustainable competitive advantages and to survive in such situations. However, the adoption of ERP among Jordanian SMEs has been reported as relatively low, which, in turn, does not affect SMEs effectively. Therefore, this study aims to examine the roles of the external forces (mimetic pressure (MP), coercive pressure (CP), and normative pressure (NP)), and Environmental Uncertainty (EU) on the adoption of ERP. Through the use of institutional theory and contingency theory, this study includes the role of EU as a moderating variable in the relationships between institutional factors (MP, CP, and NP) and ERP adoption. Data were collected from small- and medium-sized enterprises operating in Jordan. A total of 741 questionnaires were distributed to the selected SMEs, of which 192 were returned and used for analysis. The empirical data were analyzed using Partial Least Square-Structural Equation Modelling (PLS-SEM). The results show that MP, CP, NP, and EU have significant direct relationships with ERP adoption; however, contrary to our expectations, EU did not moderate the relationships between institutional factors and ERP adoption. These findings provide important insights for managers, researchers, and policy makers, helping them to understand the importance of ERP system adoption in enhancing firm performance. One limitation of this study is that it is based only on SMEs. Therefore, future studies can concentrate on the development of such research not only in SMEs, but also using larger organizations.

Keywords: ERP; environmental uncertainty; institutional theory; contingency theory; SMEs; Jordan

1. Introduction

The employment of new technologies in Small and Medium Enterprise (SME) practice provides several functionalities and benefits, such as better management, reduced costs, effective services, fewer errors, and enhanced managerial functionalities [1,2]. One such technology is enterprise resource planning (ERP), which can be defined as “a software system with integrated functions for all major business functions across an organization such as distribution, production, sales, human resources management, and finance. A particular package normally replaces several different former packages” [3] (p. 47). The implementation of such technology into SMEs has become inevitable, as many countries around the world have been trying to automate their SMEs [4].

ERP is anticipated to provide substantial improvements and developments over the incomprehensive nature of prior organizational information systems (ISs). Studies have reported that ERP systems deliver several advantages, such as improved productivity, cost decreases, structural changes, process facilitation, and better managerial decision making [5–7].

Various factors have served to catalyze studies in the ERP adoption domain. First, ERP projects are considered expensive, as they involve costly technological systems, and enormous funds must

be assigned by the associated administrations; moreover, numerous initiatives have been introduced to equip and upgrade SMEs, in order to implement such systems. However, in spite of the vast advantages delivered by ERP, previous works have documented many cases where ERP faced a low level of adoption, resistance, and failure in certain circumstances [8–10]. Low levels of ERP adoption indicate the loss of the considerable budgets that cannot possibly be reassigned with a similar aim. Another explanation for the low level of ERP adoption is the complexity and uncertainty of the technology [9,11–14], which may discourage SMEs from using it, as it would require the qualification of staff—for example, by requiring them to attend training projects or programs—thus adding time burden to staff with already-overloaded timetables [15,16]. The mere availability of an ERP system within an SME does not guarantee that they will commit to it and use it [17].

Even though numerous studies have prevalently looked at the risks and benefits of ERP systems [18–20], to date, few studies have focused on to what extent and whether institutional (external) forces play a significant role in ERP adoption [9,21]. Beyond environmental uncertainty as a mitigating factor, the present research asserts that there are various factors that may affect ERP technology adoption among SMEs. Scholars have framed the ERP solution literature using numerous different contextual adoption frameworks that encompass external factors, internal factors, and combined organizational viewpoints, with greater emphasis on internal factors [10,22,23]. The current work concentrates on external factors influencing the decision of SMEs to adopt ERP, as there is a large identified gap between the number of studies focused on internal forces and external factors [24]. The subject population of the present study is particularly important, given the modern fluid business environment and the need for works investigating the external impacts of the aforementioned external (environmental) turbulences [24,25]. This work seeks to answer the following research questions:

RQ1: Do mimetic pressure (MP), coercive pressure (CP), normative pressure (NP), and Environmental Uncertainty (EU) have a positive impact on the decision of SME owners/managers to adopt ERP?

RQ2: How does the EU factor moderate the relationship between MP, CP, and NP and ERP adoption?

Inspired by the aforementioned issues, the present study seeks to expand the understanding of ERP systems, with consideration of classifying the determining factors behind its adoption in Jordanian SMEs. Through a conceptual framework based on a combination of two theoretical models—institutional (INT) and contingency theories—the main concern of this work resides in trying to understand the factors motivating SMEs to adopt ERP. The contributions of this study lie in numerous aspects. First of all, this study addresses a gap by concentrating on ERP adoption in Jordan. Second, this study incorporates two well-established theories (i.e., INT theory and contingency theory). Finally, this study proposes a conceptual framework which assesses the direct and contingent influences of ERP adoption. The model analyzes the moderating influences of the external (environmental) factor (EU), as recommended by [26]. In a way, the contingent effects of EU serve to add new evidence, which advances and extends the prior results.

In the next section of this article, the theoretical background is discussed and the research framework is presented; furthermore, the hypotheses that address the associations between external (environmental) forces and ERP adoption are developed. Then, the research methodology is outlined. Next, we report the findings of the quantitative analysis. The following section reports the research outcomes in greater detail, and, then, the theoretical and practical implications are discussed. Finally, our conclusions are presented, with a summary of the limitations and contributions of the research, as well as the scope of future research directions in this area.

2. Literature Review and Hypotheses

Even though there is an overabundance of research and practical works related to ERP systems, few academic studies exist that have investigated ERP among SMEs from an adoption perspective. To date, the majority of related academic research has focused on determining the critical success factors (CSFs) and challenges which are faced during ERP implementation [27–29]. In view of the

criticality of the ERP system implementation decisions, many researchers have explored the selection and evaluation of ERPs [7,30]. Other studies have applied particular developmental methodologies or tools to maximize the chances of success in ERP implementation [31,32]. In particular, some scholars have examined the viewpoints of Chief Information Officers (CIOs) with respect to the CSFs effects on ERP implementation [33]. Additional works, on one hand, have aimed to investigate the impact of ERP usage on management accounting practices (MAPs) [34], while, on the other hand, others have explored the impact of ERP implementation on Supply Chain Integration [35]. However, the majority of these works have concentrated on large organizations.

Several works have been carried out to understand and study how SMEs implement ERP systems [5,13]. This stream of literature has paid attention to the critical factors associated with the successes and failures of SMEs derived from the implementation of ERP [8,36]. Few works have taken up the situation of SMEs in the context of Jordan. Additionally, we have documented several global works, which seemed to be Western biased, to unearth the factors influencing ERP adoption and the reasons for failure to yield success [37,38]. Surprisingly, it is clearly obvious from the prior literature that the context of ERP system adoption in developing countries has not been explored adequately [22,39]. Only a few researchers have focused on examining the factors influencing the adoption of ERP systems in the context of developing countries [37].

Researchers have employed several different theories to investigate the variables that influence ERP and organizational technology adoption. For instance, Zamzeer et al. [40] used the technological, organizational, and environmental (TOE) framework as a theoretical basis to highlight the factors influencing cloud-ERP adoption among Jordanian SMEs. Liang et al. [41], Teo et al. [42], and Penttinen and Tuunainen [43] utilized institutional (INT) theory to explore the adoption of various types of innovation systems. Sharma et al. [25] combined INT and strategic choice theory (SCT) to explore the early integration and adoption of Radio Frequency Identification (RFID). Liu et al. [44] used INT and variances theory (VT) to examine the intention to adopt Internet-enabled supply chain management systems (IESCMS) among organizations. Wu [45] examined the variables affecting the adoption of SaaS by applying INT theory and rough set theory (RST). Kung et al. [24] proposed complex associations, as suggested by INT and diffusion of innovation theory (DOI), to examine the influence of environmental (external) factors on a firm's intention to adopt SaaS. Ahmadi et al. [46] suggested a conceptual model based on the integration of INT theory, Human Organization Technology fit framework (HOT), and the TOE model to study Hospital Information System adoption. More recently, Li and Wang [47] combined INT theory and social cognitive theory to examine Mobile Commerce (M-Commerce) adoption among SMEs. Oliveira et al. [26] combined INT theory and the TOE model to understand SaaS adoption. Hameed and Counsell [48], in their meta-analysis study of technology adoption, asserted that DOI and TOE are the most two appropriate theoretical frameworks for organizational-level analysis. Kung et al. [24] concluded, after reviewing the prior literature on environmental factors of innovation/technology adoption at the firm level, that INT theory and the TOE framework are the two main theories that had inspired most of the earlier works. In short, INT theory asserts that the institution environment can profoundly affect the improvement of formal structure in a firm, often more strongly than market forces. Thus, INT theory is typically applied as a main lens in the current research, as it is specifically useful in investigating the external pressure components in ERP adoption and is considered as one of the most dominant theories in the existing literature. Additionally, as Oliveira et al. [26] reported, it is likely that future IS/IT research will combine more than one theory and/or model to examine adoption issues, as future innovations are anticipated to be more complex. The integration of INT theory with other theories yields more constructs and offers richer theoretical views on adoption behaviour [26]. Therefore, the contingency theory concept was integrated with INT theory as an additional essential theoretical foundation for building the model presented in this study. In this regard, several studies have further extended INT theory by incorporating factors influencing technology adoption. This is based on the rationale of contingency theory, which postulates that it is irrational to suppose that the external environment is static (i.e., environmental changes

are inevitable) [49]. In addition, environmental change is an illustration of such external factors, for example, represented as an environmental uncertainty factor [49]. This approach has produced a stream of research emphasizing the integration of institutional and contingency theories to explain innovation technology adoption [50]. However, in the context of ERP, it seems that few studies have paid attention to this issue. In response, this study concentrates on the adoption of ERP and, therefore, serves to fill this literature gap. The combination of INT theory and contingency theory results in a model that is valuable in generally explaining technology/innovation adoption in a firm and, specifically, ERP adoption in business organizations. Next, we present the theoretical background of INT theory and environmental uncertainty (EU) in the context of contingency theory, and formulate our hypotheses accordingly.

2.1. Institutional (INT) Theory

INT theory (Berger and Luckmann, 1967) has been commonly applied to investigate the diffusion/adoption of organizational technologies [24,47,51]. INT theory emphasizes that organizational actions or decisions are driven less by effectiveness or efficiency and more by external (environmental) forces, as well as the need for legitimacy [51]. The theory suggests that the decision-making process of an organization in a particular industry is beyond rational means and thinking; that is, organizations tend to increase the legitimacy in their decision making through the support of their institutional environment and act based on what is foreseeable to justify their decisions [51]. INT theory outlines three key dimensions of pressures (i.e., institutional pressures) that force and influence the rate of adoption of a technology/innovation which creates homogeneity or isomorphism in the organizational processes, structures, and strategies (especially those within the surrounding environment and same industry). These dimensions are coercive pressure (CP), which is employed by an institution on which the organization depends, whether formal forces (e.g., governmental regulations) or low/informal pressures (e.g., industry persuasion); mimetic pressure (MP), which emerges from the process of imitating others in a similar industry (e.g., leading firms or competitors) in order to cope with environmental uncertainty, which arises from the organizational environment and forms its behavior; and normative pressures (NP), which arises from social forces on firms and its memberships, leading to adaptation to certain norms [51].

Previous empirical research has used INT theory in numerous IS/IT technology works, advocating its ability to underline the external factors (drivers) [26]. INT has been commonly employed in works focusing on ERP [41], SaaS [24], Hospital Information System [46], and M-Commerce [47] adoption. INT forces have been found to be the most influential and representative for the adoption of IS/IT, particularly in terms of systems such as ERP [24]. However, INT theory does not consider the environmental uncertainty (EU) factor, which influences the process of adoption. EU is an example of an external factor that is commonly represented using contingency theory [49]. Integrating INT theory and contingency theory thus fills this gap and enriches the explanatory power of the conceptual model introduced in this study.

2.1.1. Mimetic Pressure and ERP Adoption

Mimetic forces, as one of the institutional factors, refer to the ambiguous goals and misunderstood technologies leading firms to capitalize on external experience by modelling themselves after successful competitors [51,52]. In particular, firms may ascribe the successes of their opponents to their strategic choices, consequently mimicking or imitating the behaviors and actions of these successful competitors by embracing the same practices and conduct [47], in order to preserve their market share and ensure their survival. Therefore, although imitation is not always evidently justifiable when considering efficiency [53], a firm may still capitulate to mimetic forces in order to avoid perceived risk and to reduce the costs of trialing borne by early adopters [24].

The aforementioned logic can be applied to the SME context with regard to ERP adoption decisions. When SMEs learn how their opponents have benefitted from ERP, they perceive MP and may decide to

imitate and model these successful firms [26,52]. Given the uncertainty in ERP adoption, exploring the values and outcomes of such a system directly is either costly or impossible for some firms. In order to minimize research costs or to reduce experimentation costs, SMEs may, instead, succumb to the mimetic forces and be inclined towards ERP adoption [54,55]. As acknowledged in the literature, organizations face higher pressure when they see more and more organizations in the same or similar industries and environments applying innovation successfully, thus feeling a need to also conform to it, in order to sustain their competitiveness [56].

Based on INT, several prior works have shown that MP from competitors significantly influences the adoption of IT innovations by firms. In this regard, Ahmadi et al. [46] supported the significant relationship between MP from competitors and the intention to adopt Hospital Information System (HIS) technology among organizations. MP has been extensively measured by the perceived success of competitor adaptors and adoption extent among competitors [42]. Although previous studies on ERP adoption did not clearly apply INT, several prior works have indicated that ERP adoption in firms (in the SME context) was highly influenced by competitive pressure, equivalent to MP exerted by the competitor. For instance, Alshamaileh et al. [57], in their work on ERP adoption, found that, when SMEs realize that other SME firms in the same chains have adopted ERP in their operations, they experience pressures to adopt/use ERP systems. Furthermore, Al-ma'aitah [21] found that MP has the highest impact on decisions to adopt/use ERP innovations. He believed that emerging economies (i.e., competitors) use ERP to increase and gain further competitiveness in order to be more favorable and satisfactory for their customers. Therefore, according to INT theory and earlier research on ERP adoption, with reference to the levels of organizations, it is highly anticipated that a potential adopter of ERP is subject to MP from their competition. Thus, the following hypothesis can be postulated:

Hypothesis 1 (H1). *MP has a positive impact on ERP adoption.*

2.1.2. Coercive Pressure and ERP Adoption

Coercive pressure (CP) refers to the “result from both informal and formal pressure exerted on organization by other organization upon which it is dependent and by cultural anticipations in the societies surrounded by which organization function” [58] (p. 67). Such pressures are applied when firms are forced to use certain rules or structures. CP originates from other firms or authorities which have control and/or authority over the target firm [26,42,51]. CP may also originate from government regulators and industry associations, as well as dominant suppliers or customers; for instance, industrial associations may have a large influence on firms. Powerful customers may also require new features, which may be more cost effective if executed through an ERP system. Additionally, firms may be subject to forces from shareholders or parent companies in the absence of an ERP system [41,47]. The amount of CP (coercive power) of governing bodies determines the particular (informal or formal) forces on the actions of firms [24,42].

Amade et al. [59] found that CP arises from effects that originate from the structural or legal mandates on which the focal firm is reliant. Considering the adoption of IT/IS at the organizational level, CP exerted by government regulatory bodies on innovations/technologies may extensively influence IT/IS adoption [26,42]. Lutfi et al. [49] focused on the roles of governmental policy factors (e.g., legislation barriers and governmental promotions) in the usage and adoption of Accounting Information Systems (AISs) among SMEs. They found governmental policies to be an important predictor in the scope of AIS. However, a number of the prior works did not clarify why this kind of pressure (i.e., CP) is exerted on the dependent organizations.

According to INT theory and in line with previous research of ERP adoption in the context of SMEs, it has been found that governmental policies act as an environmental pressure or driving force that is positively and significantly related to ERP adoption in SMEs, in an equivalent manner to CP in INT theory [60]. In addition, governments set related regulations (policies) that cover a diverse set of promotion programs or rules to pursue ERP system adoption/usage, which leads to the

institutionalized adoption/use of ERP [46]. Therefore, it is suggested that the multiplicity of CP from several sources can significantly influence ERP adoption, and vice versa. Accordingly, we reflect this argument in the following hypothesis:

Hypothesis 2 (H2). *CP has a positive impact on ERP adoption.*

2.1.3. Normative Pressure and ERP Adoption

Normative pressure (NP) describes the influences of professional communities and standards on a firm [58]. This kind of pressure captures the way in which firms are anticipated to conform towards professionalism and to embrace techniques considered to be reasonable by related professional bodies. These norms are created through training, education, certification, and professional processes accredited by professional groups. One essential mechanism inspiring NP is personnel filtration. Similarly, NP happens when firms comply with the structures and policies of their central firm, which act as models promoting structure homogenization.

Wu and Lee [61] stated that NP originates from the fear of losing legitimacy. When NP is high, firms tend to adopt technology not based on internal evaluations of the potential returns and efficiency of the technology but, instead, based on the pressure produced by the number of companies that have already adopted the technology. According to Basaglia et al. [62], the key source of NP is interactive channels in networks, such as customers and suppliers. Firms consider the technologies adopted by their customers and suppliers in their adoption decision making.

The majority of earlier studies have overlooked the examination of environmental forces of NP in ERP adoption within SMEs; the few empirical works conducted in this domain have assured the importance of NP in IS adoption process within institutional firms [41,42,59]. Ahmadi et al. [63] studied the adoption of Hospital Information Systems (HISs) within the context of an organization. They concluded that NP was one of the significant variables affecting HIS technology adoption. Martins et al. [64] highlighted that firms have a higher perceived tendency to depend on normative pressures for IT/IS-based system adoption. In Jordanian SMEs, when ERP is employed within firms, it is essential to incorporate (ERP) computer systems for administrative purposes, along with offering means of communications to the related sections within firms, as well as the related governmental departments. In these sections, a variety of users (e.g., accountants and department managers) are involved in using and accepting the applied systems, as well as co-operating with the governmental bodies [46]. Therefore, the forces are exerted by the user in the professional internal environment. As more SMEs within a given geographical region implement or embrace ERP, it is converted to a norm for other firms to operate the system in that area. Therefore, this research proposes that:

Hypothesis 3 (H3). *Normative pressure has positive impact on ERP adoption.*

2.2. Environmental Uncertainty (EU) from Contingency Theory

EU factors can be clarified through the lens of contingency theory. Sousa and Voss [65] suggested three types of factors (variables)—namely, contextual factors, performance factors, and response factors. Contextual factors refer to the external situational attributes that can influence the concerned firm(s). Environmental changes illustrate such external factors, commonly represented as an environmental uncertainty factor [49]. The theory underpinning environmental changes postulates that it is irrational to suppose that the external environment is static. However, to the best of our knowledge, very few studies have tested the influence of EU on ERP technology—whether as a contextual or moderating factor—in such settings. In this work, not only is the EU modeled as an external variable, but the INT forces are also treated as external factors that are subject to changes over time. In short, the effects of INT factors and EU in providing complementary explanations for INT theory and contingency theory, respectively, have not been well-developed in the existing theories. The refinement of these elements is necessary to enhance the usefulness of INT and contingency theories for ERP/IS researchers.

To fill these gaps, this study examines whether EU has a moderating influence on the relationship between the INT factors and ERP adoption. Finally, it is noteworthy that the current work is one of the limited number of studies in the ERP context that integrates INT factors and the EU factor into a single theoretical framework, rather than exploring them separately.

2.2.1. Perceived EU and ERP adoption

Bstieler [66] defined EU as the perceived complexity and unpredictability encountered when recognizing and adopting/using technology, as well as to the instability of significant and rapid changes, such as the unexpected emergence of new software or components. Such suddenly changing technologies may drive technologies (applications) into technological undesirability before they even come into use. Additionally, technological uncertainty has been cited as a key reason for postponement, due to the waiting time involved in implementing innovative technologies [67]. Almoawi and Mahmood [68] reported that the decision to adopt/use depends on the time that firms take to recognize the intricacies, benefits, and technological mechanism of innovation. In their review of the technology innovation literature, Jeyaraj et al. [69] summarized the innovation adoption predictors and reported that uncertainty is one of the most important factors, which has a negative influence on a firm's decisions to evaluate and adopt IT/IS innovation. This suggests that the higher level of uncertainty a firm perceives in relation to IT/IS technology, the lower their level of intention to adopt/use the technology. According to a comprehensive literature review of IT/IS innovation adoption, a significant negative association between the degree of perceived uncertainty and the diffusion of IT/IS technologies has been reported [70,71]. In this regard, Wei et al. [72] found a significant negative association between EU and RFID technology adoption. With respect to their research findings, they anticipated a positive association, based on prior works. The variation of their results can be attributed to the fact that they studied firms in China, which are generally more risk averse than Western firms and are more likely to avoid high-investment technology adoption. Furthermore, a wide variety of studies have reported an insignificant role of EU [73,74]. Despite this, contrary to those results and in accordance with the dominant view, Peltier et al. [75] argued that small businesses facing high EU are more likely to adopt innovations. However, if a firm perceives IT/IS innovation as uncertain and difficult to adopt/use, but also imperative for operational improvement or if the related environmental pressure is high, it is more likely to use/adopt the IT/IS innovation by acquiring services (outsourcing)—that is, hiring someone else to do it. Therefore, following this argument, this study hypothesizes that:

Hypothesis 4 (H4). *EU has positive impact on ERP adoption.*

2.2.2. The Moderating Effect of EU

Along with its direct effect, perceived EU can be seen as a facilitating condition for the role of decision makers (e.g., managers). In this study, we argue that Perceived EU may be the critical factor that managers use to direct the adoption of ERP. Perceived environmental uncertainty has been predominantly recognized as an inhibitor to technology adoption [76]. However, its role in the relationship between institutional pressures and technology adoption has hardly been explored. Theories of organizational learning suppose that, at any given instant, businesses have a certain package of skills and knowledge associated with their present managerial and operational processes [77]. An uncertain technology, therefore, requires maximization of the package of skills and knowledge a business has to obtain in order to integrate that technology/innovation effectively [78,79]. A larger knowledge gap between what an organization has and what is required produces a greater sense of uncertainty about that technology/innovation for the firm [33]. Empirical works and theories of uncertainty have posited that, when IT/IS-based systems are poorly understood and ambiguous (i.e., with a great level of uncertainty), INT factors (i.e., mimetic, normative, and coercive pressures) are more likely to be strengthened [24]. Technologies/innovations that are perceived to be highly ambiguous (i.e., if the IT/IS-based system is uncertain) tend to create a shortage of confidence in the

managers, which is likely to be seen as creating a setting in which erroneous and inaccurate decisions could result in trouble, possibly delaying the decision-making process. Under such situations, time is needed to think deeply, to reflect, and to realize solutions and technological ideas. As such, in situations under a highly uncertain environment, the decision makers of firms may perceive a greater tendency to copy and imitate other firms in the same scope of businesses that have been successful in implementing such technologies, in order to save time, reduce the associated risks, and to economize in terms of experimentation and search expenditures [24,42,51]. As mentioned, this is one condition under which a firm could create a mimetic isomorphism, as identified by Powell and DiMaggio [58].

Responding to these propositions, we anticipate that the impacts of MP, NP, and CP on ERP adoption will be higher under greater EU, as demonstrated in the following hypothesis:

Hypothesis 5a (H5a). *EU moderates the association between MP and ERP adoption.*

Hypothesis 5b (H5b). *EU moderates the association between CP and ERP adoption.*

Hypothesis 5c (H5c). *EU moderates the association between NP and ERP adoption.*

The hypothesized model (or the current research model) is presented in Figure 1.

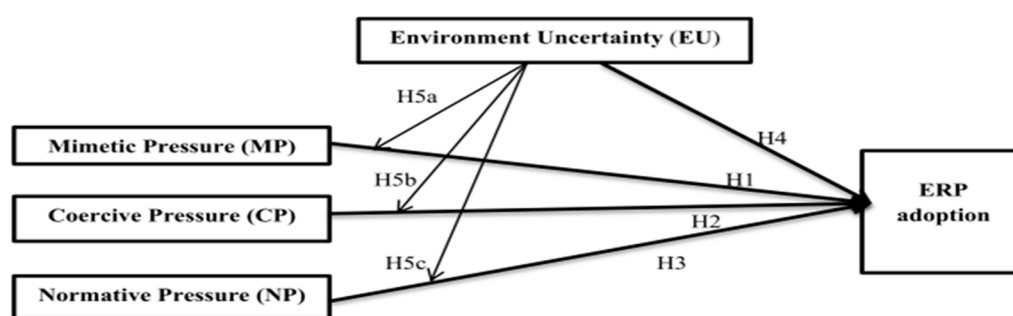


Figure 1. Research model.

3. Research Methodology

In line with aim of the current study—to investigate the impacts of institutional and external factors on ERP adoption among SMEs in Jordan—SMEs in the manufacturing sector that had adopted ERP were used to form the population of the current work. The sampling frame of the present research characterized Jordanian SMEs listed in Amman Chamber Industry Directory [80]. Of the 8000 manufacturing firms listed in the directory, 941 corresponded to the definition of SMEs adopted in the current study: a small-sized firm was defined as a firm with 10 to 49 full-time employees (FTEs), while a medium-sized firm was defined as a firm with between 50 and 249 FTEs, based on the classification of firms in Jordan by the Ministry of Industry and Trade (2016). As this research is concerned with firm perceptions of ERP adoption, the firm was the unit of analysis, with the owner/manager being the targeted respondent. This was because the owner/manager typically has an extensive understanding of the IS/IT practices of their firm and has considerable influence on most of the strategic decisions of the firm [81].

The data were gathered using a survey. The survey questionnaire was comprised of three sections; namely, the demographic information of the firm, factors impacting ERP adoption, and the profile of the respondent. The formation of the survey questionnaire followed several steps: The latent constructs were adapted from previous studies concerning the ERP context. All latent constructs (ERP adoption, mimetic pressure, normative pressure, coercive pressure, and EU) examined in this work were adapted from previous works (see Table 1) and were measured using a five-point Likert-type scale with an interval ranging from (strongly disagree) to (strongly agree), to remain consistent with the

sources. The questionnaire items were originally formulated in the English language but, as the official language of the target population in Jordan is Arabic, the survey was later translated to Arabic, in order to make it easier for the target respondents to recognize and understand. Thus, applying the Arabic language for the study survey assisted the researchers in obtaining more insightful feedback, by using the native language of the population during the data collection process. To ensure content validity, a back-to-back translation procedure was carried out by a professional translator, in order to translate the survey questionnaire. These procedures enabled the researchers to make comparisons between the translated and original versions. For content revision purposes, a pre-test was conducted by distributing the survey for review by experts (eight IS professionals, accountants, and SME managers in Jordan). Based on their feedback and observations, the questionnaires and some of the items were then revised and rewritten where appropriate. Of the 941 firms identified, 200 were chosen for the purposes of pilot testing. The survey instrument was pilot tested with 35 responses received from SME owner/managers in Jordan before collecting data for the main study, in order to test the survey questionnaire and confirm the validity of its content. The results reveal evidence of the instruments' reliability and validity.

For data collection, the method that was chosen for questionnaire delivery was self-administration. The researchers hand delivered the questionnaire to all 741 firms not used in the pilot study which had been identified from the directory. After several follow-up procedures, a total of 246 responses were ultimately gathered. Of these, 192 were found to be usable for analysis, resulting in an effective response rate of 25.9%. The number of usable responses that were received met the minimum requirement for analysis utilizing Partial Least Square-Structural Equation Modelling (PLS-SEM)—that is, at least 40 responses for a model with four independent variables [82].

Table 1. Measurement items.

Latent Constructs	Author
Coercive Pressure It's our government's intention that our firm adopts ERP. It's our industry association's intention that our firm adopts ERP. The competitive environment forces our firm to adopt ERP.	Liang et al. [41]
Normative Pressure Our suppliers are increasingly adopting ERP. Our customers are increasingly adopting ERP. Government influence your firm to adopt ERP.	Liang et al. [41]
Mimet Pressure The adoption of ERP is positively perceived by our competition. The adoption of ERP has greatly benefitted our firm. The adoption of ERP is positively perceived by our customers and suppliers.	Liang et al. [41]
Environmental uncertainty The technology in our industry was changing quite rapidly. Technological changes provided big opportunity in our industry. There have been major technological developments in our industry.	Bstieler [66]
ERP Adoption My firm is devoted to adopting ERP. The business processes in my firm require the adoption of ERP. Some of my firm's departments require the adoption of ERP.	Chan and Chong [83]

4. Data Analysis and Results

In the current work, we utilized the PLS-SEM technique for hypothesis testing. PLS-SEM is a multivariate statistical approach that allows for the simultaneous estimation of multiple variables in one single model. This approach also works efficiently when the model is complex (i.e., involving several latent variables), contains moderating variables, and even with relatively low sample sizes [82,84–87]. Based on the aforementioned reasons, we employed PLS to test the posited hypotheses, in preference

over other techniques, to analyze the data collected. This is because the proposed model contained moderating variables, which increased the model complexity. Moreover, the sample size in this study was 192, less than the threshold values necessary to utilize other techniques. Finally, the current study is explorative in nature, in applying the INT and contingency theories. This combination requires a path modelling approach to be employed, as several researchers have suggested that the PLS-SEM approach should be employed if a study is prediction-oriented or is an extension of an existing theory [82]. Figure 2 reveals the current research process.

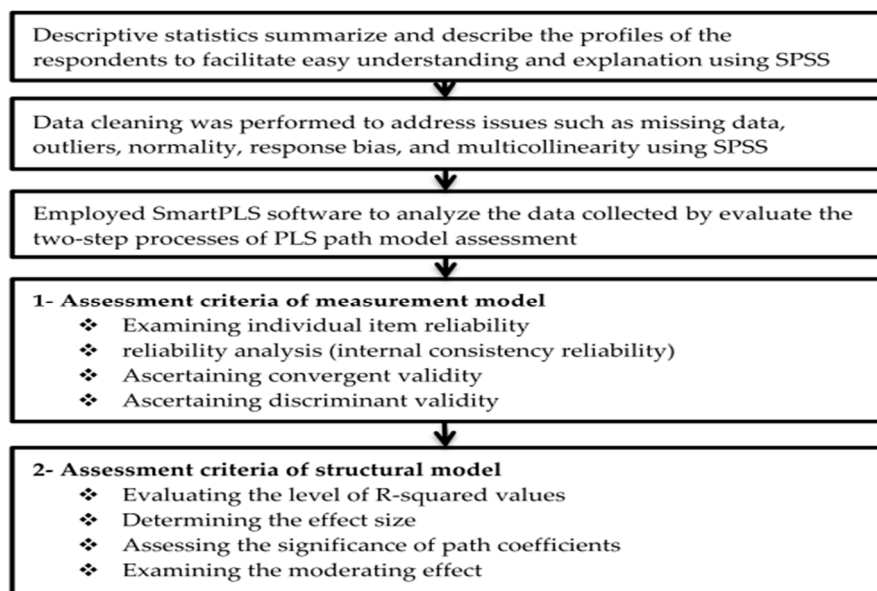


Figure 2. Research process.

4.1. Evaluation of Measurement Model

Based on the recommendation of Hair et al. [82], evaluation of the measurement model (outer model) is a key step in the PLS-SEM approach, as this evaluation assists in determining whether the observed indicator constructs are reliable or unreliable. If they prove to be unreliable, this restricts moving to evaluating the structural model (inner model). The measurement model estimates both the reliability and validity of the items, as well as the constructs.

Table 2 reports the relevant indicators representing the measurement model. The reported data shows that all constructs were reliable and valid, as all reported scores were more than the threshold values specified for the average variance extracted (AVE), composite reliability (CR), and Cronbach's alpha (0.50, 0.70, and 0.70, respectively) [82]. All items exhibited acceptable convergent validity, as all factor loadings were more than the threshold requirement (0.40) for their respective latent construct [82]. Furthermore, using the Fornell–Larcker criterion, the discriminant validity of the variables was established through comparison of the square roots of the AVEs and the inter-construct correlations.

As Table 3 shows, all the square roots of AVEs on the diagonal line were greater than the inter-construct correlation, which signifies good discriminant validity. Taking all of the indicators presented into account, it can be concluded that the measurement model met the aforementioned requirements at both construct and item levels. Therefore, proceeding with the assessment of the structural model and testing the posited hypotheses was determined to be safe.

Table 2. Relevant indicators of the measurement model.

Latent Constructs	Item	Item Loading	Cronbach's Alpha	Composite Reliability	AVE
		>0.4	>0.7	>0.7	>0.5
ERP Adoption (ERPA)	ERPA1	0.795	0.810	0.886	0.723
	ERPA2	0.907			
	ERPA3	0.845			
CP	CP1	0.898	0.864	0.915	0.782
	CP2	0.903			
	CP3	0.852			
NP	NP1	0.920	0.903	0.939	0.836
	NP2	0.919			
	NP3	0.904			
MP	MP1	0.933	0.834	0.899	0.751
	MP2	0.915			
	MP3	0.738			
EU	EU1	0.832	0.679	0.816	0.600
	EU2	0.751			
	EU3	0.732			

Table 3. Average variance extracted (AVE) square root (correlations among latent constructs).

	CP	ERP A	EU	MP	NP
CP	0.884				
ERP A	0.383	0.850			
EU	0.451	0.347	0.773		
MP	0.288	0.386	0.317	0.867	
NP	0.261	0.371	0.211	0.305	0.914

Note: The values in bold represent the square roots of the AVEs.

4.2. Evaluation of the Structural Model

Having analyzed the measurement model (outer model), the next step in PLS-SEM analysis is assessment of the structural model (inner model). Indeed, the nature of effects between independent and dependent variable relationships differs for models with and without the effect of moderating variables [82]. As one objective of the current research was to determine the significance of the main effects between CP, MP, NP and EU factors and ERP adoption, PLS analysis was executed first without the moderator; then, the interaction effects (if any) can be determined using an additional model [82]. For this reason, two separate models were executed: (1) a direct relationship model and (2) a moderation relationship model.

4.2.1. The Direct Relationship Model

The PLS algorithm and bootstrapping test were applied using 5000 resamples to find the level and significance of the path coefficients, in order to test the posited hypotheses. Table 4 exhibits the β -values (standardized path coefficients), t -values (the critical ratios), and p -values (in the instances of supported hypotheses) of every single suggested hypothesis. Overall, the four hypotheses were sustained at either the 90% or 95% confidence levels. Among them, the effect of NP on ERP adoption ($\beta = 0.194$, $t = 5.659$, $p < 0.01$) was the strongest; thus, H1 was supported. MP was significant in determining ERP adoption ($\beta = 0.095$, $t = 4.194$, $p < 0.01$); thus, H2 was also supported. The relationship between CP and ERP adoption was also significant ($\beta = 0.009$, $t = 3.470$, $p < 0.05$), supporting H3. With regard to the role of EU on ERP adoption, the relationship was positive and significant ($\beta = 0.127$, $t = 1.841$, $p < 0.10$); therefore, H4 was supported.

Table 4. Results of the hypothesis testing of the direct association model.

Hypothesis No.	Relationship	Path Coefficient	t-Value	p-Value	Decision
H1	CP → ERPA	0.009	3.470	0.013 **	Supported
H2	NP → ERPA	0.194	5.659	0.002 ***	Supported
H3	MP → ERPA	0.095	4.194	0.007 ***	Supported
H4	EU → ERPA	0.127	1.841	0.070 *	Supported

Note: Significant at * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$ (one-tailed test).

4.2.2. The Moderation Relationship Model

The interaction latent constructs of CP * EU, NP * EU, and MP * EU were examined using the bootstrapping procedure with 5000 resamples. Based on the results, the p-value was calculated and a decision was made regarding whether a moderating effect existed. As shown in Table 5, hypotheses H5a ($\beta = -0.555$, $t = 2.721$, $p > 0.10$), H5b ($\beta = 0.255$, $t = 1.014$, $p > 0.10$), and H5c ($\beta = -0.118$, $t = 0.540$, $p > 0.10$) were not supported, indicating that EU did not moderate the relationships between CP, NP, or MP and ERP adoption, as hypothesized in the current study.

Table 5. Results of moderation relationship model.

Hypothesis No.	Relationship	Path Coefficient	t-Value	p-Value	Decision
H5a	CP * EU → ERPA	−0.555	2.721	0.026	Not Supported
H5b	NP * EU → ERPA	0.255	1.014	0.184	Not Supported
H5c	MP * EU → ERPA	−0.118	0.540	0.309	Not Supported

Notes: Significant at * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$.

5. Discussion and Conclusions

Our nomological testing resulted in some interesting findings. The results of this research supported hypotheses H1, H2, H3, and H4, as the paths were all positively significant. We, therefore, found that all external factors—that is, CP, NP, MP, and EU—were significant antecedents of ERP adoption. The positive impacts of the factors CP, NP, and MP were consistent with the results of other related studies in different regions, such as in the United States [24], Singapore [29], China [41], and Portugal [26]. However, none of these mentioned studies measured the moderating influence of EU on ERP adoption. However, in this study and among these, NP appeared to be the most relevant and essential variable influencing the adoption of ERP. This finding is in agreement with earlier research that showed the critical significance of NP in the adoption of IT/IS-related applications [47,88]. NP is derived from governmental agencies, suppliers, and other bodies that have successfully employed ERP. These bodies, by nature, share norms, values, and information with firms, leading to better involvement of the environmental situation in ERP adoption. Through NP, SMEs are anticipated to follow the standard of professionalism and to adopt techniques and systems considered to be greatest practices by related professional bodies. When NP is high, SMEs adopt IT/IS not on account of their assessment of the potential efficiency of the technology, but on account of the pressures caused by the number of organizations that have already adopted it.

CP was also found to be significant, in line with prior works [47,88]. The compulsory nature of CP leads to better environmental involvement, which, in turn, significantly influences ERP adoption. Moreover, developing economies have been generally found to rely heavily on governmental assistance and incentives to accelerate IT/IS adoption [49]. Hence, it is appropriate to suppose that obtaining valuable and beneficial information from the government facilitates SMEs to adopt ERP systems, in support of the essential necessities of a firm. The findings of this study also approve that government policies supporting and encouraging technology/innovation among SMEs can comfort them to adopt ERP more effectively and empower them to attain competitiveness in the market. Government bodies can also stimulate the adoption of ERP among SMEs through the provision of related assistances or

targeted regulations. Therefore, it is clear that CP plays an important role in promoting ERP, facilitating its adoption and breaking through the obstacles of ERP adoption in SMEs.

Similar to other institutional pressure factors, MP was also found to be significant. MP reflects the action of imitating and copying other structurally comparable firms, including competitors [42]. To avoid uncertainty, SMEs depend on the experience of competitors, leading to higher participation of the external environmental context in ERP adoption. Therefore, SMEs are likely to adopt ERP more extensively when they perceive the advantages and benefits that can be derived from its application, in regard to the experiences of their greater competitors. Decision makers in SMEs prefer to imitate other organization's IT/IS choices, rather than adopting recommendations created internally; explicitly, a decision maker may abandon feedback from an internal assessment of different IT/IS options, in favor of copying another firm's choice that has proven to be successful. Another possible explanation for such a conclusion can be attributed to adequate media coverage by reputable local organizations of initiatives concerning ERP system adoption. According to Oredo et al. [89], media coverage of IT/IS innovation adoption leads to reinforcing the role and effects of MP. In addition, such publicized instances may drive the adoption of decision-making strategies in an organization, in terms of the types of applications to be outsourced and which vendor to select by utilizing the mutual pool of competence.

Similarly, EU was found to influence ERP adoption. Consistent with the predictions of contingency theory and the anticipated hypotheses, the results of this study suggest that SMEs with higher degrees of EU have a higher tendency to adopt ERP. An earlier study reported such an influence of EU on the adoption of IS/IT-related applications [90–92]. In an uncertain environment, SMEs are forced to consider and adopt new technologies (e.g., ERP systems) in order to improve the effectiveness of their business through reducing the number of mistakes and cost savings, enhance the efficiency of their business operations, and to maintain their competitiveness in the industry. Practically, this also demonstrates the simple fact that the perception of operating under EU by the manager of an SME provides key motivation to embrace and implement a certain technology/innovation; simultaneously, as managers encounter greater EU, they are also more likely to recognize the advantages of technologies that promise to minimize the threats of an unstable environment. In this regard, previous studies have stated that SMEs recognizing superior levels of competitive intensity in consumer preferences are more likely to embrace a novel innovation such as an ERP system if they realize the relative advantages that it can deliver. Additionally, previous studies have found that one of the most effective organizational responses to external pressures is to implement supporting ERP-type technologies to allocate resources efficiently and to facilitate decision making [75,93].

An interaction model was assessed to investigate the stipulated hypotheses. However, contrary to our expectations, the moderating roles of EU on the relationships between the three institutional pressure factors (i.e., normative, coercive, and mimetic pressure) and ERP adoption were not confirmed. This finding is relevant to the study of Galbraith [94], who reported that SMEs in a low uncertainty environment may concentrate more on generating competitiveness by focusing on improving their technology and thereby increasing their information processing capabilities, in order to match the increased information requirements. However, for SMEs, development proficiency could be even more essential in the presence of an uncertain environment—an environment in which development tasks may be more challenging and complex. Managers who feel uncertain about the state of their environment will spend more time and resources on environmental anticipation and scanning, such that they can recognize and understand the environment, similar to those managers who are more confident and assured of their circumstances [83,95]. For example, under conditions of high uncertainty, marketing and research and development are anticipated to provide significant contributions, as a greater need exists to process and gather market- and technology-related information. Accordingly, in a highly uncertain environment, managers seem to favor placing more of an emphasis on development proficiency, in order to account for the absence of information.

6. Implications

The current study provided an account of the factors affecting ERP adoption among Jordanian SMEs, as well as the moderating effect of EU on the specified relationships. In spite of extensive research on the adoption of ERP, few studies have specifically related to the effects of external institutional pressures or the moderating effect of EU. The results of the current study have several theoretical and practical implications in the areas of ERP and SMEs.

6.1. Theoretical Implications

As stated previously, the existing literature review reveals that, although a great deal of attention has been given to the adoption of several IT/IS technologies, very little has been associated specifically to the ERP field. Consequently, the current study offered a validated model for researchers, in terms of the antecedents of ERP adoption. For this reason, our research confirmed the usefulness of integrating INT theory and contingency theory for studies at the organizational level in the context of ERP, serving as a guide to realize the adoption of ERP. The current study also extended on previous work regarding the evaluation of the moderating effect of EU on the relationships between external factors and ERP adoption, which has not been considered (beyond the direct effect of such relationships). Incorporating INT theory and contingency theory into a single research model to explore the adoption of other types of technologies may increase the explanatory and predictive powers of both theories, in addition to producing findings that serve both practitioners and academics.

6.2. Practical Implications

With respect to practical contributions, SME managers and practitioners, industry leaders, and policy makers who have the desire to understand why Jordanian SMEs lag behind their larger counterparts in ERP adoption can benefit from the findings of this study. As the respondents indicated that EU played an insignificant role as a contingent effect on the relationships between institutional factors and ERP adoption, the current study suggests that, when SMEs adopt ERP systems, their performance will improve, regardless of the challenges posed by the level of uncertainty that the firms experience. Thus, SME managers should pursue ERP adoption decision making more proactively, given the greater potential to attain benefits from ERP. More specifically, they are anticipated to be more innovative, proactive, and sensitive to the strategies of their competitors and the needs of their SMEs.

Additionally, the developed and validated model facilitates SME managers in identifying the factors that have greater importance in promoting ERP adoption. The proposed model can help them to concentrate on the potential antecedents of ERP adoption that they may have previously ignored. This can support them to assess the impact and values of ERP and help them to support their decision-making about ERP initiatives.

From the perspective of policy makers, the findings of this study can offer them the capability to link the actual adoption and implementation of ERP systems with organization value creation. Governmental bodies can also play a more vital role by rendering assistance and creating awareness among SMEs, as well as helping them to gain access to ERP technologies. Jordan's government needs to enhance awareness in SMEs, with respect to the perception of the importance of ERP adoption. Those firms might need to be encouraged to be more responsive to ERP adoption. Thus, one recommendation is to conduct and prepare a comprehensive campaign regarding the importance of ERP to SMEs. This campaign could be in the form of seminars, training courses, publications, and expert visits. On the other hand, governments should also stimulate SMEs to embrace ERP. The benefits of ERP usage are several, such as cost reduction; quality, productivity, and customer service improvements; better decision making and planning; better resource management; and organizational empowerment.

Furthermore, the findings of the present study can increase the potential of software developers to make new developments or to build new data models of the ERP systems that support the complex necessities of SMEs in Jordan. Taking into consideration that ERP adoption/implementation is

possibly considered as an uncertain investment by organizations, the findings of this study can help owners/managers to adopt a trade-off situation between the flexibility of ERP systems and the efficiency of their adoption and implementation. Another essential implication arising from the results of the present study is targeting ERP vendors. This study provides insights into factors that are significantly associated with ERP adoption. With such outcomes, ERP vendors aspiring to promote and encourage ERP adoption can consider the effects of MP by highlighting, for potential or targeted adopters, that other (SME) competitors have successfully and effectively adopted such systems. The publication of success stories, case studies, training courses, and seminars may serve as an effective instrument to attain these goals. Vendors can develop more efficient and effective promotional policies for their ERP systems; likewise, they could direct more of their attention to convincing SME owners/managers about the potential of ERP systems and how they can maximize their advantages by adopting the ERP. Such an effort would serve the goal of decreasing managerial concern and uncertainty concerning ERP adoption.

7. Limitations and Recommendations for Future Studies

As is always the case when carrying out research work, the current study had limitations that should be considered when interpreting the findings. On the other hand, these limitations also provide opportunities for future research. First, this study was conducted among manufacturing SMEs in Jordan. Thus, the findings may not be directly generalizable to SMEs in other sectors or in other countries. One possible topic for future study would be to replicate this research in other different sectors and places. The replication of this research across other sectors and countries might reveal similar or comparable findings, serving to increase the understanding of the adoption issue or whether the outcomes presented here are a phenomenon of the Jordanian SME setting as a whole. It would also help to validate the measurement scales, conceptualizations, and generalizability of the results further. Second, despite various follow-up efforts, the findings of this study are based on a data set of 192 responses. While this sample size was considered adequate to test the model fit and to proceed with statistical inference, future research could verify this study's findings by using a much larger sample that allows for the use of covariance-based SEM, which would provide more robust findings. Likewise, a larger sample size would allow for a richer understanding of the associations between the latent variables and greater confidence in the results. Third, this study utilized cross-sectional data; thus, a causal association between factors could not be ascertained. The utilization of longitudinal data might surmount such a limitation. Fourth, the current study overlooked the influence of technological and organizational attributes on the adoption of ERP. Thus, it would be interesting to consider these attributes in the organizational context, such as relative advantage, compatibility, firm size, organizational culture, and top management support, in order to investigate the relationships and causality between those factors that are essential to ERP adoption. Finally, future studies could employ different analysis methods in order to investigate whether there exists different types or degrees of EU contingent effects.

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