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Information Systems and Performance: an analytical approach to understand IS value in business organizations

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Abstract- This study provides an overview of the theories and research on information systems and performance, and explains in details a literature review of information systems and their impacts on an organization performance. The literature review includes contributions from several academic disciplines in addition to information systems, including economics, strategy, accounting, and operations research. Thus, the main purposes of this study are first to attain an in depth understanding of the relationship between information systems and performance at both organizational and individual levels and to evaluate the significant value of information systems in order to understand the determinants their value to organizations, helping them to better manage information systems resources and enhance performance.

Keywords: Information systems, IS value, Performance aspects, Productivity paradox.

I. INTRODUCTION

Information systems (IS) are changing rapidly and considering their strategic effect on organizational operations, the successful management of IS is of the utmost importance [14]. Further, it has been claimed that to be competitive in today's "high tech environment " world, organizations need to offer specialized services and develop an innovative strategy that employs new technologies especially IS [37], [39]. These technologies allow organizations to recognize the beneficial impacts of IS as an enabler of high standard performance. High quality performance, efficiency and effectiveness represent critical challenges that most modern organizations face.

In light of these challenges, IS becomes an important strategic ingredient that helps create competitive advantages and supports organizational survival. On the other hand, organizations are required to adopt new technological devices and tools that support them in obtaining more benefits especially in the economic orientations which have influenced organizational strategies. IS applications have become one of the most crucial technologies and have taken on extremely important roles. It has been claimed that IS constitutes more than 70% of the invested capital in service industries [55].

Therefore, the rapid growth of IS and the associated reflections on the organizations, market and industries,

have created a widely held belief that IS is fundamental to organizational survival and development.

II. JUSTIFICATION

Researchers are still struggling to identify the underlying link between IS and organizational performance. Research has indicated that effective and efficient use of IS is a major factor differentiating successful organizations from their less successful equivalents [17]. The spectacular growth of IS has enormous potential for improving the organizational performance. However, the huge investment made in IS puts increasing pressure on management to justify the outlay by quantifying the performance effects of IS applications. Furthermore, challenges such as reducing costs, increasing efficiency and improving performance have led organizations today to implement new organizing mechanisms to improve performance which include IS [52]. Thus, IS represents a practical response from organizations to overcome these challenges.

From the practical viewpoint, the importance of IS to organization is very clear especially when IS affects organizational process, mechanisms, and the ways the organizations function [81]. Thus, this dynamic mechanism pressures organizations to become digital so as to better respond to the external environments more rapidly than traditional organizations, giving them more flexibility for survival in turbulent environments [55]. On the other hand, researchers and practitioners are motivated by a desire to understand how and to what extent the application of IS within organizations leads to improved performance. They have adopted diverse conceptual, theoretical, and analytic approaches and employed various empirical methodologies at multiple levels of analysis which made this area truly interdisciplinary [19], [24], [34].

III. LITERATURE REVIEW

The IS investment has witnessed an unparalleled growth in the last decade [35]. Organizations invest increasingly in IS for various reasons such as achieving more efficiency and improving performance and quality [4], [57]. Identifying the impact of IS on performance has been the major concern of a substantial amount of

research in recent decades [25]. The results of these studies however, are mixed and anecdotal.

Even though, IS contribute to organizational performance, the empirical results relating IS applications to performance measures were equivocal and multifaceted. However, previous studies relied exclusively on accounting-based measures of firm performance, which obviously tend to ignore IS's contribution to other performance dimensions such as organizational goals and effectiveness.

Investigating one side without taking into consideration the other sides made these studies fragmentary leading to inconsistent results. However, they produced many important factors that should be taken into account in the future, and discussed in details before evaluating IS and performance or analyzing IS impacts on the performance. This study conducted an extensive review of the literature investigating the business impact of IS using a wide variety of methodologies and different levels of analysis [9], [23],[61]. It has been found that many of the previous studies were conducted on the relevance between IS and organizational efficiency or firm performance. Some of these studies have shown a significant relationship and correlation between IS and organizational performance [1], [76], [77], [67]. Meanwhile other studies have not found such a relationship [22], [33]. This is known as the productivity paradox in the literature of IS and productivity [1]. As result many questions have been raised regarding the level of analysis, analysis approach, the paradox and mixed results and measures. Thus, in this study we categorize previous research according to the following criteria:

Performance aspects and measures

Information systems at different levels

Information systems and analytical approach

Information systems and organizational context

Information systems and type of business

The results and productivity paradox

IV. PERFORMANCE ASPECTS AND MEASURES

The measurement of IS impact on performance and productivity has been a major interest of researchers and practitioners since at least [79] Solow's seminal article in 1957 [54]. Prior research measured various types of factors in examining performance impacts of IS. More specifically, the focus of these studies was on organizational performance and IS impacts at the organizational level through using a variety of ways to measure the IS impacts [55], [64]. In this sense, previous studies could be classified into three major streams based on the data and measures used to examine the relationship between IS and performance. The most commonly used factors are market, financial and economical factors as discussed below.

A. INFORMATION SYSTEMS AND MARKETING PERFORMANCE

Prior studies, that related the market value (Measures) of IS relied on privately gathered survey information. They

had relied on public announcements of IT initiatives and stock market values to represent expectations of future earnings improvements associated with IS investments, they also used some other factors such as volume of sales and demand, product quality, price, market share and customer satisfaction [36], [18], [47], [29], [56].

Generally these studies argued that the most important factors that should be taken into consideration when evaluating performance were the market factors, disregarding other factors such as effectiveness and quality of performance. They proposed that bigger market share, sales volume and other marketing factors explained most of the effects of IS on performance. However, some of these studies, as mentioned earlier, were paradoxical in their findings. Further, most of these studies investigated IS as a whole by looking at IS investment associated with marketing performance from different perspectives. Once again, depending on one perspective, measuring IS impacts on performance appears to be too simplistic leading to unreliable results.

B. INFORMATION SYSTEMS AND FINANCIAL PERFORMANCE

Another stream of prior studies relied on financial measures in order to evaluate IS impacts on a firm's performance. Measures such as return on investment (ROI) and return on assets (ROA), relative profitability, economic input and outputs, total revenue [9], [63]; [73], [53] provided a good synthesis and meta-analysis of this type of study by analyzing prior research that has used these financial factors to examine the IS impacts on the organizational performance. However, these studies have focused on assessing the impacts of IS investments and relationships between IS and various ratios of financial performance [32] [83], [13], [62], [41], [84]. Compared to the productivity paradox, the question of whether IS contributes to profitability has not yet been clearly answered [11].

Overall, previous research has been very ambiguous and has failed to show a clear links from IS to profitability performance and interpret that relationship clearly. Neither earlier studies nor recent analysis [11] have found evidence of clear positive effects of IS on financial performance.

In spite of theoretical arguments and research belief about the relationship between IS and financial performance, empirical evidence on this relationship has been inconclusive. Several empirical studies and ample anecdotal evidence indicate that organizations' expenditure on IS is not rewarded with improved financial performance [81].

In order to guide the direction of future research on the impact of IS spending as proposed by previous studies [19], [43], [11], researchers should consider various performance measures rather than relying on traditional financial ratios.

C. INFORMATION SYSTEMS AND ECONOMIC PERFORMANCE

The last stream of previous studies relied on economic measures to evaluate the effects of IS on a firm's performance or output-based measures captured as dependent variables [38], [9], [20], [21], [22], [68][63], [45], and [19].

Previous research examined the relationship between IS investments and firm performance and found mixed results. Some studies [9] reported a positive relationship between IS and firm economic performance, while others found no significant relationships [7]. The focus of these studies was on different economic factors. They stated that optimal productivity could be achieved if organizations integrate IS factors with complementary and other organizational factors such as organizational redesign and change, strategy and structure.

To summarize, previous studies that examined economic performance of IS present equivocal findings and inconsistent results especially when major analytical focus was on organizational productivity and production. As a result, researchers stressed the need to move the analytical focus to a more granular level and to refine the conceptualization of firm performance variables for resolving these inconsistent findings [74].

In brief, measure issues have been discussed by many researchers as an important factor to study the relationship between IS and performance. However, to date no comprehensive framework and measurement have achieved universal acceptance in this area.

V. INFORMATION SYSTEMS IMPACTS AT DIFFERENT LEVELS

The level of analysis that has been used to examine IS impacts on performance represents another way to look at prior research in IS and performance. The impact of IS on performance has been studied at different levels including industry and economy [75] and firms and individual information systems [30]. This section analyses the IS impact on performance at both levels in order to build a more comprehensive view and identify what is known.

Early studies examining the contribution of IS to the economy and industry typically found little or no improvement in productivity, despite massive investments in IS since the early 1970s [82]. In other words, early research led to IS productivity paradox and initiated a long stream of empirical work focused on describing the paradox, denying the paradox, solving the paradox and burying the paradox [82]. Furthermore, industry level studies led to the mismeasurement of inputs and outputs in the productivity measures that were used in the early research [22], [33]. Researchers have attempted to solve the mismeasurement problems associated with the economy-level and industry-level studies by identifying the IS productivity issue with firm-level data [82].

Indeed, a huge amount of research into various types of IS and performance models has been carried at the organizational level. These studies have been classified by researchers as they have focused on the organizational

value of IS and the impacts of IS in an organizational context.

Although organizational level analysis is the most popular level that has been used by previous research, sectional or cross sectional analysis also have been used as an indicators for the whole organizational impacts of IS. For example [15] stated a positive relationship between IS and performance in the purchasing function. His study not only investigated the existence of the relationship, but also of the mediating role played by both purchasing practices and the strategic integration of purchasing. The results revealed not only the positive effect of IS at the functional level, but also helped researchers to understand how IS and performance interact positively.

While other scholars used cross sectional level analysis to examine such a relation. [82], used a closed-form analytical model, they demonstrated that investments in technologies that reduce the firm's fixed overhead costs do not affect the firm's product quality and pricing decisions but do increase profits and improve productivity. In addition, they demonstrated that investments in technologies that reduce the variable costs of designing, developing, and manufacturing a product encourage a firm to improve product quality. It has been also shown that the direction of the firm productivity following such investments depends upon the relationship between the fixed costs of the firm and the size of the market.

[55], stated that various dimensions of IS are significantly and positively linked to a firm's performance irrespective of the different criteria of performance measures. The results also show that IS has a significant effect on aggregated composite measures of accounting-based and market-based performances.

In brief, studies at the user level have been almost absent in this type of study and seemingly such studies are required to clarify the relationships between IS and user performance in different settings.

VI. INFORMATION SYSTEMS AND ANALYTICAL APPROACH

Previous research can be broadly classified into two major streams, the first using a traditional approach using total expenditure on IS (including its applications) to investigate performance outcomes associated with that expenditure [45], [43].

A more traditional approach was adopted for measuring the impact of IS on firm performance [63] by using the systems resource approach as a framework for measuring organizational performance. They tested performance measures used in previous research to use within this framework. Based on that review, they selected several direct measures of organizational strategic performance such as return on investment, return on sales, growth in revenue, sales by total assets, sales by employee, and market to book value. In addition, several IS measures were identified, including IS budget as a percentage of revenue, value of an organization's IS budget spent on staff, percentage of IS budget spent on the training of IS staff, and the number of PCs and terminals as a

percentage of total employees. One notable point in this study is that researchers alluded to the importance of the individual's attributes with regard to IS and performance.

This is different to other streams of previous research which focused on specific IS elements and their relationship with performance or changes associated with elements such as Volume Sophistication, Information contents, IT variables, IT activity MIS budget and MIS staff budget [55], IS capabilities ,infrastructure , and flexibility [74]. Overall the results of these studies stated a strong relationship between IS and organizational performance, they also proved the moderating effect of organizational infrastructures in the relationship between IS and firm performance.

VII. INFORMATION SYSTEMS AND TYPE OF BUSINESS

The level of penetration of IS in different sectors shows some variability [69]. [84], argued that organizations might differ in converting IS expenditure into productive outputs; however such, a relationship has not been yet clearly defined. Accordingly, in previous research business was classified into two broad groups: manufacturing and service type.

That is to say, the sector or the setting in which studies were applied represents another significant approach. Importantly, some studies reported that IS applications differ from one setting to another. However, the results of these studies show no significant difference and are seen as similar to other studies. Previous literature in this regard can be divided into service sector including education insurance [41], [26], banks [2] and the manufacturing sector [55], [84], [50].

In the manufacturing sector, the results were mixed and anecdotal. Some of these studies proved positive relationships, while other stated otherwise. Similarity, in the service sector the results indicated mixed relationships between IS and performance. Research suggests that high-performance firms spend a significantly higher proportion of revenue for IS than do low-performance firms [41].

Literature reveals that different contexts have been examined in these studies ranging from manufacturing to service settings. Although these studies have different settings, environments, circumstances and factors however, they have some common results in general.

In other words, the degree of IS impact on the performance is different from sector to sector. However, these studies did not specify the reasons of that deference.

VIII. INFORMATION SYSTEMS AND ORGANIZATIONAL CONTEXT

A number of researchers have investigated IS and performance considering factors such as organizational factors, business size e.g. [31], business process [1], business strategy and the nature of managerial work and management skills and user training [33]. According to this view research could be categorized according to its

main focus in terms of factors moderating IS impacts on performance.

Many studies have considered the organizational context of IS impacts on performance. The results of these studies indicate that context is an important factor, which moderates IS impacts on performance. Research in the area provides explanations and some evidence into how IS impacts can be moderated by organizational factors. However, the specific type of IS focus of these studies is still a weakness and does not tell the whole story.

The size of the business has also been considered including small, medium and large organizations focusing on business related factors. It is believed that, the rapid evolution of information is creating opportunities for organizations to change dramatically and improve the way they conduct business [3] by providing support to the business processes, which could be used for many organizational aspects.

The computing environment in small firms is fundamentally different from medium-sized firms [71]. Research in this regard argued that in small firms IS impacts may differ from those in large firms due to IS sophistication and managerial sophistication. Other research provides clear evidence that some aspects of IS management are weak in small firms. For example small firms do not perform adequate planning of the use and operation of IS [51].

Some researchers have contemplated that the greatest benefits of IS are obtained when IS is joined with other complementary investments, such as organizational re-engineering, restructuring and redesign [55], while others investigated whether the size of an organization is related to its willingness to use IS and whether organizational performance is related to how an organization applies this technology. No significant relationship was found between relative IS (measured as the percentage of IS expense to total assets) and organizational performance (measured as the percentage of net income to total assets). Firms' structures and strategies were also examined to manipulate the effects of these variables on performance within various IS environments. Many studies have examined the relationships between IS and organizational context and structure [59]. The results have shown some evidence that organizational factors might moderate IS impacts on performance.

Recently, suggestions have been made that IS should be viewed as a moderating variable affecting organizational structure attributes[78], while others suggested that IS seems to play a direct role in reinforcing organizational structure and productivity [9]. Claims have been made that studying the performance impact of IS should take into consideration the role of key contextual factors and also should be studied within a strategic and management framework.

In brief, reviewing these empirical studies revealed a rich but mostly theoretical explanation of how context can moderate the impacts. Further, these studies did not generate any theory or model linking IS attributes, contexts and performance which might be generalized to

other IS settings. As a result little has been uncovered, which could be used in other IS environments. Much still remains unknown in this regard.

Despite a significant amount of research effort in evaluating the performance impacts of IS, there is recognition for a more inclusive and comprehensive approach that considers a broader organizational context in the investigation of IS impacts on performance [30]. This calls for expanding performance measures to capture the impacts of contemporary IS use in business organizations.

IX. THE RESULTS AND PRODUCTIVITY PARADOX

A demonstrably large number of studies have been performed with the aim of assessing the impact of IS on performance and productivity, but the findings have been contradictory, inconclusive and usually non-generalizable [55]. A number of studies [55], [63], [9] indicated some positive and significant effects, while others have frequently generated controversial or inconsistent results [59]. Consequently, it has been realized that the relationship between IS and performance is complex and multifaceted. The measurement problems, methodological deficiencies, and the poor quality of data sets may have contributed to the so-called productivity paradox of information technology [70].

Distinctively, two viewpoints are associated with IS and organizational performance. In the theoretical viewpoint, researchers have debated that, while IS has served to increase firm productivity and consumer value, they have also lowered entry barriers, eliminated market inefficiencies that enable a firm to maintain monopoly power, and intensified market competition, thereby failing to create any lasting return to the investing firm [18], [43]. As a justification for these equivocal results, one suspected reason for these inconsistencies may be the broad range of objectives expected from the implementation and use of IS in organizations [60]. These objectives range from narrow operational improvements, such as reducing specific operational costs or improving customer service, to broad strategic benefits, such as gaining a competitive advantage. Albeit descriptive, these dimensions fail to provide a direct linkage between IS use and variations in organizational outcomes.

In short, the complexity of the relationship between IS and performance needs a more profound review and more empirical research to clarify many aspects related to both performance and IS at the same time, and how to measure them both. In this sense Legris, Ingham and Collette (2003), found that correlation and canonical correlations have been obtained between a set of six organization performance variables and a set of six IS variables. Based on the correlation, it was found that organizational performance and return on investment (ROI) were positively and significantly correlated with IS measures.

In summary, a significant amount of research [28], [62] has indicated such a relationship between various types of IS and performance, while other research [2], [41], [45],

reported negative or inconclusive relationships between IS factors and performance.

X. HISTORICAL VIEW OF IS AND PERFORMANCE

IS and its adaptations in business organizations has attracted extensive interest from researchers in the last decades [79].

Starting from 1980s serious research efforts were carried out in different sectors. Many questions have been asked against the backdrop of large investment in these resources. Motivated by the productivity paradox, research into the issue was launched in the 1980s and 1990s. Early studies were unable to show that IS led to payoffs, in most cases because of inadequate data on IS investments and small sample sizes [34]. Researchers investigated many organizational aspects of IS [32] and computer utilization on organizational performance. Computer utilization was measured in terms of the reported number of computer applications, while organizational performance was measured using four profitability measures including profits, return on assets, and return on net worth and sales growth. The study found that firms with heavy computer usage were either very strong or very weak performers. Contemporaneously, limited computer usage was associated with poor or average performance.

In 1993 more rigorous studies [20], [34] with larger samples were carried out. Most of these studies have found that IS improves performance and shown higher gross marginal returns than non-IS investments.

Another vital study [21] used IT spending data of the firms to estimate the contribution of computer capital to the output of firms based on a set of economic production functions. It was found that the IS application had contributed positively to the production output meaning that IS affected the economic performance for the firm under study. However, it was also found that IS contributed negatively to profitability measures such as ROA and ROE, though the magnitude of such impact is very small [63].

Similar results were reported [42] by employing economic measures and examining the productivity impacts of new technology. The study found no support for the 'IT paradox' and reported large robust and statistically significant productivity gains associated with ATM introduction.

In brief, this literature review has found that most studies have indicated positive relationships between IS and performance partially or totally especially in studies conducted since 2000.

The equivocal results of the previous studies increased the gap between the actual knowledge about IS and performance, and the real relationships between IS and firm performance in real practical life.

XX. CONCLUSION

While earlier studies showed mixed results, especially those that were conducted during the 1980s or before 1990, nearly all major studies since the mid-1990s have

shown positive and significant relationships between IS and performance at the individual as well as organizational levels. An important point is that the data utilized in the studies run from the late 1980s to the mid-1990s, before the internet boom and before significant advancements in information technology [34].

Researchers argue that a useful way forward should focus less on issues of whether IS creates value, but more on how, benefits occur from IS [49]. Thus, there is a need for more rigorous theoretical studies that analyse and investigate the impact of IS applications on productivity and other performance measures.

Earlier research focused on competitive advantage, market measures and profitability measures derived from IS applications and the relationship between IS and firm performance [6], [16], [48]. In resolving these inconsistent findings, researchers stressed the need to move the analytical focus to a more granular level and to refine the operationalization of firm performance variables [74].

Finally, the actual business value and essential impact of IS is a controversial issue, debated for a number of years. Many authors have attributed large productivity improvements and substantial benefits to IS. Organizations continue to invest large resources in IS and related technologies. Thus, further research is needed to develop deeper knowledge about the contingencies under which IS investments enhance firm performance [74].

XXX. LIMITATIONS

The limitations of previous studies on the performance impacts of IS concern methods of analysis, measurement problems and methodological deficiencies, which are limited by both data and empirical specification concerns with data sometimes covering a single system or IS applications in general [44].

One of the most significant limitations in previous studies was the treatment of IS either on a single component basis (eg, payroll, accounts receivable, etc) or as a whole factor. Given the complexity of the technology and the difficulty of implementing IS in organizations, some systems may be effective, while others may not. Therefore, the aggregation of the over all systems could be helpful though the favorable impact of effective systems may be nullified by poorly designed ones. Furthermore, many of the earlier studies use cross-sectional and/or organizational short-time series data. If there is a lag in achieving IS performance effects, data covering a limited time period may not reveal the impact [67].

Although a considerable amount of information systems research has addressed the importance of IS to businesses, researchers have, at first glance, had little success in quantifying the relationships between business and IS, or clearly explain such relationships [40].

Additionally, previous studies did not identify the common variables that affect organizational performance and/or which variables could affect performance more than the others.

Even in meta-analysis and longitudinal studies certain independent variables may be systematically excluded because of accepted beliefs in a particular field [27]. Yet another limitation is that the nature of applications supported by IS is unknown on most studies [84].

Lastly, a methodology limitation, which has been mentioned in most studies also affects and may lead to mixed and inconsistent results. Previous studies limited the methodology and analyses within the macroeconomics view, they did not give sufficient attention to other factors at micro level such as individual variables. However, investigating relationships with other organizational (contextual) and individual variables may enrich our understanding of processes through which IS creates performance impacts [8]. This study attempts to deepen our understanding of the relationship between IS and performance through examining the most important empirical studies in this area and comparing the two sides (positive and negative) to evaluate the actual effect of IS on the performance and identify the most important variables and measures that could be used to examine such relationship.

XL. SUMMARY

The performance impact of information systems is an important research topic [59]. Over the past decades, a great amount of attention has been drawn to the contributions of Information Systems by researchers and practitioners. Although there have been many attempts at assessing the impact of IS on organizational performance, the empirical results have varied along with the deployment of key performance indicators [55].

In this sense, measuring IS utilization, rather than IS investment, makes better sense in terms of understanding IS's role in the organization and how IS affect performance at the organizational level. Organizations that can achieve optimal performance from their IS are coordinated with organizational redesign and other managerial decisions [46], business strategy and the nature of managerial work [72], [12]. Also investment on user training, application of standards and the way people work and how their performance is measured and controlled are critical to realizing more productivity from IS [33].

One logical reason for the mixed empirical results is that the studies did not effectively differentiate among (and often confuse) the goals of increasing efficiency, improving quality, improving performance and increasing productivity. Organizations typically invest in technologies to gain more profits and achieve high levels of productivity. It is commonly assumed that such improvements in the performance are recognized by improving the efficiency of production and improving products and services quality as well [82].

“The major problem with these studies is that they failed to address two fundamental issues that are essential to this type of research: (1) adoption of a conceptual framework to define IS and organizational performance and, (2)

identification of relevant and accurate measures to operationalize these concepts [63].

More to the point, analyzing prior IS studies reveals that IS sometimes impacts organizational performance via intermediate business factors such as processes; organizational resources and workplace practices interact with IS to produce such impacts. In addition, the external environment plays a role in IS business value generation; so it is important to disaggregate the IS construct into meaningful subcomponents. Therefore, the received wisdom of IS business value can thus be as follows: if the right IS is applied within the right business process, improved processes and organizational performance result [65].

L. CONTRIBUTIONS

In this literature review of IS performance impacts the following points should be noted:

User aspects were disregarded and absent in the previous studies

IS application and its elements should be measured not only as whole application but paralleled with other factors specially user factors because users are the vital tools that create the actual impacts of IS within organizations

Studies based on output measures of IS impact have been of limited value in developing understanding of IS impacts also there is an emerging view that adopting a process perspective holds the key to additional insights into the IS performance matters, besides that, performance measures need to be expanded to capture the impacts of contemporary IS use.

There is a need for a greater recognition of the importance of user factors, ignored in previous studies. Specifically, how users perceive the benefits of the applications and whether or not the application itself is suitable for the users tasks as well as how these factors jointly and separately affect users performance which in total affects organizational performance.

Last but not least, because of the failure of previous measures to capture performance impacts from IS, a better understanding of IS performance impacts requires a shift from output focused to user perspective research.

However, as said formerly previous IS research has provided a good base of knowledge about IS and performance and has examined the contributions of IS resources and capabilities to firms performance, nevertheless the studies are fragmented, and key gaps exist in the literature. Many questions have been raised on the subject of methodology, unit of analysis, analysis,

results and measures. In additions most of the previous studies ignored the individual aspects in their analysis and measures which are crucial to understand the whole relationship between IS and performance because users or individual are the imperative tools that create (maximize and minimize) the impacts “Benefits” from IS and its capabilities in all organizations. Thus, further research is needed to develop deeper knowledge about the contingencies under which IS applications enhances performance, and also how these applications could improve performance efficiency and effectiveness.

Another essential point which has not been taken into consideration by researchers is that the comprehensive set of measures to test such complex relationship is critically needed to gather a various types of factors that mostly affect performance in an IS environment. Such set should contain both organizational as well as individual aspects to be analyzed from different perspectives which probably give more vital knowledge and contributions from both academics and practitioners.

Last but not least, individual factors and technological factors should be merged with tasks factors to give a whole set comprehensively to evaluate the actual impacts of IS on the performance which has net been mentioned by previous studies.

LX. FUTURE DIRECTIONS

The study of information technology’s impact on performance will always be inherently complex due to the many influences on performance. Unlike previous studies, the omission of important elements and reverse causality in the frameworks employed in previous studies are subject scrutiny.

In this sense, measuring IS utilization, rather than IS investment, makes better sense in understanding IS’s role in the organization and how IS affect performance at organizational level.

The idea is that numerous elements affect performance in ways that are hard to recognize by the researcher and these unmeasured elements can either change or influence the precision of the estimates or bias the estimates.

To study IS and performance researchers should take into account individual role, technology characteristics and other factors that are related to performance to build a comprehensive analysis framework which helps reach more accurate results. Furthermore, IS aspects must be taken in more details which basically need multiple review from several disciplines.

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