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Technological Antecedents of Organizational Agility: PLS-SEM Based Analysis Using IT Infrastructure, ERP Assimilation, and Business Intelligence

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Abstract

Business intelligence, ERP assimilation, and IT infrastructure flexibility are components that can enhance organizational agility. At the same time, business intelligence (BI) usage improves management decisions. However, there are a few empirical studies on ERP assimilation and business intelligence. To fill this gap, we have proposed a new model with five direct and two mediating relationships. We have distributed 265 questionnaires and received 253 complete questionnaires. We collected the data through self-administered questionnaires adapted from earlier studies. The study has used the Smart PLS software to analyze the data using the partial least square structural equation modeling technique. Since the study measures second-order constructs, therefore, we believe that PLS-SEM is an appropriate software. The results indicate that IT infrastructure flexibility affects organizational agility, business intelligence use, and ERP assimilation. The results also support the association between business intelligence use and organizational agility and ERP assimilation and organization agility. Further, we find that business intelligence use and ERP assimilation have a mediating effect on organizational agility .

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Introduction

Information technology has completely changed organizational operations by providing advanced hardware and software infrastructure support. Organizations prefer to use the Enterprise Resource Planning (ERP) and Business Intelligence (BI) tools to manage their data. Organizations take management decisions using BI; therefore, organizations' focus on BI skills has increased significantly (Luftman & Ben-Zvi, 2010). Many organizations still ignore the importance of ERP as they lack the required technological infrastructure support resulting in poor organizational agility.

Organizational agility is how responsive an organization is towards its strengths, weaknesses, opportunities, and threats. Agility strengthens the decision-making process in organizations and industries, using business intelligence to face daily challenges. By assimilation of IT Infrastructure, business intelligence (BI), and ERP, organizations can convert raw organizational data into a presentable and understandable form of dashboards, reports, and charts.

Business intelligence can save costs and increase the revenue of organizations. Business intelligence is continuously improving with ERP assimilation technologies. That is why sufficient empirical studies are not available on business intelligence and organizational agility (Watson et al., 2006). Organizations that lack IT infrastructure support are unable to fulfill the requirements of BI and ERP assimilation. If organizations use outdated equipment, they may not benefit from BI. Many organizations ignore investing in IT infrastructure, not realizing that such investments may decrease costs in the long run (Chung, Rainer & Lewis, 2003).

Al-Mashari (2003) argues that IT infrastructure flexibility helps organizations to incorporate large-scale software like ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management), leading to interaction with customers and organizational success. ERP is a complex software that integrates and records financial/non-financial transactions, customers' and employees' queries, complaints, and other feedback. Management can retrieve all such data with a single click. Integration of different departments' data is expensive and time-consuming (Appelbaum et al., 2017). Such software is essential for an organization that generates huge data daily, and management takes decisions based on that generated data. Such software will enhance organizational performance and give an edge to a firm over others (Shao, Feng & Hu,

2017; Gessner & Volonino, 2005; Lönnqvist & Pirttimäki 2009).

Research Objectives

The literature lacks empirical evidence on the relationship between organizational agility, ERP assimilation, and business intelligence use. Past studies found inconsistent results on BI impact on business performance (Fink, Yogev & Even, 2017). This study aims to build a theoretical model and test the hypotheses while measuring the effect of different organizational agility factors. The model developed in this study will help organizations to understand the significance of using BI, IT infrastructure flexibility, and ERP assimilation. Specifically, the objective of the study are as follows:

1. To identify the effect of IT infrastructure flexibility on organizational agility.
2. To identify the mediating effect of business intelligence use between organizational agility and IT infrastructure flexibility.
3. To identify the mediating effect of ERP assimilation between organizational agility and IT infrastructure flexibility.

Literature Review

Industrial organizations have extensively discussed business intelligence, but empirical evidence is insufficient (Jourdan et al., 2008). This section discusses the constructs of organizational agility, business intelligence use, ERP assimilation, and IT infrastructure flexibility for the theoretical underpinnings.

Conceptual Model

The contingency theory of organizations that emerged in the 1970s is a dominant theoretical model for understanding organizations and technology-related issues (Betts, 2003; Scott, 1991). The theory elaborates the relationship between the organizational environment and the technology that an organization uses. The theory emphasized that the decision-making process in an organization is contingent upon the internal and external situation. Based on the theory, this study has developed a new conceptual model presented in Figure 1. The conceptual framework has four variables: "business intelligence use, IT infrastructure flexibility, ERP assimilation, and organizational agility." We have briefly discussed these variables in the following sections:

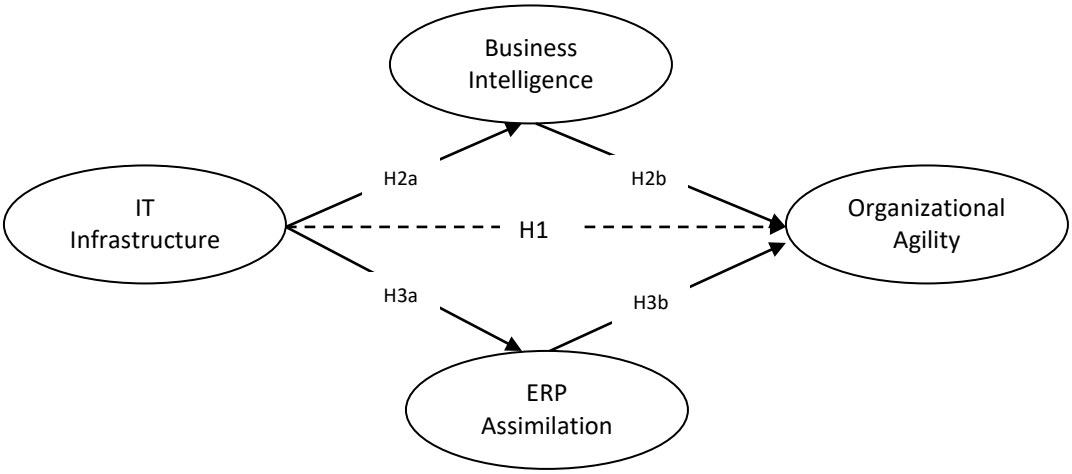

Figure 1: Conceptual Model

Organizational Agility

The study based on the literature review has categorized organizational agility as a dependent variable. Agility refers to an organization's agility to respond and meet the challenges based on its available resources (Li, Chung, Goldsby & Holsapple, 2008). Agility can be taken as the organization's capabilities to survive in a competitive environment by adopting innovative opportunities (Goldman, 1994). Another definition of organizational agility is an organization's ability to sense the changes across the market and take required actions (Chen & Siau, 2012).

Organizational agility has three interconnected capabilities: (i) customer agility, (ii) partnering agility, and (iii) operational agility (Sambamurthy, Bharadwaj & Grover, 2003). Customer agility is the interaction with customers using innovative opportunities of an organization. Partnering agility is leveraging partners like suppliers, distributors, and manufacturers through partnerships, mergers, or joint ventures. Operational agility is an organizations' operational capabilities to improve business processes by incorporating innovative opportunities (Tallon & Pinsonneault, 2011; Sambamurthy et al., 2003).

IT Infrastructure Flexibility and Organizational Agility

The extent to which a firm can survive without IT resources depends on IT infrastructure flexibility. IT infrastructure flexibility refers to an organization's ability to support technology advancement in hardware, software, communication, and network services. IT infrastructure flexibility comprises four key components: (i) connectivity, (ii) compatibility, (iii) modularity, and (iv) IT support competency (Duncan, 1995; Byrd & Turner, 2001). Literature also suggests that IT infrastructure flexibility relates to IT-

related resource usability to support the communications and business applications throughout the organization.

Firms need to efficiently use IT resources for the current environment and future technology advancements (Chen & Siau, 2012). IT infrastructure has become an essential part of organizational business processes, as it's the only source through which the organization can streamline business processes. From the systems theory perspective, an organization is a system whose communication process supports organizational agility (Byrd & Turner, 2001). Many past studies have used IT infrastructure flexibility as an independent variable (Byrd & Turner, 2001; Tiwana & Konsynski, 2010). However, limited literature is available that supports the direct relationship between IT infrastructure flexibility and organizational agility. However, many studies have studied how IT infrastructure supports the business functional line process agility. They found that IT infrastructure flexibility can improve an organization's ability to meet the competitive environment's challenges. A change in stakeholders, including partners, customers, supply chain, employees, and operations in an organization, promotes environmental challenges (El Sawy & Pavlou, 2008; Bush et al., 2010). Moreover, Sambamurthy et al. (2003) argue that IT infrastructure flexibility has a positive relationship with organizational agility, or agility in general (Sharifi & Zhang, 2000; Tiwana & Konsynski, 2010). Therefore, we postulate the following hypothesis.

H1: IT Infrastructure flexibility significantly affects organizational agility.

Direct and Indirect Effect of Business Intelligence Use

Business intelligence is a broader term that encapsulates the processes, technologies, and applications to collect, store, and access the data to provide better decision-making (Wixom & Watson, 2010). Business intelligence also refers to the procedures and systems, which can help managers make better decisions by transforming the raw data into useful information (Watson, 2009). BI is an information system comprising of three elements, i.e., (i) technology, (ii) human competencies, and (iii) knowledge for increasing business values. BI systems depend on IT infrastructure, including hardware and shared services like network services, database services, and security services (Laursen & Thorlund, 2010).

Although the literature supports BI's issues with the new technology, Jourdan et al. (2018) suggest that empirical studies on this association are not available. Prior studies focused on the emergence of IT fashions, but they did not explore the organizational consequences of using IT (Wang, 2010). Based on systems theory, organizations are considered systems, and organizational agility can accept these organizations' creative

challenges. Previous studies have examined the association between intelligence and organizational agility in the information system domain (Mithas et al., 2011). Organizational agility depends on three factors, i.e., partner agility, customer agility, and operation agility (Sambamurthy et al., 2003; Chen & Siau, 2012). Studies have also examined the direct and indirect effects of BI utilization in the context of business performance (Lönnqvist & Pirttimäki 2009). Moreover, a recent study on organizational agility found that business intelligence significantly affects organizational agility (Cheng et al., 2020).

Therefore, we believe that business intelligence use can help organizations to enhance their agility. Thus, we postulate the following hypotheses:

H2: Infrastructure flexibility promotes business intelligence use.

H3: Business intelligence use promote organizational agility.

H4: There is a mediating effect of business intelligence use between IT infrastructure flexibility and organizational agility.

Direct and Indirect Effects of ERP Assimilation

Assimilation refers to the degree to which technology adaptation can diffuse across the organizational work processes. Enterprise resource planning software is an important tool used in medium and large-scale organizations. This software supports large-scale data storage and transaction processing to automate organizational processes,. In this study, ERP assimilation refers to the best practices that the organization has adapted by using the ERP software. Organizations usually developed/outsourced ERP software to get better analytics, data processing, automation, and real-time reports to improve decision-making processes. ERP assimilation enhances the organizational ability to meet competitive challenges through innovative and automated processes (Appelbaum, Kogan, Vasarhelyi & Yan, 2017).

Past studies have used ERP with dimensions, including knowledge-based, resource-based, capabilities-based, and risk-based (Hwang & Min, 2013; Eisenhardt & Martin, 2000; Spender, 1996). Due to the limited literature support, it is still a preliminary stage to claim that ERP assimilation will positively or negatively affect organizational agility. However, many past studies have documented the association between ERP and organizational agility. Many researchers argue that ERP assimilation and organizational agility have an association with the organizational process (Armstrong & Sambamurthy, 1999).

Innovation assimilation across the organization, automates, and regularizes business processes (Purvis et al., 2001). ERP systems regularizes the business processes and increases the complexity affecting organizational agility (Rettig, 2007). ERP has been discussed as the mediating variable in previous research, specifically with suppliers' performance (Hwang & Min, 2013). Moreover, ERP systems' mediating role has also been discussed as IT-enabled capabilities. Thus, this study postulates the following hypothesis:

H5: IT infrastructure flexibility stimulates ERP assimilation.

H6: ERP assimilation promotes organizational agility.

H7: There is a mediating effect of ERP assimilation between IT infrastructure flexibility and organizational agility.

Methodology

This study has used the quantitative research design to provide empirical evidence related to BI and other related factors affecting organizational agility. Primary data was collected using the survey method (Yin, 1993) through questionnaires distributed among managers/executives working in Pakistani organizations' decision-making process. The sample is a subset of the population that represents the characteristics of the selected population. Different researchers have different views on the minimum sample size. Sekaran (2006) suggests using 30 respondents for each variable for calculating the minimum sample size. Hair-Jr., Black, Babin, & Anderson (2010) suggest that a sample size of 253 is enough for multivariate analysis. Based on these opinions, we had distributed 265 questionnaires and received 253 complete questionnaires. Convenience sampling is a technique that helps researchers to collect data from relevant respondents quickly. Convenient sampling is a non-probability sampling technique often used to save time and expenditure in collecting data (Sekaran, 2006; Kline, 2011). The study has used the Partial Least Square Structural Equation Modeling by using Smart PLS 3.0. Since the study measures second-order constructs, we believe that PLS-SEM is appropriate (Hair, Ringle & Sarstedt, 2011).

Instrument

Business-intelligence-use has 13 items taken from Chen & Siau (2012). IT infrastructure flexibility 14-items scale was adapted from Chen & Siau (2012), ERP Assimilation 9-items scale was taken from Kharabe & Lyytinen (2012). The organizational agility 8-items scale was adopted from Chen & Siau (2012). We measured the respondents' opinions on a scale of 1 to 7. One being "strongly disagree," and

seven beings "strongly agree." All instruments adopted had established reliabilities in previous studies, i.e., Cronbach's Alpha was greater than 0.7. However, the constructs' reliabilities were re-established to ensure internal consistency, as the demographics characteristics in Pakistan are different from the Western countries.

Results

Respondents' Profile

We distributed 265 questionnaires to organizations' managers and executives because they are the key decision-makers. After discarding the incomplete questionnaires, we retained 253 cases. The respondents' profile are as follows. In terms of gender, we found that 53% of the respondents were males, and 47% were females. The respondents' marital status shows 48% were single, and the rest were married. The age segmentation shows that 45% of the respondents belong to the age group of 20 to 30 years, 20% respondents were in the age group of 31 to 40 years, 20% respondents were in the age group of 41-50 years, and the remaining 15% were more than 50 years old.

Descriptive Statistics, Reliability & Convergent Validity

The study has used descriptive statistics for measuring means, standard deviation, Skewness, and Kurtosis. It is also inclusive of measuring composite reliability and AVE. Descriptive analysis is a prerequisite for multiple regression analysis (Saunders et al., 2009). Table 1 illustrates the result of descriptive analysis for the constructs used in the study.

Table 1: Descriptive Statistics & Reliability of the Constructs

Construct	M	SD	SK	KT	CA	CR	AVE
Business Intelligence use	4.54	1.58	-0.66	-0.05	0.97	0.97	0.73
IT Infrastructure flexibility	4.61	1.17	1.11	1.64	0.91	0.92	0.80
Organizational Agility	4.52	1.38	-0.56	0.42	0.90	0.92	0.52
ERP Assimilation	4.70	1.23	-0.53	-0.42	0.79	0.84	0.72

Note: M=Mean, SD=Standard Deviation, SK=Skewness, KT=Kurtosis, CA=Cronbach's Alpha, and CR= Composite Reliability.

The results of the descriptive analysis show that business intelligence use (Mean = 4.54, SD=1.58) has the lowest value of skewness (SK = -0.66), and IT infrastructure flexibility (Mean = 4.61, SD=1.17) has the highest value of skewness (SK= 1.11). The lowest value of kurtosis (KT=-0.05) is for business intelligence use (Mean = 4.54, SD=1.58), and the highest value of kurtosis (KT = 1.64) is for IT infrastructure flexibility

(Mean = 4.61, SD=1.17). Since all the Skewness and Kurtosis values are within the range of ±3.5, the data fulfills the requirement of univariate normality. The study has checked the internal consistency based on Cronbach Alpha and Composite Reliability tests. All the Cronbach's Alpha values are greater than 0.7, confirming the construct's reliability (Sekaran, 2006). The results show that AVE values are greater than 0.40, and composite reliability values are greater than 0.70, meeting the convergent validity requirements (Hsieh & Hiang, 2004; Shammout, 2007).

Exploratory Factor Analysis

The study has used Exploratory Factor Analysis (EFA) to find the relationship between the latent variables and constructs. We have also used it to validate the items in a construct. In EFA, we dropped the items from the constructs with a factor loading of less than 0.4 (Hair Jr., Black, Babin & Anderson, 2010). The results suggest that Kaiser-Meyer-Olkin (KMO) for all the constructs are greater than 0.6. We also found that Bartlett's test was significant (Sekaran, 2006). Based on EFA, we dropped four items from ERP assimilation. Table 2 contains the summarized results.

Table 2: EFA Statistics

Construct	OA	KMO	BT	AVE	IR	BI	ITIF	ERPA	OA
Business Intelligence use	13	0.88	842.53	0.73	13	0.85			
IT Infrastructure flexibility	14	0.77	567.16	0.80	14	0.64	0.90		
ERP Assimilation	9	0.69	85.27	0.52	5	0.44	0.79	0.73	
Organizational Agility	8	0.81	277.89	0.72	8	0.80	0.87	0.81	0.66

Note: OA = Original Items, KMO = Kaiser-Meyer-Olkin Measure of Sampling Adequacy, BT = Bartlett's Test of Sphericity, TVE= Total Variance Explained, IR = Items Retained

Correlation Analysis and Discriminant Validity

Table 2 shows that the correlation of IT infrastructure flexibility with organizational agility is the strongest (R=0.87), and the weakest is for business intelligence use and organizational agility (R=0.44). Table 2 also shows the results related to discriminant validity. The results show that the square root of variance explained is greater than the Pearson correlation values, confirming that the constructs are unique and distinct (Fornell & Larcker, 1981).

Validation of Second Order Constructs

In the developed model, organizational agility and IT infrastructure were second-order constructs. Smart PLS was used to validate these second-order constructs by executing the consistent PLS algorithm, a covariance-based SEM approach. We used

a repeated indicator approach to ascertain that the items' outer loading is 0.5 and the t-statistics values are significant (Duarte & Amaro, 2018; Garson, 2016; Hair et al., 2011). After meeting the required condition, we tested the structural model (Cronbach & Meehl, 1995).

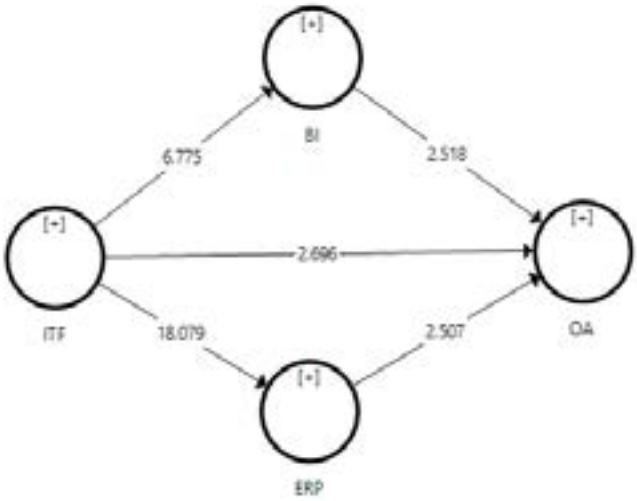

Figure 2: Structural Model

PLS-SEM Results

Tested the structural model using Smart PLS. Latent variables business intelligence use (BI), IT Infrastructure flexibility, ERP assimilation, and organizational agility were used in the model to test the hypotheses. We checked the model's significance and the mediating effect of the variables, using the Bootstrapping test with 2000 subsamples. Table 3 depicts a summary of the results.

Table 3: PLS-SEM Results

	B	T	Sig
Direct Effects			
H1: IT Infrastructure Flexibility ⟶ Organizational Agility	0.47	2.65	0.01
H2a: IT Infrastructure Flexibility ⟶ Business Intelligence Use	0.66	7.11	0.00
H2b: Business Intelligence Use ⟶ Organizational Agility	0.45	2.49	0.01
H3a: IT Infrastructure Flexibility ⟶ ERP Assimilation	0.86	19.15	0.00
H3b: ERP Assimilation ⟶ Organizational Agility	0.69	2.49	0.01
Indirect Effects			
H2: IT Infrastructure Flexibility ⟶ Business Intelligence Use ⟶ Organizational Agility	0.29	2.28	0.02
H3: IT Infrastructure Flexibility ⟶ ERP Assimilation ⟶ Organizational Agility	0.59	2.37	0.02

The results indicate that all three variables, i.e., business intelligence use (β=0.45,p<.05), IT infrastructure flexibility (β=0.47,p<.05), and ERP assimilation (β=0.69,p<.05), significantly affect organizational agility. Moreover, it is also evident from the results that Business intelligence use (β=0.29,p<.05) and ERP assimilation (β=0.59, p<.05) play a significant mediating role between IT infrastructure flexibility and organizational agility.

Discussion and Conclusion

The developed model has seven hypotheses, and our results support all the hypotheses. The results are also consistent with earlier studies. We have discussed all seven hypotheses and their relevance with earlier studies in the following sections.

The first hypothesis assesses the effect of IT infrastructure flexibility on organizational agility. Our results support this hypothesis, and it is consistent with the previous literature. Extant literature has discussed IT infrastructure flexibility ignoring its impact on organizational agility (Sambamurthy et al., 2003; Tiwana & Konsynski, 2010). This study fills this gap in the literature.

The results indicate that an organization's success and its agility depend on IT infrastructure flexibility. The cost of IT infrastructure flexibility is comparatively higher, so organizations are reluctant to invest in this sector. However, this investment has long-term benefits. When an organization can step ahead for ERP or BI, these factors will play a key role in meeting its requirement (Kumar & Hillegersberg, 2000). The flexibility of IT infrastructure will help the organization provide the latest IT equipment/software/algorithms.

An organization can buy IT infrastructure, but it cannot buy IT culture. Organizations cultivate such a culture for streamlining the work processes and enhancing business values. IT infrastructure flexibility is not restricted to office equipment only. It helps the organization to maintain compatibility, modularity, connectivity and improves human resource skills. The IT personnel are the assets of an organization, as they are the ones who manage the IT infrastructure.

The study found that business intelligence mediates IT infrastructure flexibility and organizational agility. Our results also suggest that infrastructure flexibility promotes business intelligence use, and business intelligence use stimulates organizational agility. A substantial literature on business intelligence in various research areas is available (Arnott et al., 2017; Khurana & Goje, 2016; Pankaj et al., 2006). However, limited empirical evidence is available on BI use with organizational agility (Fink, Yogev & Even, 2017). This study contributes to the body of knowledge by providing empirical evidence on the

association of BI and organizational agility. Business intelligence is a critical component in any organization. Technically sound people should handle it. Otherwise, it may affect the organization's overall work processes.

Our result suggests that ERP assimilation mediates IT infrastructure flexibility and organizational agility. We also found that IT infrastructure affects ERP assimilation, and ERP assimilation stimulates organizational agility. Thus, organizations using an ERP software should focus on technology innovation to face the competitive challenges with the best practices. However, ERP assimilation is not an easy process due to the huge cost incurred in ERP development and installation. These issues are challenging for the management. For instance, organizations may face resistance from the employees to adapt to new technology. Simultaneously, they may require complete training for operating this kind of software, which is time-consuming and costly. Therefore, firms should focus on change management and directing resources on acquiring the technology. Organizations also need strong IT infrastructure flexibility to support ERP assimilation that positively affects organizational agility.

Conclusion

This research is one of the few empirical studies that has examined the association between BI use, IT infrastructure flexibility, and ERP assimilation and organizational agility. The study found that investment in IT infrastructure, ERP assimilation, and business intelligence is beneficial for a firm and its sustainability. BI is a new trend, and many organizations are adopting it without having prior evidence about its effect on organizational agility. This study fills this gap by providing empirical evidence on BI's association, IT infrastructure flexibility, and ERP assimilation. These factors will improve an organization's operational business processes and help managers in making timely decisions. Organizations spend time, money, and other resources to adopt the BI-process. Sometimes the entire organizational structure is changed in this process. Adopting the BI process will not immediately benefit the organization as it usually takes time. BI is becoming popular in the industry, but still considered an emerging technology. It is unlikely to be extensively adopted until the academic literature provides sufficient evidence of its benefits (Lahrmann et al., 2011).

Implications for Managers and Policymakers

This study validates the relationship between all the three constructs and guides managers to focus on the latest trends of using business intelligence and spending on IT infrastructure. The IT infrastructure flexibility has a significant positive effect on organizational agility. IT infrastructure flexibility is a costly process for maintaining compatibility, modularity, and connectivity. Small scale or even medium scale

organizations should be more focused and careful while investing in IT infrastructure flexibility, although the result shows that it positively affects organizational agility. Similarly, the result shows that business intelligence plays a significant mediating role between IT infrastructure flexibility and organizational agility. Managers should focus on BI to improve their decision-making efficiency (Fink, Yogev & Even, 2017).

All three components of BI, i.e., technology, human competence, and knowledge, should be considered while adopting BI. Adopting BI may not be a feasible option for all firms. Small-scale organizations at a start-up stage may not need the BI process. ERP systems and BI processes need the support of IT infrastructure flexibility. ERP is large-scale software, which requires huge costs, time, and resources. Usually, large-scale organizations use the ERP software with business intelligence. The result shows that ERP assimilation positively affects organizational agility. Therefore, managers should adopt ERP to improve efficiency, cost, and decision-making. Adopting ERP saves variable costs and is beneficial for the organization.

Limitations and Future Research

For this study, we have collected cross-sectional data. However, future studies may adopt a longitudinal research approach. Another limitation of this study is that all the respondents gave their opinions on the dependent and independent variables, due to which the results may suffer from common method bias. Although we followed all the protocols to avoid common method bias, future studies may collect data from different respondents. The model we have developed and tested is generic. Future studies may test this model in different domains to increase its generalizability in other contexts.

Annexure-1

Constructs and Items used in the questionnaire

Business Intelligence
My organization uses business intelligence systems to extract values of key performance indicators (KPI).
My organization uses business intelligence systems to get operational reporting.
My organization uses business intelligence systems to get tactical reporting.
My organization uses business intelligence systems to get strategic reporting.
My organization uses features of business intelligence systems to compare and contrast different aspects of the data.
My organization uses features of business intelligence systems to test different assumptions against data.
My organization uses features of business intelligence systems to derive insightful conclusions from data.
My organization uses features of business intelligence systems to get regular, standardized reports on key performance indicators.
My organization uses features of business intelligence systems to drill down into data to understand the root causes of exceptions.
My organization uses features of business intelligence systems for on-the-fly analysis of current and past data.
My organization uses features of business intelligence systems for querying
My organization uses features of business intelligence systems for statistical analysis.
My organization uses features of business intelligence systems to share insights based on data within the organization.
IT Infrastructure Flexibility
Connectivity
My organization has a high degree of information systems inter-connectivity.
Information systems in my organization are sufficiently flexible to incorporate electronic connections to external parties
Remote users can seamlessly access centralized data in our information systems. Data is captured and made available to everyone in my organization in real time using information systems.
Hardware Compatibility
Software applications can be easily transported and used across multiple information systems platforms in my organization.
Our information systems user interfaces provide transparent access to all platforms and applications.
My organization offers multiple information systems interfaces or entry points (e.g., web access) to external users.
My organization makes extensive use of information systems middleware (systems that help connect heterogeneous information systems platforms) to integrate key enterprise applications.
Modularity
Our information technology components are highly interoperable in my organization.

The inter-dependencies of software/hardware components are well-understood in my organization.
Software/hardware components are loosely coupled in my organization.
Information technology standards are well established at the enterprise-wide level in my organization.
Information technology polices are well established and implemented at the enterprise-wide level in my organization.
Information technology architecture is well established at the enterprise-wide level in my organization.
Compliance guidelines for information technology applications are well established at the enterprise-wide level in my organization.
Compliance guidelines for information technology infrastructure are well established at the enterprise-wide level in my organization.
Functionality can be quickly added to critical applications based on end-user requests.
My organization can easily handle variations in data formats and standards.
Organizational Agility
Customer Agility
My organization can easily and quickly respond to changes in aggregate consumer demand.
My organization can easily and quickly customize a product or service to suit an individual customer.
My organization can easily and quickly react to new products or services launched by competitors.
Operation Agility
My organization can easily and quickly introduce new pricing schedules in response to changes in competitors' prices.
My organization can easily and quickly expand into new markets.
My organization can easily and quickly change (i.e., expand or reduce) the variety of products/services available for sale.
Partner Agility
My organization can easily and quickly adopt new technologies to produce better, faster and cheaper products and services.
My organization can easily and quickly switch suppliers to take advantage of lower costs, better quality or improved delivery times.
ERP Assimilation
We expect the ERP system will provide future opportunities for improving the way we do business.
We see the ERP system as providing additional opportunities for improving the unit's effectiveness.
We see the ERP system not just as a replacement for our old systems but also as a new platform that can provide valuable new capabilities.
We actively look for new ways of using the ERP system to improve our effectiveness.
We encourage our people to further explore and learn the ERP system so that new ways of utilizing it can be found.
We devote resources to exploring the ERP system to find new ways to leverage its power.
We continue to find new ways of taking advantage of the ERP system to improve the way we do business.
We are still discovering new ways of using the ERP system to get business benefits.
The ERP continues to gives us new opportunities to improve our effectiveness.

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