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EXAMINING THE ROLE OF BUSINESS ANALYTICS CAPABILITY IN FIRMS' AGILITY & PERFORMANCE: EVIDENCE FROM MANUFACTURING SECTOR

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ABSTRACT

The purpose of study is to analyze empirically effect of Business Analytics Capability (BAC) on agility and performance of firms by focusing on role of Information Quality (IQ) and Innovative Capability (IC). The research was conducted using a quantitative research design focusing on workers in manufacturing sector in Pakistan. The data attained from a sample of 350 managerial-level workers in Lahore by means of structured questionnaire survey supports the significant positive relationship between BAC & both FA and FPP. The study reveals the strong and positive relationship between IQ & firms' adaptability, productivity and significant and positive impact of innovative capability on organizations' agility and efficiency. The study emphasizes complexity of factors critical for organizational success within organizational context. The significance of results extends beyond reach of study, providing relevant insights into academic and professional contexts. The existing theoretical frameworks can be strengthened by adding these aforementioned antecedents and managers should exploit this opportunity in order to improve organizational agility and performance in the dynamic manufacturing environment.

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INTRODUCTION

In the rapidly changing commercial world of today, companies have to be flexible to quick progress in technology, fluctuations in market prices and customer preferences. This ability to respond and adjust quickly is called 'agility (Khalil, Aziz, Ariffin & Ngah, 2023). Agility is thus an essential trait in exploiting business analysis: output level of organizational agility and performance. Turning data into value-added information, and creating effective decision-making is called business analytics

capabilities (Ravasan, 2023). With BAC as a necessity for enterprises, it becomes necessary to use data to understand impact on business from their financial seating actives (Alaskar, 2023). As data-driven strategies become a must for businesses, it is important to understand the impact of BAC on FA and FP - key components in competitiveness (Arias, Henao & Zapata, 2023). This study concerns the complex connection between BAC and its consequences for an organization's capabilities, thus, homing in on the crucial roles of information quality (IQ) and creative capacity (IC) as two critical antecedents combining to determine the agility performance. This agility, coupled with enhanced performance over data-driven insights, positions firms to thrive in dynamic & competitive business environments. Data-based decision-making relies on aspects of information quality like accuracy, relevance, and timeliness.

The information quality is foundational to effective analysis and strategic planning within context of business analytics (Garmaki, Gharib & Boughzala, 2023). This study investigates the influence of information quality on two related constructs, firms' agility and firms' Performance. An emphasis on information quality as a construct arises because a fundamental condition for any data analytics project success is that information is correct, accurate and trust worthy, for example, free from data provenance issues, the data quality issues, schema matching issues and instance identification issues (Ashrafi, Ravasan, Trkman & Afshari, 2019). Business analytics capability plays the crucial role in enhancing firms' agility and performance by providing valuable insights, aiding decision-making processes, and enabling proactive responses to changing market conditions. Understanding how the interplay between the information quality & business analytics capability can illuminate the path toward improved data utilization for agile & high-performing organizations (Troise, Jones, Candelo & Sorrentino, 2023). Consequently, innovative capability is the ability of organization to generate and more importantly implement new innovations, namely, new ideas, products, or processes. The innovation is key to sustained competitive advantage in the digital age (Ashrafi, Ravasan, Trkman & Afshari, 2019).

In this study, we explore the interplay of innovative capability, agility, and firm performance. The present research seeks to develop effective understanding into the synergy between innovation and analytical capabilities by isolating how firms with the strong innovative capabilities use business analytics to enhance both their agility and their firm performance. Functioning in corporate context where data drives decision making is paramount to staying ahead of the competition. The analysis of BAC is critical in making the strategic decision (Khalil, Aziz, Ariffin & Ngah, 2023). Furthermore, innovation has been linked to increased efficiency in operations and healthier overall outcomes for the organization (Tripathi & Kalia, 2022). Thus, the main objective of this study is to explore how research gap can be closed for the complex links between BAC and information quality, innovative capability, firms' agility and firms' performance. Although, the businesses' analytics is increasingly gaining momentum but still there is the shortage of any kind of the works which evaluate all these variables at a time in the context of manufacturing companies in Pakistan. This study aims to fill this gaping hole by providing the picture with the varying degrees of the combined pressure of business agility, informational quality and innovative capability on the agility and required performance of manufacturing companies.

LITERATURE REVIEW

Several researches have indicated that business analytics capabilities are a key factor in improving organizational performance and agility. Business analytics is the utilization of data analysis tools & techniques to aid in decision making in organizations (Khan et al., 2022; Li et al., 2022). A previous study asserted that companies with greater BAA capabilities are better at finding critical patterns in large data sets; hence, they can make critical decisions (Alaskar, 2023). This improved decision-making ability is closely linked with improved business agility and performance (Daradkeh, 2023; Wamba, 2022). Hence, H1 derives support from existing studies demonstrating the importance of BAA on both agility and performance. The information quality within an organization significantly influences outcome. The key aspects of useful data involve precision, applicable relevance to needs, complete comprehensiveness, and well-timed availability for requirements, as reliably established by previous research (Khan et al., 2022). Studies also clearly show that companies obtaining exact and timely intelligence that exhibit higher levels of proficiency in the decision-making that leads to enhanced the results (Wamba, 2022). As such, it is widely recognized that top-notch information quality empowers an organization with the required agility necessary to promptly and fittingly adapt to continuous changes in the customer demands and market development (Ong & Tan, 2022; Zhang & Li, 2022).

Consequently, this lends support to the correlation between information quality and both agility and performance levels within a company, reaffirming our second hypothesis. Innovative capability holds immense potential for organizations, as it cultivates an environment that empowers new ideas and technological progress. A wealth of research corroborates the notion that innovation enhances performance (Idrees et al., 2022). When cultivating the innovation serves as priority, organizations become more adaptive and reactive. Thus, they can accurately predict changes in the market and respond swiftly, securing a competitive edge. Additionally, innovation has been linked to increased efficiency in operations and healthier overall outcomes for organization (Tripathi & Kalia, 2022). Hence, prior studies validate hypothesis three by demonstrating the positive relationship linking innovative capability to organizational agility and success (Kiranantawat & Ahmad, 2023). In this connection, the organizations that cherish creativity in all its forms set themselves up to navigate the challenges with visionary solutions, constantly evolving to stay ahead towards the competition (Ganguly et al., 2022). Thus, the literature study presents the narrative in which business analytics capacity (BAC), information quality, and inventive capability play a crucial role in the agility and performance of businesses.

The interplay of these variables creates an environment in which the processes of decision-making, adaption to market changes and overall level of operation are significantly impacted (AlTaweel & Hawary, 2021). Business analytics capability is posited as being paramount. It allows organizations to derive insights from their data that are sensitive, make informed decisions & position themselves in a strategic sense relative to the competitive space (Seddon et al., 2017). It is reported universally as holding true that firms with the sophisticated BAC tend to be more agile and hence able to react quickly to changing market conditions as they appear and as a consequence are able to capture opportunities as they emerge (Tallon & Pinsonneault, 2011). This empirical research, encased in the domain of manufacturing firms in Pakistan, intends to trace the convoluted nexus between business

analytics ability, information quality, and innovative capability (Allwein, 2017). The research aims to closely dissect the undercurrents of the interrelationships among the triad. This consequently sets forth very specific insights that can help us to improve overall pool of knowledge. The study strives to encapsulate these constructs as whole, trying to furnish a complete panorama of manner in which BAA, information quality, and innovative capability together configure organizational outcomes. This expands academic frontiers & offers meaningful intervention points for professionals in domain to optimally streamline their business processes and strategies in what is very tumultuous Pakistani manufacturing sector.

RESEARCH METHODOLOGY

The research approach adopted for this study was positivism, emphasizing on objective & empirical investigation of the linkages between business analytics capabilities, organizational agility, as well as performance outcomes. Similar research approach was used by (Matila & Shahzad, 2022; Sabir et al., 2023). Thus, a quantitative research design was selected as it will enable us to systematically collect and analyze numerical data providing a structured approach to measuring the variables of interest (Hussain et al., 2022; Shafique et al., 2023). The choice of the research population and the sample were determined by the focus upon the role of business analytics capabilities in SMEs within the manufacturing sector at a regional level, namely Lahore. Studying manufacturing employees in SMEs was deemed appropriate as this sector has a critical role to play in many economies. The focus on the textile and cement industries in the Lahore region was due to the importance of these sectors in the local economy which enabled the conclusions that have relevance to the specific industrial setting considered.

The sample size of 350 was chosen to match the statistical significance with practical feasibility so that the robust analysis could be carried out while the sampling was done stratifying industries. This method broadens applicability of results to SMEs in the general manufacturing context and adds practical implications for regional dynamics of emerging countries business setting. Data collection process was based on well-designed questionnaire which was used to extract necessary information from the participants. Questionnaires were adapted from credible literature sources (Ashrafi et al., 2019). In this linking, this allowed the research for systematic data collection on business analytics capabilities, organizational agility and performance measurements. The collected information was finally analyzed through the advanced Partial Least Squares Structural Equation Modeling (PLS-SEM), the statistical method & procedure used to explore the complex relationships within proposed research framework.

RESULTS OF STUDY

Tabel 1 Reliability Analysis

	CA	RHO_A	CR	AVE
BAC	.833	.829	.825	.523
FA	.808	.816	.893	.526
FP	.829	.824	.828	.645
IQ	.881	.874	.888	.608
IC	.828	.837	.855	.655

Reliability and validity indicator scores of study constructs are presented in Table 2. The Cronbach's alpha values, to assess internal consistency level of measurement items, are between .808 and .881 indicating that constructs have reliability levels well within acceptable limits. The RHO_A values following the Cronbach's alpha scores as another reliability measure support the reliability of the measurement tools. The composite reliability scores, which refer to degree to which the indicators of latent variable account for variance in their constructs vary from .825 to .893 indicating satisfactory level of reliability. AVE values, which represent the amount of variance shared between the items and respective constructs, are amid .523 and .655 surpassing threshold of .50, thus, indicate good convergent validity.

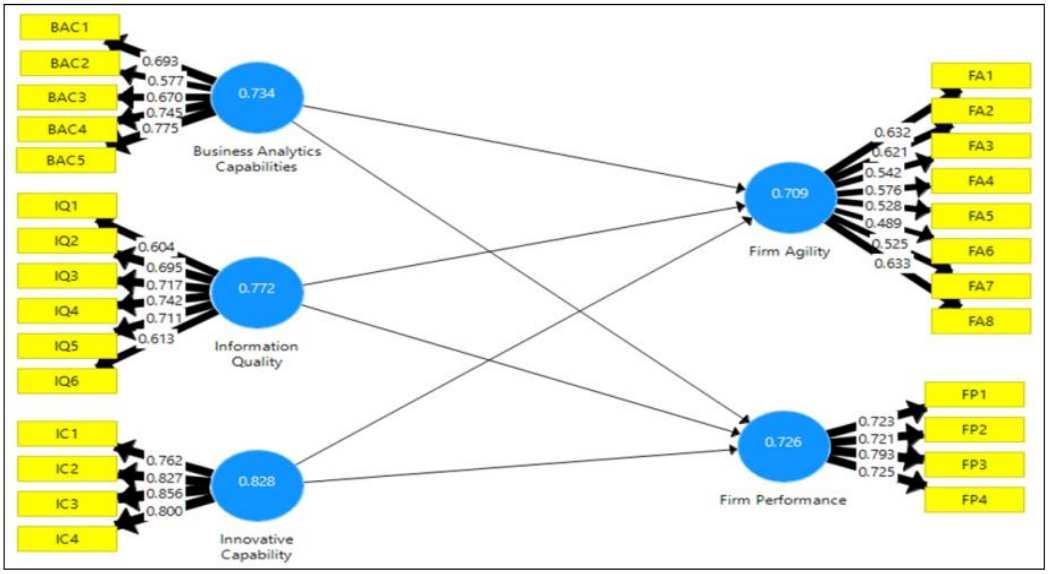
Tabel 2 Factor Analysis

	BAC	FA	FP	IQ	IC
BA1	.6928				
BAC2	.5767				
BAC3	.6703				
BAC4	.7448				
BAC5	.7746				
FA1		.6319			
FA2		.6215			
FA3		.5419			
FA4		.5758			
FA5		.5283			
FA6		.4892			
FA7		.5248			
FA8		.6326			
FP1			.7229		
FP2			.7211		
FP3			.7934		
FP4			.7254		
IC1					.7625
IC2					.8268
IC3					.8564
IC4					.7998
IQ1				.6043	
IQ2				.6946	
IQ3				.7172	
IQ4				.7417	
IQ5				.7113	
IQ6				.6134	

The factor analysis table presented here shows the relationships and correlations among the key variables in study, each represented by factor loadings. For loadings higher than threshold of 0.5, it is considered significant in determining the strength and direction of associations. Notably, Business Analytics Capabilities (BAC1 to BAC5) show relatively high factor loadings, ranging from 0.5767 to 0.7746, indicating a strong positive correlation with the underlying factors. This is also the case for firm agility (FA1 to FA8), which presents remarkable loadings and thus strengthens the linkage with a broader construct. The factor loadings for Firm Performance (FP1 to FP4) also exceed the threshold;

this indicates strong associations between this factor and measured variables. Innovative capability (IC1 to IC4) has significant factor loadings, which asserts its strong influence in this study. On other hand, information quality (IQ1 to IQ6) has moderate to high factor loadings, which suggests that it is important in study.

Figure 1 Reliability Analysis



Tabel 3 Hypothesis Testing

	OS	SM	SD	TS	PV
BAC -> FA	0.2599	0.2656	0.037	7.0145	0.000
BAC -> FP	0.2836	0.2827	0.0517	5.4865	0.000
IQ -> FI	0.3083	0.3095	0.0482	6.396	0.000
IQ -> FP	0.1294	0.1305	0.0454	2.8528	0.0044
IC -> FI	-0.0868	-0.0893	0.0418	2.0754	0.0382
IC -> FP	0.1593	0.1595	0.0422	3.7699	0.0002

A positive T-statistic and low P-values across multiple relationship show the statistical significance meaning it is improbable that the observed relationships occurred by chance. More specifically, the association between BAC & FA is statistically significant at 7.0145 T with P value of 0.000, which reveals a strong positive relationship. Similarly, correlation between BAC and FP shows a T statistic of 5.4865 with a P value of 0.000, that is, a highly significant positive correlation. The link between IQ and FI (Firm Agility) presents a T statistic of 6.396 with a P value of 0.000, showing a significant positive association. Besides, T statistic of 2.8528 and P value of 0.0044 for association between IQ and FP imply statistically significant positive relationship, though with a slightly lower magnitude compared to other associations. On contrary, IC and FI show a negative T statistic of -2.0754 with a P value of 0.0382, which suggests a statistically significant negative correlation. The relationship between IC and FP has a T statistic of 3.7699 and a P value of 0.0002, which indicates a significant positive correlation.

DISCUSSION

This study contributes greatly to the understanding of complex interrelationships among Business Analytics Ability (BAA), Information Quality (IQ), Innovative Capability (IC), Firm Agility (FA), and Firm Performance (FP) in context of manufacturing firms in Pakistan. Positive and statistically significant link between BAA and both FA and FP corroborate argument that businesses competent in advanced analytics are not only dynamic in responding to market forces but also show improved overall performance. Additionally, research shows the strategic relevance of data-based decision-making to organizational agility and competitiveness. As shown in previous research (Ganguly et al., 2022; Hussain et al., 2022; Idrees et al., 2022; Khalil et al., 2023), our study reaffirms the critical role of information quality, positively influences firm agility & positively affects firm performance. Firms with better information are able to make better decisions as compared to those with the worse information as decisions are based on information that they have, enabling them to be more agile in changing course.

Better information quality, as well, enhances the overall firm performance, in line with literature that quality information, which is correct and timely, promotes the efficient organizational decision making (Alaskar, 2023; Allwein, 2017; AlTaweel & Al-Hawary, 2021)." Remarkably, the negative relationship between innovative capability and firm agility implies more sophisticated association that deserves further enquiry. Even though earlier findings recognized that innovation has positive effect on the organizational agility (Tripathi & Kalia, 2022; Troise et al., 2023; Wamba, 2022), the negative correlation here might indicate possible trade-offs or challenges in seamlessly integrating innovation into agile processes within specific context of Pakistan manufacturing firms. This finding offers interesting direction for future research to explore deeper determinants of relationship amid innovative capability & firm agility. Thus, this study, not only corroborates the existing theoretical underpinnings but also presents a novel dimension by expounding the hidden connections between the key variables.

CONCLUSION

The study yields helpful practical suggestions and actionable recommendations in the areas of operational efficiency and strategic decision-making as they pertain to Pakistani manufacturing industry. Significant inferences can be made for these businesses in terms of how they deal with information quality, business analytics, and innovative capacity. The study highlights the crucial part of business analytics capabilities in creating organizational agility & enhancing performance as data-driven culture is to be developed along with the adoption of modern analytics technologies for Pakistani manufacturing companies to overcome from fast-changing business environment. To this conclusion, these firms should integrate analytics into strategic decision-making processes, thus demonstrated by positive links amid business analytics capabilities & firm performance. Through building up crucial resilient analytics systems, Pakistani manufacturing companies can increase productivity, take informed decisions and raise their performance, keeping in par with the current digital transformations.

The study is primarily concerned with relationships between firm agility, performance, information quality, and innovative capability which is particularly relevant to the Pakistani industrial context highlighting the need for accurate information, quality control methods, and an innovative culture

for sustained success and agility in response to market changes. Theoretically speaking, the study contributes significantly to understanding of the role of organizational dynamics, specifically firm agility, and business analytics capabilities in Pakistani context. The study, over SEM, concludes that organizational agility and analytics skills are strongly positively correlated, adding to the growing body of data on transformative effect of data-driven plans on organization flexibility. Moreover, the research extends current theoretical discourse on link amid firm performance & business analytics capabilities, further validating the fact that sophisticated analytics positively contributes to overall organizational efficiency.

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