Journal of Business Strategies, Vol.14, No.1, 2020, pp 63–98 *DOI:10.29270/JBS.14.1(20).04*

BUSINESS INTELLIGENCE AND FIRM PERFORMANCE: ASSESSING VALUE AND FUTURE DIRECTIONS IN PAKISTANI FIRMS

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ABSTRACT

The purpose of study is to examine how Business Intelligence (BI) enhances the firm's performance in Pakistani firms. Pakistan is a growing country and BI is supposed to be in its initial stages in Pakistan while the data about BI implementation and use in Pakistani firms are also not many available, especially in statistical patterns. Model and questionnaire were adopted from Peters et al. (2016). BI system quality is based on BI infrastructure, functionality and self-service, that aids in getting a more serious competitive advantage and increasing firm performance by enhancing performance measurement capabilities. Data is collected from 300 employees of varied firms in Karachi, where business intelligence is being implemented. Outcomes were analyzed through SEM-PLS. Results suggested that BI system quality enhances the performance measurement capabilities, that raises the competitive advantage and optimizing the firm carrying out.

Keywords: *BI Quality, Performance Measurement, Competitive Advantage, Firms Performance.*

INTRODUCTION

Background of the Study

It has now-adays become the need for every organization to enforce Business Intelligence tools in their firms globally. At present, only those firms can live and enhance or keep up their offices which makes more use of technology in the right way. In Pakistan now the contest is also getting on using BI tools and houses are shifting towards it.

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BI is the processed pattern of data analytics that is used to arrive at a decision for any concern. Essentially, it is towards the decision making of executive staff, higher management executives in any society. But in Pakistan, currently, we don't have BI implemented in many of the organizations because it is evidently a new venture for many Pakistani firms, but still, companies are implementing it and employing the tools like Power BI, SAP, click sense, and they are doing wonders by implementing BI in their respective clientele.

The process to implement business intelligence for any system is broad. All forms of data are actually residing on multiple information sources for example Share point, SAP, Oracle, SQL Server, and so on so, very first step all the data is actually integrated by shipping it into a centralized hub of data which is known as a data warehouse. After creating this data warehouse where all the sources will integrate and actually shipping this information, dashboards or reports are constructed for the executive management on the groundwork of the whole data of the system. Thus, these dashboards are actually the live reporting of the data which is actually representing an obvious procedure. For example, Toyota Motors was facing the issue that when their supply chain or their line of production get disturbed, there was no visibility where the problem is actually residing so, they created a dashboard on which the executive management can see that how the production line is going on and in case of any problem at any point, for instance, if the problem is in supply chain or the warehouse or bar code or assembly line the dashboard can reflect the immediate condition or exact condition of that point of time or assembly line so it figures out that where is the root cause and they actually fix that problem at right time so, it fixes the production quality and improve the production quality through business intelligence plus. In pharmaceuticals they are directly working on predictive analysis and perspective analysis to forecast their upcoming quarterly sales, next year sale, this year's closing sale and not only the sales and financial data, but they are also doing the whole warehousing and demand-supply, the supply chain concept using BI so they are the main ventures in which Pakistani companies are mainly working using the business word.

Globally organizations are using BI systems in firms of various sizes, as it help in enhancing functioning of organizations. Investment in BI

system implementation is increasing as the time is passing. Information attained from BI system is more relevant and timely to deploy in strategies and operations. It's one of the challenge in implementation phase is technical but it provides much business value.

It is easy for BI workers to work in global organizations. Moreover, most of the organizations that are working on this system do not share much information for academic purposes and are reluctant because they have a fear of information leak to the competitors.

Problem Statement

Organizations operating internationally do not conceive in the neighborhood of their hands, as their workers perform their businesses beyond the edges. Thus, innovative systems are today getting interest in the accumulation of information (BRAC, 2009).

As compared to other countries not much research is conducted in Pakistan on the topic of BI, Khan et al. (2009).

Although, statistical data about BI is not a great deal available in Pakistan and not about every sector of Pakistan. Because BI implementation is now has become important for every business, but its usage quality, implications, issues, the cost is not much available statistically.

Prior to the promotion of information technology (IT), it was nearly impossible to access the required information, hence businesses had to mostly rely on instincts. Investment in IT was focused on stand-alone information Systems (IS) resulting in "islands of information" since they could not be integrated with other IS. Mergers and acquisitions complicated the problem because the different companies were using different enterprise applications in carrying out the same function. It is evident firms in producing countries face constraints in areas such as eructation, expertise, and infrastructure (Melville et al., 2004).

The companies that implemented BI in Pakistan also don't possess the research data to anticipate the future of their BI systems to adopt the measures proactively and accordingly.

The focal point depend on worker capacity to take over arrangements.

Gap Analysis

Uncertainty exists on the link between IT contribution and firm's performance among researchers, hence the knowledge in this area remains undeveloped and unsystematic (Melville et al., 2004; Ida et al., 2015; Vuksik & Popovic, 2013).

Previous researches shoes the factors that helps in successful completion of BI and it's impact on performance of related departments such as supply chain. Some studies focus on leadership and culture necessary to implement BI while others focus on organizational capabilities. Multiple publications explains BI benefits but still much knowledge and information is needed to fill the gap.

Jourdan et al., (2008), describes the deficiencies of previous research in utilization of organization resources for BI adoption. Moreover, BI capabilities in relation to technical and operational aspects are also not describes in much research in elaborate manner. And above all, there is a lack of scientific inquiry about the BI industry in Pakistan due to the unavailability of BI statistics and low expertise. A lot of the research conducted globally in the field of BI does not focus on sensitivity around the cultural component of BI user types as regards the uniqueness of opinion in a particular state or area. Hence, the consideration of state-specific variance in study or opinion results on BI-related subjects holds weight. So, to cover that gap, we aim to explore BI capabilities in Pakistani firms.

Research Objectives

How BI quality enhances performance measurement practices, competitive advantage and strong performance in a growing nation like Pakistan is surveyed. It is found that BI quality is dependent on BIII, BIF, and BISS. Alavi and Leidner's (2001) suggested three dimensions of data, information, and knowledge, to relate BI quality. Theoretical model is examined through a survey in which data is collected via questionnaire from 300 employees of different firms, where commercial enterprise intelligence is being implemented in Karachi. ted in Karachi. Results are analyzed through SEM-PLS, which showed the positive association of BI system quality with others.

Research Question

1. How does BIII influence BIF?

2. How does BIF influence the BISS?
3. What is the impact of BI quality on PMC?
4. How does the BI systems and PMC impact competitive advantage?
5. What is the relationship among Business intelligence and performance of firms?

Significance

This research will help us in exploring the role of BI in Pakistan and the key drivers as well Khan, Amin, & Lambrou (2009). Our research will add a piece of information on this topic and attaining more competitive advantage, and overall performance. This study is going to help in making strategies to implement BI in Pakistani organizations and also in the technical and operational decision making while implementing BI. As BI has become the need of every organization today and in order to flourish and keep pace with existing technology it is indispensable.

LITERATURE REVIEW

BI Infrastructure Integration

Fast-paced technological challenges are faced by organizations. To meet those technological changes and arising issues strong infrastructure for Business Intelligence is needed. Seufert & Shiefer (2005) studied those infrastructure requirements and real-time business analytics integration in business operations. Findings suggested that any deficiency in integration as well results in inefficient outcomes. Architecture is also suggested that can salvage time and helps in making determinations.

Herschel & Jones (2005) emphasizes on the importance of integration of BI. So, BI can be considered a Knowledge Management subset. BI technologies are more mature, but BI needed a backup of knowledge base and BI integration needs the right knowledge management as well.

BI implementation strategies and purpose are too studied by Gangadharan and Swami (2004) and found that organizations always need access to information and monitoring of natural processes and performance for hunting down an organization efficiently.

BI Functionality

Rouhani & Savoji (2016) examined the decision support organization and its advantages for firms. The decision support organization is the core part of BI. For seeing the connection between the decision support system,

BI, firm's advantages, survey was conducted from (228 companies) different industries of the Middle East. The solution supports the speculation and confirms the positive relationship between them.

Azvine (2005 and 2006) addresses the issues and problems in BI system functionality and suggested that it is necessary to implement BI in today's competitive environment to forecast and analyze tendencies and take advantage of BI. It also discussed how data are examined through a BI system to better organizational output by studying and anticipating the movements of various services and merchandise.

BI Self-service

Jurij Jaklic, Ales Popovic and Simoes Coelho (2011) identified the possible Impact of Information that is attained by BI Systems and the usage of that quality information in business routines and operations. The data were compiled and analyzed from medium and great firms of Slovenia. The findings hint that the attained information may cause a different effect according to the right use and manipulation of knowledge that could assist in better management if used wisely. Furthermore, quality information eliminates errors and gives accuracy and zips up response time to react to several positions.

Hou (2012) analyzes the electronic industry of Taiwan and BI usage in it. Data was collected from 330 users from electronic industry of Taiwan. The findings suggest that user satisfaction is positively linked to the user's performance and BI system. This research must be guided in different industries and in dissimilar states.

Capabilities of service-oriented decision support systems were discussed by Demirkan & Delen (2013), it is one of the emerging trends and for that agile application is selected for research. In this paper, different models are discussed, but some need to be discussed fully so, research in future in needed in this domain as well.

Performance Measurement Capabilities

Peters et al. (2016) found that how BI systems usage impacts the PMC and how it's quality enhances the competitive advantage of an organization. Three variables are selected for measuring business intelligence quality than its relationship is measured with performance measurement capabilities and how it impacts the competitive advantage

of the firm. It is necessary to adopt it in this fast paced technological and competitive era.

Okkonen (2014) researched the triangle of performance measurement, knowledge management and BI systems which revealed that due to rapidly changing market and technological environment, variety of new challenges and issues have arisen and to cope with the new technologies must be implemented through proper knowledge management techniques, while performance measurement capabilities must be enhanced at the same time by making appropriate use of BI systems. It was proven through results that knowledge management, performance measurement and BI systems are positively correlated with each other and best works in collaboration.

Vuksic Bach and Popovic (2013) critically took the interview from managers and employees of the banking and telecommunication sector. 4 organizations are selected for data collection, 2 from telecommunication and 2 from the banking sector where each is categorized as an early adopter or late adopter of BIS and BPM technology and their impact on their performance is measured accordingly. Interview questions are also made accordingly and on an organizational level not on functional at the departmental level. The results indicated that there is a need for commitment by employees to improve the sales and business processes, a firm cannot solely rely on BIS and BPM for better productivity.

Competitive Advantage

BI in SMEs is studied by Miyamoto (2014) by focusing on the role of competitive forces in Japanese culture. For competitive advantage, Michael Porter's five forces model is examined through the research framework in SME's, That how these five forces have the influence to gain competitive advantage along with the integration and application of BI systems. The sample is gathered randomly through different databases of Japanese businesses. The findings indicate that IT has become indispensable in carrying out each and every activity of the supply chain as it adds much value. Because of gaining competitive advantage, the company must offer something very timely and customer oriented that can be possible only through technological channels.

Firm's Performance

The article by AlešPopovič, BorutPuklavec, Tiago Oliveira, (2018) focused on how BIS impacts the performance of the firm. Data was

collected from one hundred and eighty-one small and medium enterprises and analyzed through PLS-SEM. The research findings revealed That BIS has a partial influence on performance of firms and BIS usage by managers and employees in a firm.

Caseiro (2018) is directly focused on BI with innovation and network learning as a mediator. Data is collected from 228 European firms that are just startup. The results of this research show that BI has a positive impact on all variables and organizational performance.

Arefin (2015) examines how organizational structure, processes, culture, and strategy influences the organizational performance and effectiveness with BI as a mediator. Data is collected from two hundred and twenty-five organizations in Bangladesh. The research findings indicated effectiveness along business intelligence system's effectiveness.

THEORETICAL FRAMEWORK

Business Intelligence systems are believed to be most usable and can be termed as the need of the time. BI infrastructure integration can be referred as data quality. BI functionality refers to the quality of the applications that process data into in formation. BI self-service and in performance measurement capabilities such information is mediated cognitively. Then, in competitive advantage, which brings up to superior business unit performance as compare to competitors (Grafton et al., 2010). And in final stage, the effect on productivity and execution is valued.

BI Quality

BI infrastructure integration (BIII) refers to the processes and structures of the database. BIII first connects primary data sources to the structure. When BIII is "low", data is not integrated in spreadsheets. When BIII is "high", it is a "common" in database configuration.

BI functionality is the serviceability of an application for interaction and usage with other data (Peng, 2007). When BI functionality is "low", reduced interaction occurs in spreadsheet. But, when BI functionality is "high", interaction and speed also becomes fast (Ariav, 1992). Therefore, BI functionality provides ease of piloting as well as authentic and precise data for use. Thus: H1. BI infrastructure integration ⟶ BI

functionality.

The concept of self service is originated her that is the frequency of private usage of a BI application (Hou, 2012). BI self-service is low when managers use it lees because of less usage. And it is high when it is used more frequently by managers.

It is observed from literature of other studies that BI functionality tends to increases the self-service. Because when interface is efficient and features are user friendly, managers are more likely to use it again and again. And can rely on the data shown on dashboards. So, H2. BI functionality ⟶ BI self-service.

BI Quality & PMC

PMC (Performance measurement capabilities) shows how managers are using measurement tools to maintain or alter a business unit for enhancing performance. (Simons, 1995). PMC has two different styles, diagnostic or interactive which works with cybernetic feedback loop processes, which also links BI to PMC (Otley, 2012). According to Huber (1991) "entity learns if, through its processing of information, the range of its possible behaviors is changed" and "an organization only learns if any of its units acquire knowledge that it recognizes as potentially useful to the system", it links BI functionality with PMC. It leads to: H3. BI functionality ⟶ performance measurement capabilities.

When features are user friendly and easy to use then the self-service will be greater, that also increases the PMC because managers have more interaction with the system and dashboards, it will be easier for them to measure the performance. Shollo (2015). Thus: H4. BI self-service ⟶ performance measurement capabilities.

Links to Competitive Advantage

PMC must be capable to enhance competitive advantage. Data is transferred to all layers of power structure during performance measurement. Agreeing to the knowledge-based perspective, in which resources are immobile and heterogeneously distributed amongst competitors, value creation can be a beginning of relatively persistent competitive advantage (Grant, 1996). As such: H5. Performance measurement ⟶ competitive advantage.

Links to Firm's Performance

Côrte (2017) discussed that gaining competitive advantage is the only way to sustain in the market, which can be attained by using data analytics tactfully which leads to better performance of the firm. It is clear if the company is not getting enough competitive advantage, then its under performing or not matching the market criteria.

Researchers have bought forth various IT resources that can generate a competitive advantage. These resources include IT strategy, IT infrastructure and IT human capital (Yogev et al., 2013). Melville et al. (2004) observed that when the correct IT is functional within the right business process, the outcome is increased organizational performance and improved processes. According to Olszak (2014). Accordingly, the final hypothesis is: H6. Competitive advantage ⟶ firm's performance.

As, BIII, BIF, and BISS provide the base for BI quality in theoretical model. BIF and BISS together have an impact on performance measurement capability, which affects competitive advantage, which subsequently impacts on firm performance.

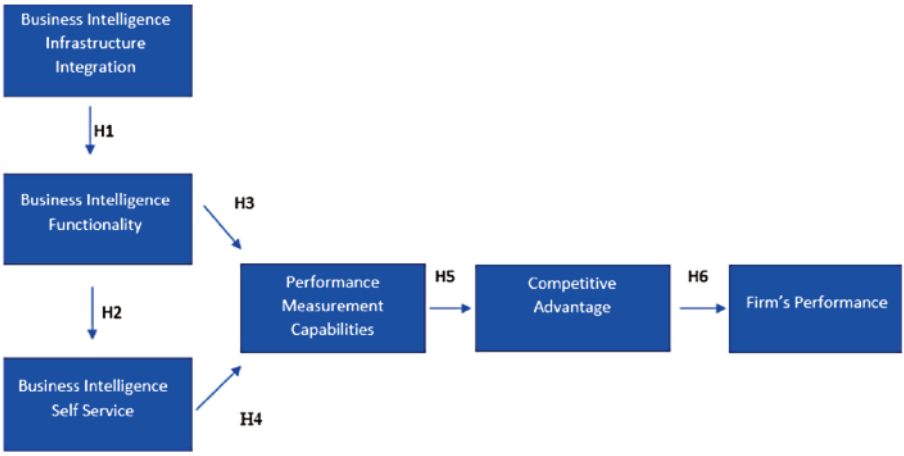

Figure 1 Theoretical Model

Industry Analysis

Many companies are using BI technology in Pakistan and as time passed more firms are moving towards it because it's the way to get a competitive advantage and in the future, it's going to become a need. BI is not applied in many of the firms in Pakistan and it is seemingly a brand new task for plenty of Pakistani firms, but still, businesses are imposing it and using it like Power

BI, SAP, click sense, and achieving their targets more effectively.

The BI system to put into effect for any enterprise intelligence for any endeavor is somehow extensive. All kinds of facts are lying on multiple data resources for example Share Point, SAP, Oracle, SQL server, and so on.

Toyota motors was dealing with the issue that when their supply chain or their line of production get disturbed, there was no visibility wherein the problem is residing so, they created a dashboard on which the executive management can see that how the production line is going on and in case of any trouble at any point, as an instance if the trouble is in delivery chain or the warehouse or bar code or meeting line the dashboard can reflect the immediate situation or exact condition of that point or assembly line so it will help to find out that wherein the reason and that is really effective in restoring that hassle at inappropriate time so, it helps in restoration of the issue and saving them time and cost and enhancing the performance.

Pakistani pharmaceuticals firms are currently working on the predictive analysis and perspective analysis to forecast their upcoming income, next 12 months sale, this year's ultimate sale and no longer only the sales and economic facts but they may be additionally managing the whole warehousing and supply chain, etc. SAP also suggested various BI systems, to compete globally (Gate, 2011).

METHODOLOGY

Sampling

300 responses are collected using convenience method of sampling from Pakistani employees, especially of Karachi are targeted in sampling, 130 responses were collected online and 170 are collected on paper for analysis.

Instrument

The questionnaire consists of two principal parts, Section A consists of questions regarding the demographics of a respondent, including age, gender, working experience, and professional level. The age limit given to have opted from the nominal scale is 21-30 years to 60 and above. Respondents are classified on gender bases as male and female. For setting the working experience range is provided from more than one year to 16 and above. While the professional level is encompassing non-managerial staff as well as first-line, middle and top-level management respectively.

Section B is composed of 26 main questions to measure 6 variables by Likert scales of five point in which 26 main items are adapted, first five questions are to measure BI infrastructure integration (IV), five for BI functionality (IV), two for BI self- service (IV), five for performance measurement capabilities (DV), five for competitive advantage (DV) and four for firm performance (DV). Respondents could agree or disagree on the provided five-points Likert type scale.

The questions are designed accordingly for conducting research and to get the required information and provide feasibility to achieve the objective of research.

Measurement Scales

The table below shows independent and dependent variables in which 26 items are adapted. Independent variable comprises of BI infrastructure integration, BI functionality, BI self-service whereas Dependent Variable comprises of performance management capabilities, competitive advantage and firm's performance.

The five items of BI infrastructure integration (IV) were adapted from the source Lior Fink, Nir Yogev and Edir Even (2016). Five Items of BI functionality (IV), two items of BI self- service (IV), the five items of performance measurement capabilities (DV) were adapted from Peters (2016). Three points of competitive advantage (DV) are adopted from Peters (2016) while the other 2 items are adopted from Schilke (2014). Firm's Performance (DV) having 4 items that were adapted from Elbashir Collier, & Davern (2008).

Table 1: Measurement Scales

Variable Measument	Sources	Number of Items
Business Intelligence Infrastructure	Computed by the Author Lior Fink, Nir Yogev and Edir Even (2016)	5
Business Intelligence Functionality	Peters (2016)	5
Business Intelligence Self Service	Peters (2016)	2
Performance Management Cabilities	Peters (2016)	5
Competitive Advantage	Peters (2016) Schilke (2014)	3 2
Firm's Performance	Elbashir (2008)	4

DATA ANALYSIS

Demographic Information

Table 2: Respondents Profile

Name of Demographic	Demographic Features	Frequency	Percentage
Age	21-30	222	74%
	31-40	49	16.33%
	41-50	16	5.33%
	51-60	10	3.33%
	60 and above	3	1%
Gender	Male	207	69%
	Female	93	31%
Experience	Less than 1 year	56	18.66%
	1-5 years	151	50.33%
	6-10 years	48	16%
	11-15 years	22	7.33%
	16 and above	23	7.67%
Professional Level	Non-managerial Staff	50	16.67%
	First line management	120	40%
	Middle level Management	103	34.33%
	Top level Management	27	9%

The demographic data indicates that our most of respondents are male, 69% and female respondents are 41%. The most of the respondents, 74% are between 21 to 30 years of age, while 16.33% are from the age set of 31 to 40 years. 5.33% are from the age group of 41 to 50, 3.33% are in between 51 to 60 years of age and 1% are 60 and above. The most of respondents, 50.33% have working experience of 1-5 years while 18.66% are giving birth experience of less than 1 year. 16% of respondents have experience of 6-10 years, 7.33% of respondents have experience of 11-15 years and 7.67% of respondents have experience of 16 and above years. The professional level of respondents is non- managerial staff, first-course management, middle-stage management, top-level management that is 16.67%, 40%, 32.33%, and 9% respectively.

Descriptive Statistic

Table 3: Descriptive Statistic

Variables	Questions		Descriptive Stats		Confirmatory Factor Analysis		
			Mean	St.Dev.	Outer Loading	T Stats	P Values
Business Intelligence Infrastructure Integration	1	BIII1	4.127	0.961	0.842	33.313	0.000
	2	BIII2	4.097	0.960	0.882	58.685	0.000
	3	BIII3	4.103	1.023	0.790	23.534	0.000
	4	BIII4	4.053	1.025	0.849	44.180	0.000
	5	BIII5	4.167	0.927	0.805	27.580	0.000
Business Intelligence Functionality	6	BIF1	3.977	1.024	0.849	40.064	0.000
	7	BIF2	3.977	0.978	0.851	49.608	0.000
	8	BIF3	3.960	0.999	0.860	39.224	0.000
	9	BIF4	3.970	1.008	0.850	38.796	0.000
	10	BIF5	3.910	1.030	0.831	35.150	0.000
Business Intelligence Self- service	11	BIS1	3.860	0.891	0.887	45.358	0.000
	12	BIS2	3.850	0.987	0.913	79.234	0.000
Performance Management Capabilities	13	PMC1	3.907	0.882	0.739	22.535	0.000
	14	PMC2	3.787	1.024	0.848	44.143	0.000
	15	PMC3	3.870	0.905	0.770	24.750	0.000
	16	PMC4	3.820	0.880	0.759	23.785	0.000
	17	PMC5	3.837	0.893	0.728	18.280	0.000
Competitive Advantage	18	CA1	3.887	0.942	0.811	32.756	0.000
	19	CA2	3.850	0.984	0.842	37.056	0.000
	20	CA3	3.817	0.985	0.859	45.154	0.000
	21	CA4	3.837	0.961	0.828	30.450	0.000
	22	CA5	3.803	0.975	0.816	29.542	0.000
Firm's Performance	23	FP1	3.863	1.032	0.869	52.102	0.000
	24	FP2	3.930	0.969	0.854	47.629	0.000
	25	FP3	3.870	1.000	0.878	44.761	0.000
	26	FP4	3.863	1.064	0.803	26.054	0.000

The board presents the mean and standard deviation of the variables starting it with BI quality that is our independent one, which has further split up into three parts mediating BI Infrastructure Intelligence, BI Functionality, BI Self-Service mediating the relationship between BI quality and firms' performance whereas all three BI quality measures have greater influence on Performance Management Capabilities i.e. The variable which enhances competitive advantage and enhancing firms' performance as a result. The mean of the variables mentioned above range from 3.803 to 4.167 and SD from 0.880 to 1.064

Similarly, the mean of all the five items of the variable i.e. BI Infrastructure Intelligence range from 4.053 to 4.167 whereas SD 0.927 to 1.025 There are five items of the mediator Performance Management Capabilities and all the value of the mean range from 3.820 to 3.907 and SD 0.880 to 1.024 Likewise, the five items from Competitive Advantage and their mean value range from 3.803 to 3.887 and SD range from 0.942 to 0.985. Nevertheless, the firms' performance, which is our dependent variable, the mean and the SD value of all four items of a firm's performance are in the range 3.863 to 3.930 and 0.969 to 1.064

Concisely the most significant mean and SD are from the variable BI Infrastructure Intelligence BIII5 4.167 and SD 0.927 which clearly shows that this item has more impact on BI quality and firms' performance as compared to other items, on the other hand, mean and SD of the variable Competitive advantage CA5 3.803 and 0.975 which clearly revealed that this item has lowest mean.

In the above table, all the factor loadings of the variable's items exceed 0.05 range from 0.728 to 0.913, similarly, all the T values of the items are above the desired value i.e. $T>1.96$ between 18.280 to 79.234 whereas P values of the items are significant range i.e. $P<0.01$.

Structural Equation Modeling

We have used SEM for our research and Smart PLS. In addition, to assess the indirect and direct impacts testing was performed. The job of (SEM) is crucial for testing hypothesis and the bootstrapping and other calculation methods. It used to assess the basic connection among exogenous and endogenous factors. So as to check all immediate impacts, a strategy has been executed which is bootstrapping (Shrout, 2002).

Measurement of Outer Model

To find the reliability and validity, we performed a test of convergent validity and discriminant validity by using Smart PLS.

Factors Loading Significant

CFA is mentioned is descriptive analysis. Below 0.5 constructs are not necessary to mention in table while constructs with the loading of 0.5 are considered as strong.

Reliability and Convergent Validity

For the core reliability and steadiness of data, we use Cronbach's alpha by following Anderson and Gerbing (1988) and for the validity as per Hair et al. (2006).

Table 4: Reliability & Convergent Validity

	Cronbach's Alpha	Composite Reliability	AVE
BI Infrastructure integration	0.890	0.919	0.696
BI functionality	0.903	0.928	0.720
BI self-service	0.766	0.895	0.810
Performance management capabilities	0.828	0.879	0.593
Competitive advantage	0.888	0.918	0.691
Firm's Performance	0.874	0.913	0.725

Table 6 shows the Cronbach's value for BIII (0.890), BIF (0.903), BISS (0.766), PMC (0.828), CA (0.888), FP (0.874). Scales are reliable because they are above threshold of 0.70 Hair, (2010).

The composite reliability values are ranging from 0.87 to 0.93 which exceeds the bound of 0.7 which is indicating towards its reliability Bagozzi & Yi (1988).

The AVEs range from 0.593 to 0.810, which is greater than 0.5 hence showing its reliability (Chin, 1998).

Discriminant Validity:

Table 5: Discriminant Validity

Variables	BIF	BIII	BISS	CA	FP	PMC
BIF	0.848					
BIII	0.776	0.834				
BISS	0.701	0.636	0.900			
CA	0.662	0.644	0.601	0.831		
FP	0.659	0.655	0.649	0.748	0.852	
PMC	0.664	0.652	0.647	0.686	0.710	0.770

Table shows that the discriminant validity is achieved as the values are less than 1 which illustrates that this term is easily matched.

Model Fit Measures

The measurement model has a good fit.

Table 6: Model Fit

Fit Summary		
	Saturated Model	**Estimated Model**
SRMR	0.056	0.134
d_ULS	1.105	6.312
d_G	0.524	0.651
Chi-Square	925.779	1.058369
NFI	0.834	0.811

Hypothesis Testing

Bootstrapping is done for the testing of hypothesis in SEM, it gives the consistent and stable results. T values for structural model is obtained through bootstrapping. Path diagram is shown in figure 2. At 95% confidence level where alpha is 0.05 shows that relation is strong and t value is greater than 1.96 and p value is less than 0.05.

Structural Model

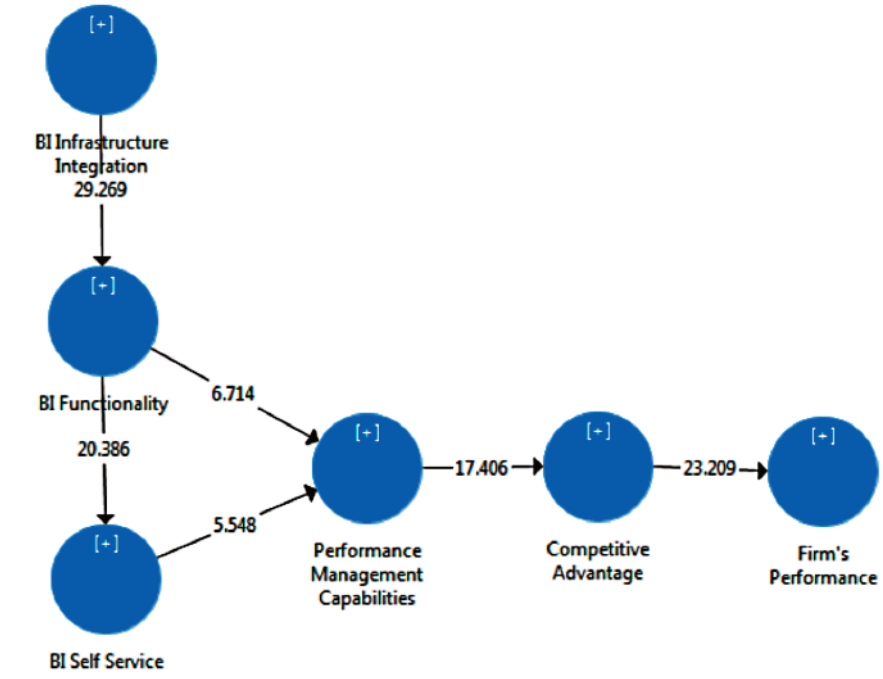

Figure 2: Structural Model

With the help of bootstrapping, all the extracted values (Table 5, path coefficient values and T statistics values of direct effects) clarify that BI infrastructure integration (β = 0.778; t = 29.330), BI functionality (β = 0.702; t = 19.135), BI self service (β = 0.415; t = 7.104), performance measurement capabilities (β = 0.356; t = 6.047), competitive advantage (β = 0.689; t = 17.940) and Firm's Performance (β = 0.748; t = 22.713) are having direct positive relationship, leading to the acceptance of all hypothesis.

Table 7: Path Coefficients & T Values

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)
BIII → BIF	0.776	0.778	0.026	29.330
BIF → BISS	0.701	0.702	0.037	19.135
BIF → PMC	0.415	0.415	0.058	7.104
BISS → PMC	0.356	0.356	0.059	6.047
PMC → CA	0.686	0.689	0.038	17.940
CA → FP	0.748	0.748	0.033	22.713

RESULT

According to the table 9, all hypothesis from H1 to H6 are well supported as a positive and significant relationship is seen.

Table 8: Hypothesis Testing

Hypothesis	Constructs	T Statistics (|O/STDEV|)	P Values	Status
1	**BIII → BIF**	29.330	**0.000**	Accept
2	**BIF → BISS**	19.135	**0.000**	Accept
3	**BIF → PMC**	7.104	**0.000**	Accept
4	**BISS → PMC**	6.047	**0.000**	Accept
5	**PMC → CA**	17.940	**0.000**	Accept
6	**CA → FP**	22.713	**0.000**	Accept

In order to measure the significance, the H1, H2, H3, H4, H5, and H6 were expressed as T=29.330, 19.135, 7.104, 6.047, 17.940 and 22.713 respectively (T >1.96) whereas P<0.05.So, consequently, we are accepting these hypotheses as well since all values meeting the criteria.

As shown in table 9, It is found that BIII has a positive association with BIF which is consistent with H1. Whereas, BIF has a positive association with both BISS and PMC that are consistent with H2 and H3 respectively. Subsequently, PMC have a positive association with both BIF and BISS, which is consistent with H4 and the PMC

enhance the CA, consistent with H5. Finally, the competitive advantage has a positive linkage with firm's performance, showing consistency with H6.

Table 9: Specific Indirect Effects

	Original Sample (O)	T Statistics	P Values
BIII →BIF →BISS	0.544	13.669	0.000
BIF →PMC →CA	0.285	5.976	0.000
BIII →BIF →PMC →CA	0.221	5.615	0.000
BISS →PMC →CA	0.244	5.867	0.000
BIF →BISS →PMC →CA	0.171	5.659	0.000
BIII →BIF →BISS →PMC →CA	0.133	5.352	0.000
BIF →PMC →CA →FP	0.213	5.422	0.000
BIII →BIF →PMC →CA →FP	0.165	5.102	0.000
PMC →CA →FP	0.513	11.118	0.000
BISS →PMC →CA →FP	0.182	5.382	0.000
BIF →BISS →PMC →CA →FP	0.128	5.131	0.000
BIII →BIF →BISS →PMC →CA →FP	0.099	4.864	0.000
BIII →BIF →PMC	0.322	6.687	0.000
BIF →BISS →PMC	0.249	6.018	0.000
BIII →BIF →BISS →PMC	0.193	5.749	0.000

Mediating Effect

To find the mediation between BII and BISS first we will analyze a direct effect between BIII and BI Functionality having β=0.77 then another effect of BI Functionality and BI Self-Service will be carried out.Findings showed as on β=0.70 and when mediated by BI Functionality β=0.54 which shows significant mediation. To analyze the mediation of PMC between BIF and competitive advantage, we will identify a relationship among BIF and PMC having β=0.41 then another effect of Performance Management Capabilities on competitive advantage will be carried out. Results revealed as on competitive advantage having β=0.69, and when it's mediated by Performance Management Capabilities β=0.28 which establishes a significant mediation. Also, mediation between BIII and competitive advantage will be tested via BI Functionality and Performance Measurement Capabilities which shows positive relations having β=0.22. The mediating effect between BI Self Service and competitive advantage will be carried out via Performance Measurement Capabilities β=0.24 which is a good mediation.

Afterward another mediating test between BI Functionality and competitive advantage through BISS and PMC having β=0.17 then another

mediating process will be done between. BII and competitive advantage via BIF, BISS, and PMC having β=0.13.Similarly, BI Functionality and firm's performance will be tested through PMC and CA findings clearly show a positive relationship as β=0.21 Afterwards BIII and firm's performance mediated through BI Functionality, Performance Measurement Capabilities and competitive advantage as β=0.21 which is a significant one. Another relationship between Performance Measurement Capabilities and firm's performance mediated via competitive advantage results revealed β=0.51. Similarly, BI Self-Service and firm's performance will be mediated by PMC and CA hence β=0.18. Nevertheless, the mediation test between BI Functionality and firm's performance carried out through BIF, BISS, PMC and CA and the result indicated a positive significant mediation i.e. β=0.12. BIII and firm's performance mediation test done through BIF, BISS,PMC and CA whilst findings revealed β=0.09. Another mediating test between BIII and PMC through BIF and found β=0.32. One mediation test is also carried out between BIF and PMC through BISS hence the results revealed a positive impact as β=0.24.

Finally, the last mediation test is done BIII and PMC through BIF and BISS as β=0.19 which defines there is obviously a mediation.

CONCLUSION

We carried out this research to investigate how BI quality enhances the PMC, competitive advantage, firm's performance. BI quality was measured through BIII, BIF, and BISS, which brings up to independent and feasible usage of the BI system by managers specifically in Pakistani firms. Right implementation and handling of BI improves the performance measurement capabilities that help in getting a better competitive advantage, which ultimately increases the performance of the firm.

The research was causal and the data was gathered by conducting a survey via questionnaire. 300 responses are collected from employees of different firms where BI is being implemented to test the hypothesis. The data analysis shows, the relationship among variable is strong and positive. Still, due to various reasons, such as low expertise and unavailability of BI statistics, there is not enough information specifically focusing on Pakistan that's why we conducted this research. BI system is increasing firm performance in Pakistani firms. Global BI's perspective has also influenced the BI industry in Pakistan.

The data through questionnaires from various Pakistani firms is gathered in research. Various employees dealing with BI on a regular basis and their responses.

In conclusion, based on the findings, this research proposes a practical recommendation. It is suggested for Pakistani firms to diagnose which areas regarding their usage of the Business intelligence system need to be improved with regards to their carrying out objectives. Afterward, they can modify their BI system in response to the diagnosis and invest more in BI to sustain in a competitive marketplace.

As new events are being stood up in BI so more variables must be studied for future inquiry. Employee's behavior towards BI adoption and upcoming challenges of BI in Pakistan are potential topics to be focused for future research work.

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