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Significance of Business Intelligence System on Quality Decision Making using Analytic Hierarchy Process in Fast Moving Consumer Goods Industry (A Case Study of Pepsi Co. Pakistan)

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Abstract

This study investigates the impact and usage of business intelligence on the quality decision making from two usage perspectives; employee designation and departmental classification. Study has been done on Pepsi Cola International Private Limited as a case of beverages industry of Pakistan. After a decade of reforming policies and development, Fast Moving Consumer Goods organizations are now playing vital role in the development and sustainability of economy in Pakistan. A single exploratory case study approach has been employed to analyze the Pepsi Co. by using quantitative method. Pepsi Co. organization is using business intelligence technology to twirl the raw data into useful information, resultant information into knowledge and plans that are optimizing business strategic activities such as decision making and improve the proactive management, curtail expenditure and capitalize the profit. For the collection of data, questionnaire survey was conducted. Based on respondents, stated association between significance of business intelligence in organization on basis of department and employee classification on quality decision making through analytic hierarchy process has been testified with Regression analysis and Sobel test.

Keywords

Strategic decision making, Multinational organization, Fast moving consumer goods, Analytic hierarchy process

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1. Introduction

Organizational internal environment build up unusual forces from diverse kind of factors associated with the organizational financial functionality such as its structure, processes, people, systems and resource constraints. All these forces, their nature, functionality, controllability can be understood and well organized with the use of Business Intelligence (BI). So we can say that BI is an implausible tool which every nature of business required in order to gain competitive advantage as well as to contend in a vibrant, complicated and competitive business environment. BI significantly provides strategic insight for the adaptability, changeability and applicability of management toward organizational maximum profitability. BI let a business to forecast and conjecture the economic situation by visualizing data in a way that can be infer at strategic level. With help of data extracted through it, decision making is done on basis of priority and criterion that indicates how many times more important or dominant one element is over another element. And in our opinion organizational intelligence environment concede by human brains but with BI tools and techniques (Duedahl et al., 2005).

Beverage industries are playing key role in establishing the Pakistan economy. It has developed over a hefty level growth periodically. It has twelve-monthly intensification of approximately 20% to 25% and has the impending ability to twice its volume in next 3 to 5 years. These organizations employed the majority of workers; which augment the economic growth of country. So, this diligence along with large number of market network together with shops and outlets are the reason to prop up and to spawn ample extended economic activity in Pakistan. Thus it is generally recognized as significant to economic enlargement and growth. In an environment where consumer satisfaction is key for any business to survive and develop, consumers focused organizations be obliged to be competent to congregate demand and service requirements timely, according to expectations and as efficiently as promising.

BI tool philosophy straight away relate to what these companies are struggling to attain. With BI system these organizations were competent to change its business operations towards their object of customer focus. It endow with a next-generation software solution supporting the direct store delivery process from order to cash and settlement. The BI system will support the existing processes to improve it and endow with new functionalities and opportunities to perk up their customer service and contentment. It also helps to develop merchandising,

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permits for growth in marketplace share, amplifies customer satisfaction, and diminishes logistics cost (Hagel and Brown, 2001). The current purpose of study is to find out the significance of BI and its impact on Fast Moving Consumer Goods (FMCG) Industry in Pakistan.

2. Literature review

Organizations in history faced a lot of snags. Manual record of transaction, manipulation of data, report formation over computerized system escorted to many dilemmas such as; inaccuracy, less reliable, repetition of data, lack of internal control, loss of time, paper damaged and system crash etc. 1n 1940 computer were used for organizational clerical activities. Financial record is always use as a tool to measure and evaluate the firm's position. Intelligence is an amalgamation of analysis, assessment, and interpretation of information according to the particular difficulties that this may entails to endow organizations with a cutthroat strategy to compete in the market and be profitable at the same time. BI Tasks includes forecast future with the past and present performance and what if' analysis of impact of changes and alternative scenarios (Armstrong et al., 2013).

Buckhout et al., (1999) described that decision making system is all about allocating and using source of funds in appropriate manner. It is associated with hoisting the capital desired to invest in the enterprise's assets and activities, the right speculation of the inadequate and limited finance between challenging uses, and to make certain that the assets are being exploit efficiently and proficiently in attaining the enterprise's objective. However, according to Bacon (1992); "decision making includes all areas of management, financial implications of investment, production".

Rapidly increasing trend of growth is always a characteristic of highly developed and contemporary organizations. More sales intensify more rapidly demand for capital intrudes along with increase in stock as well as receivables. So, functionality of decision making strategy is lie in expounding the strategy for financing, defining down financing objectives, setting up the on the whole scale, conduit and productive and profitable techniques of financing, arranging deliberate methods of capital structure optimization and lastly envisage and amass the amount of capital the organization required (Chen et al., 2012).

To compete in the highly completive advantage the most significant strategy is to understand and keep track record of all data which is created in result of day to day operations for future events. BI is not merely a technology but it is a methodology. With the usage of BI organization can understand in better way growth in systematic sale level, guide trade policies, required capital, increase level of stock in response to elevated ratio of receivables, making strategies for allocation of resources, investment policies and reinvestment to attract new products, sustain old one with value adding features in existing products (Apte et al., 2003).

BI conduits amongst different departmental activities for the purpose to attain information regarding day to day operations to make working capital management efficient, allowing FMCG industries to scrutinize the business performance. With BI these industries can amalgamate influential tools, scrutiny, consistent reporting, controlling system with an assortment of key performance indicators (KPIs), data assimilation, among other features, within a service-oriented architecture vital for a superior business administration to guide managers in strategic direction for quality information, with the establishment of principles, values and procedures to make certain compliance with the objectives (Rajteric, 2010).

For decision making comparisons is done to indicate which element has to execute before on basis of significance how many times more important or dominant one element is over another element with respect to the criterion or property with respect to which they are compared. For example, one compares a drink indicated on the left with another indicated at the top and answers the question: How many times more, or how strongly more is that drink consumed in the US than the one at the top? One then enters the number from the scale that is appropriate for the judgment: for example enter 9 in the (coffee, wine) position meaning that coffee consumption is 9 times wine consumption. These strategies are used to make effective decision making by using the data of software and hierarchy process (Byun, 2001).

Cross sectional analysis of firm's performances is facilitated when enterprises has a repository consist of consolidated, unstructured and semi structured data from finance, marketing, production, human resource, customer service and other departments including external sources data, led to scrutinize exploratory analysis using BI methodologies (Mohammad, 2012). Combination of informative historical data with BI facilitates to craft strategic decisions (investment,

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financing, profit distribution and customer retaining etc.) through potentiating patterns to understand the business processes. FMCG should espouse a deliberate and dynamic code of conduct, fulfilling the demand of customer by balancing supply and maintain capital, R & D development on exploring more competitive pricing model, catering the new market by sustain with the old one and gaining the cutthroat position in market.

Use of BI with cloud will be very constructive and profitable for every organization. Cloud BI is a new way to do BI. Instead of installing complex and expensive software BI will run in cloud. There is no need to install or buy any hardware. When organization computing need will grow with the passage of time cloud will automatically assign new resources. That's what makes cloud BI more powerful tool.

Chaudhry et al., (2016) investigated the critical failure factors and significance of business intelligence system on decision making in Pakistan. Only 2 percent SMEs applying BI framework for their elementary leadership others are using diverse sort of gadgets for the feasible administration.

3. Research objectives and research questions

Today due to increase in demand, BI became an indispensable issue in business world to perk up the Business progression and development. In FMCG industries there is large amount of data to be used. Mangers need right information at the right time on right place to make productive and profitable decisions. The *objectives* were formulated as follows:
- To find out the BI important for an organizational quality decision making
- To find out the BI role to upsurge the organizational efficiency and effectiveness?

Research objectives defined above leads to following objectives:
- What is the significance of BI in organization on basis of department and employee classification on quality decision making through analytic hierarchy process?
- Has BI helped organization to align organizational performance with pre-set goals?

The following *research hypotheses* are made to meet the research objectives:

- H_1: There is significant relationship between BI used in organization on basis of department and employee classification and quality decision making through analytic hierarchy process.
- H_2: There is significant relationship between BI and quality decision making by employee through analytic hierarchy process.

4. Theoretical framework

Figures 1 is showing the mediation of analytic hierarchy process between the business intelligence system and strategic decision making system. The following linear models are used to test this mediation.

Model 1: Estimating strategic decision making (SDM) system from business intelligence system (BIS):

$$\text{SDM} = i_{m1} + c\,\text{BIS} + e_{m1} \tag{4.1}$$

Model 2: Estimating analytic hierarchy process (AHP) from business intelligence:

$$\text{AHP} = i_{m2} + a\,\text{BIS} + e_{m2} \tag{4.2}$$

Model 3: Estimating strategic decision making from both business intelligence system and analytic hierarchy process:

$$\text{SDM} = i_{m3} + c'\,\text{BIS} + b\,\text{AHP} + e_{m3} \tag{4.3}$$

The direct effect of BIS on SDM is: c'

The indirect effect of BIS on SDM through AHP is: $a * b$

The total effect of BIS on SDM is: $c = c' + a * b$

5. Research methodology

The research consists of quantitative techniques to analyze the relationship between BI system and strategic decision making system. SPSS is used for the Regression analysis and Sobel test. Case from beverage industry is taken under consideration. Questionnaire is used to collect the data from employees of organization. One hundred respondents participate in this research. The questionnaire is designed to collect information pertaining to demographic of respondents and company, BI usage level and relation of BI with decision making.

6. Data analysis and interpretations

6.1 Significance of business intelligence system (BIS) in organization on basis of department classification on quality decision making (QDM) through analytic hierarchy process (AHP):

Run Regression IV(BIS) predicting DV(QDM): In Table 1, based on the Regression result, the p-value in ANOVA is 0.007, therefore, there is significant relationship between business intelligence in organizational department and quality decision making. The value of use of BI department wise is the total effect: $c = 0.380$ which is highly significant.

Run Regression IV(BIS) predicting MV(AHP): In Table 2, based on the Regression result, the p-value in ANOVA is 0.001 so there is significant relationship between business intelligence in organizational department and analytic hierarchy process. The effect of BIS on AHP is $a = 0.306$ which is highly significant.

Run Regression IV(BIS) and MV(AHP) predicting DV(QDM): In Table 3, after analyzing the values associated with AHP, the effect of quality decision making appears to be small ($c' = .268$ with AHP; $c = .380$ without AHP, that is, $c' < c$). Thus, there is support for partial mediation. Now, Sobel test is used to determine whether there is significant partial mediation. Preacher and Leonardelli (2017) online Calculation for the Sobel test has been shown in Table 4. The Sobel test P value is less than 0.05. Thus, the analytic hierarchy process is a statistically significant partial mediator of the effect of business intelligence on quality decision making on organizational departmental level in beverage industry in Pakistan.

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6.2 Significance of business intelligence on quality decision making by employee through analytic hierarchy process:

Run Regression IV(BIS) predicting DV(QDM): In Table 5, based on the Regression result, the p-value in ANOVA is 0.002 therefore, there is significant relationship between business intelligence in organizational department and quality decision making. The value of use of BI employee wise is the total effect: c = 0.377 which is highly significant.

Run Regression IV(BIS) predicting MV(AHP): In Table 6, based on the regression result, the P-value in ANOVA is 0.000, so there is significant relationship between business intelligence in organizational department and analytic hierarchy process. The effect of BIS on AHP is $a = 0.374$ which is highly significant.

Run Regression IV and MV predicting DV: In Table 7, after analyzing the value associated with AHP, the effect of Quality decision making appears to be small (.377 without AHP; .259 with AHP).Thus, there is support for partial mediation. Now, Sobel test is used to determine whether there is significant partial mediation to see reduction of .118 (.377 to .259). Preacher and Leonardelli (2017) online Calculation for the Sobel test has been shown in Table 8. The Sobel test P value is less than 0.05. Thus, we can conclude that analytic hierarchy process is a statistically significant partial mediator of the effect of business intelligence on quality decision making on basis of usage according to employee designation level in the beverage industry in Pakistan.

7. Conclusion

As it's well known fact that business intelligence speaks to the contraptions and frameworks that assume a key part in the vital arranging process inside an organization. These BI frameworks permit an organization to assemble, store, get to and examine corporate information to help in basic leadership. For the most part these frameworks will delineate business insight in the zones of client profiling, client bolster, statistical surveying, showcase division, item gainfulness, measurable examination, and stock and appropriation investigation that give a boost to organizational competeness. Research study reveals the impact and usage of BI on the quality decision making from employee and departmental perspective. Case Study analysis has been done on Pepsi Co. to find out significant relationship between BI used in organization on basis of department and employee classification and quality decision making through analytic hierarchy process. Result of regression test signifies the positive association between BI and decision making.

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The Sobel test is used to find out the mediation level. As P value is less than 0.05.Thus, we can conclude that analytic hierarchy process is a statistically significant partial mediator of the effect of business intelligence on quality decision making on organizational departmental level in beverage industry in Pakistan. Use of BI for quality decision making is very constructive and profitable for beverage industry. As BI has implemented at departmental level and expected to be move forward to corporate for its fullest benefits utilization. It is facilitating to craft decisions (investment, financing, profit distribution and customer retaining etc) through potentiating patterns to understand the business processes.

So well-planned BI applications can give organization the capacity to settle on better choices by rapidly understanding the different "data resources" and how these connect with each other. These advantages can incorporate client databases, store network data, work force information, fabricating, item information, deals and advertising action, and in addition some other wellspring of data basic to your operation. A powerful BI application, which incorporates joining and information purifying capacities, can permit you to coordinate these divergent information sources into a solitary lucid system for constant reporting and nitty gritty investigation by anybody in developed endeavor – clients, accomplices, representatives, supervisors, and administrators.
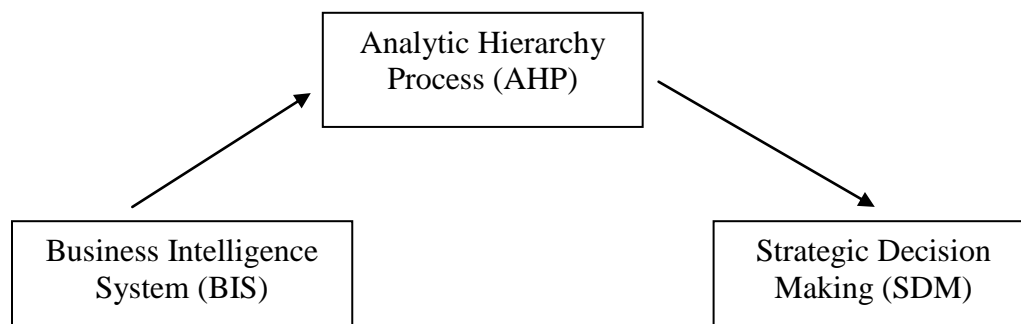

Figure 1: AHP as mediator between BIS and SDM

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Table 1: Regression IV(BIS) predicting DV(QDM)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.226	.411		5.422	.000
	BIS	.380	.137	.270	2.779	.007

Table 2: Regression IV(BIS) predicting MV(AHP)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.586	.271		9.546	.000
	BIS	.306	.090	.324	3.391	.001

Table 3: Regression IV(BIS) and MV(AHP) predicting DV(QDM)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.280	.556		2.300	.024
	BIS	.268	.141	.191	1.901	.050
	AHP	.366	.149	.246	2.451	.016

Table 4: Preacher and Leonardelli (2017) Calculation for the Sobel test

Input:		Test statistic:	Std. Error:	p-value:
a	.306	Sobel test: 1.99110484	0.05624817	0.04646936
b	.366	Aroian test: 1.93682269	0.0578246	0.05276702
s_a	.090	Goodman test: 2.05022271	0.05462626	0.0403427
s_b	.149	Reset all	Calculate	

Table 5: Regression IV(BIS) predicting DV(QDM)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.998	.430		4.644	.000
	BIS	.377	.118	.307	3.189	.002

Table 6: Regression IV(BIS) predicting MV(AHP)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.158	.271		7.972	.000
	BIS	.374	.074	.453	5.026	.000

Table 7: Regression IV and MV predicting DV

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.316	.544		2.419	.017
	BIS	.259	.131	.211	1.982	.050
	AHP	.361	.158	.212	1.997	.049

Table 8: Preacher and Leonardelli (2017) Calculation for the Sobel test

Input:		Test statistic:	Std. Error:	p-value:
a	.374	Sobel test: 2.08194796	0.06484984	0.03734722
b	.361	Aroian test: 2.04891356	0.06589541	0.04047057
s_a	.074	Goodman test: 2.1166335	0.06378714	0.03429096
s_b	.158	Reset all	Calculate	

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