Technological-Centric Business Intelligence: Critical Success Factors

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The purpose of this paper is to deliver an insight into the interaction effects of technology characteristic as a critical methodology for an association to accomplish the adoption of Business Intelligence applications that have the capacity to examine the immense measure of information and give better and snappier reactions to businesses. The target population comprised of 162 ICT personnel in Malaysian organization. The choice of ICT departments in this organization is due familiarity with the subjects of the proposed study. This study employed PLS Structural Equation Modelling. The results revealed that technology is an essential component consideration for associations to adapt to present difficulties in making a critical decision. The findings of the study are that system compatibility, task complexity, and perceived benefit were most significant and were viewed as an earth shattering component in expanding business esteem and execution. This study offers concrete insights into a scope of elements that influence technological advancement and execution. It, therefore, represents a useful source of information for both practitioners and academics who are interested in improving the efficiency and effectiveness of business operation. Research on business intelligence is still deficient in examining the role of characteristic technology dimensions in influencing implementation of Business Intelligence. Investigating the relationship will assist an organization with the way to deal in business from a global perspective. The intention is that transference of capability is achieved through learning, information exchange, data display and analysis to fill the current gap in academic research and policy influencing literature in this field.

Key words: *Business Intelligence, technological characteristic, system compatibility, task complexity, perceived benefit.*

Introduction

Currently, business intelligence gives verifiable, contemporary, and prescient perspectives of business tasks in immense business systems that are essential elements for administrators to use in making rigorous judgment. Business intelligence instruments strengthen administrators through review of the business condition in routes, for example, business process rebuilding, client relationship administration, marketing research, and contender analysis (Koupaei & Khamseh, 2017). Business intelligence system is a coordinated enterprise figuring system that is intended to automate the stream of material, data, and related financial resources among all capacities inside an enterprise on a typical database (Su & Yang, 2010). Business intelligence facilitates diverse association division information sharing and learning, decrease costs, and enhances business process administration.

The execution of business intelligence in associations is a colossally complex endeavour. Be that as it may, as business intelligence can influence almost every part of hierarchical execution (Chang, Pesce, Chiang, Kuo, & Fong, 2015) lately researchers have examined the impacts of business intelligence. For business, the primary focus is to increase revenues and or reduce costs, thereby improving performance and increasing profits (Williams & Williams, 2007). For the public sector, the primary focus is service to citizens, coping with budget constraints, and using resources wisely in support of an agency's mission. Figure 1 below illustrates this definition. Associations are defines as having exceptional development in the sheer measure of information accessible from heritage systems to them; associations make data systems to manage business necessities as these grow, regularly prompting numerous divergent systems. With veneration to the vital use of business intelligence advances, business intelligence assumes a fundamental part in giving noteworthy data to empower better business essential management.

Figure 1. Business intelligence means in practice
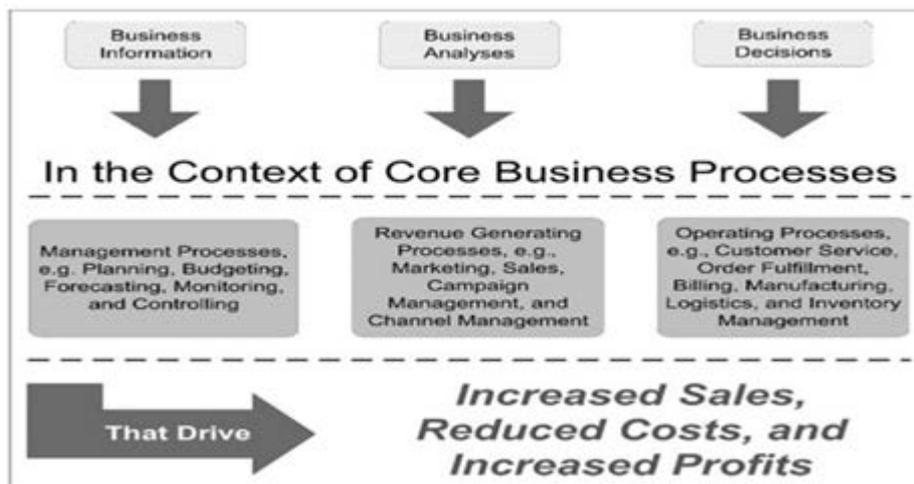
Literature Review
System Compatibility

A few investigations utilizing the similarity factor have demonstrated its legitimacy in anticipating innovation appropriation among associations. This factor could convey changes to the association by changing over old data to be perused on another design, retraining clients to utilize and enabling IT to work force to look after programming adequately. Be that as it may, if existing frameworks are not good with business intelligence innovation, it might take critical speculation of time and assets to move data. In business intelligence, specific contrary qualities identifying with such measures as, data displaying, or equipment or programming applications and also business intelligence stages are real inhibitors to business intelligence appropriation. This framework incorporation is an imperative method for accomplishing enterprise coordination for fundamental leadership. This requires the business intelligence to become a network symbolized by different frameworks, gauges, and work methods. System compatibility has an essential part in tackling the prevalent issues facing association during current difficult times.

In this light, it can be asserted that productive information systems re recognized by specific attributes or measurements (Bokhari, 2005; Mahdi, Ibrahim & Armia 2018). During the previous ten years, the way to oversee business has changed world-wide and associations are demonstrating greater capability with transference of learning, information exchange, and demonstrating the appropriate information and learning. Business intelligence is a critical

methodology for any association to accomplish an upper hand (Azma & Mostafapour, 2012). It is contended that business intelligence applications have the capacity to break down a massive measure of information and give better and faster reactions in business decision making (Elbashir, Collier, & Davern, 2008; Isik, Jones, & Sidorova, 2011; Li, Shue, & Lee, 2008).

System compatibility may, accordingly, be viewed as gratifying in the event that it meets criteria, for example, satisfying client needs and authoritative targets. In the meantime, a scope of components may influence systems advancement and usage. Nonetheless, it appears that the assessment of a system as far as its prosperity, is convoluted (Bokhari, 2005; Hartono, Santhanam, & Holsapple, 2007). Estimation of system compatibility achievement has acquired real significance among analysts. However, assessment of fulfillment, additionally an appraisal of the capacities of the developed system relies upon different terms, for example, system execution, adequacy, quality, utilize and clients' fulfillment is necessary.

Based on the above discussion, the researcher makes the following proposal:
H1: There is a positive relationship between system compatibility and the adoption of business intelligence

Task Complexity

Despite the fact that the authoritative structure of more prominent firms could be altogether different from one to another organization, it is sensible to expect that organizations of any size, portrayed by high hierarchical unpredictability or multifaceted business nature, likewise demonstrate an essential requirement for coordination and control of business exercises which, thus, is identified with the intricacy of the data system (Greenley, 1986; Vancil & Lorange, 1975). Since business intelligence has been pushed by analysts and experts as the response to dealing with the many sided quality of data streams all the more successfully, this last interpretation of business, will be utilized in the examination model of this research. The research will test whether the condition of being an unpredictable association which is estimated by an arrangement of business factors and a more prominent degree of business intelligence selection are directly related components.

Consequently, this research model methodologies of business intelligence as a kind of black box and in this way, their irrefutable internal unpredictability communicated by usage and mechanical issues, for example, is underestimated, and are thus viewed as just an exogenous consideration implicit in the business intelligence idea itself. Specifically, the few issues identified with business intelligence contracting, advancement and support are within the

fundamental achievement factors stream of research (Davenport & Prusak, 2000; Mandal & Gunasekaran, 2003; Motwani, Mirchandani, Madan, & Gunasekaran, 2002) and for the most part, allude more to the accomplishment of the usage than to the reasons that bring organizations to assess the chance of actualizing the business intelligence. The advantages of an effective business intelligence activity are difficult to disregard.

Gathering and sorting out information from numerous sources and exhibiting rational analysis helps drive a more astute enterprise and makes businesses more aggressive in an inexorably crowded market. It is true that a business's success depends on accurate, fact based decisions. Business intelligence solutions can facilitate the decision making process by helping companies leverage the goldmine of information that they capture on a regular basis. However what many companies still lack today when using business intelligence is a data warehouse. Such a repository can serve as the primary source of business information that integrates and processes data from multiple sources into easy-to-understand formats that can be used by decision makers to fuel their insights.

Based on the above discussion, the researcher makes the following proposal:
H2: There is a positive relationship between task complexity and the adoption of business intelligence

Perceived Benefit

Business intelligence is one territory of IT in which conventional assessment systems may perform inadequately, the same number of advantages are vital, and therefore not effortlessly quantifiable (Irani & Love, 2000; Artha & Mulyana 2018). This selection has been principally determined by programming sellers and advisors and is utilized to group an extensive accumulation of programming stages, applications, and innovations that intend to help leaders perform all the more adequately and proficiently. Business intelligence bolsters a scope of business applications, for example, data mining, questioning, examination, and administration revealing. As opposed to operational data systems, a considerable lot of the advantages of business intelligence may not be acknowledged for quite a long time, maybe years subsequent to going into operation.

Principal level advantages may even be perceived in another territory of the association's monetary explanations; in this way, the business esteem probably would not be ascribed to the system in a straightforward manner. As a consequence, many, if not all of today's business intelligence implementations are primarily data centered, are focused on analyzing data from an organization's with the ultimate goal of generating reports and supplying

management information systems with aggregate relevant information in order to support management processes (Bucher, Gericke, & Sigg, 2009). IT speculation was made to profit associations on operational levels. A lot of data could be prepared at high speeds. Equipment was getting to be extensible, and similarity with different systems was expanding.

The prominence of business data handling systems was developing quickly, and there was an emotional increment in the number of PCs being utilized in business applications. The quantitative advantages were clear and the related appropriation costs solid. These systems could process numerous assignments considerably quicker than past advances; a business could save money on labor. The present association can never again burn through cash on an unnecessary foundation. Any innovation that does not give a fast effect on the business' main concern would not be viewed as a suitable prospect. Regularly, any potential venture will be deliberately screened for noted advantages and incentive for rewards. The administration is suspicious in approving an undertaking except if there is an unmistakable exhibition of development or a change in proficiency. Challenges in recognizing IT esteem have been specially featured in a discussion over the profitability and have received critical consideration from various analysts amid the previous decade (Brynjolfsson, 1993; Dewan & Kraemer, 1998; Francalanci, Willcocks, & Kern, 2001).

Based on the above discussion, the researcher makes the following proposal:
H3: There is a positive relationship between perceived benefit and the adoption of business intelligence

Theoretical Background

The appropriation of the advancement procedure is a procedure that achievs outcomes in the incorporation of a development that is new to an association. The appropriation procedure concerns a grouping of stages that a potential adopter of an advancement goes through before acknowledgment of the new procedure, item or thought. The reception procedure is characterized as the procedure through which an individual or other basic leadership unit moves from first receiving information of a development to shaping a disposition towards the advancement, to a choice to receive or not embrace the development, to execution of the new thought, and to affirmation of this choice (Rogers, 1995). The advancement procedure can be viewed as a win to the degree that development is acknowledged and coordinated into the association (Rogers, 1995; Zaltman, Duncan, & Holbek, 1973).

As for hierarchical selection, two fundamental stages are brought up, inception and execution (Tornatzky & Klein, 1982; Zaltman et al., 1973; Haseeb et al., 2019). Along these lines, the

selection of business intelligence is the consequence of a radical development. For business intelligence client associations, the reception of business intelligence is probably going to cause the adjustment in work methodology of various business capacities, information of particular system applications and to expand PC organize based systems among the representatives. In this way, an advancement is not exclusively a restoration by method of innovation, it can likewise be a reestablishment as far as thought and activity go (Thong, 1999). The technological factor is, in fact, an earth-shattering component in expanding business esteem and execution. It is demonstrated by their exploration system which proposed to ground measures of IT utilize and IT execution affect. Aside from this, Diffusion of Innovation theory (DOI) was utilized as an essential development hypothesis for some disciplines including correspondence, human science, advertising, instruction and in addition Technology. It depicts numerous advancement factors, for example, compatibility, trainability, complexity, recognisability and relative preferred standpoint which impact on the decision to acknowledge or the dismissal of IT development, for example, Business Intelligence. In any case, these are key factors that measure Business intelligence productivity in associations. Other than those technological elements director proprietor administrator creativity and proprietor supervisor IT learning is additionally significant to guarantee Business Intelligence effectiveness (Boonsiritomachai, McGrath, & Burgess, 2014).

A proposed conceptual model

The proposed research framework for this study was developed incorporating critical variables derived from a review of the literature on technology characteristic and business intelligence adoption in organizations. In figure 2 below, the research variables used in this study are summarized.

Figure 2. Proposed framework model
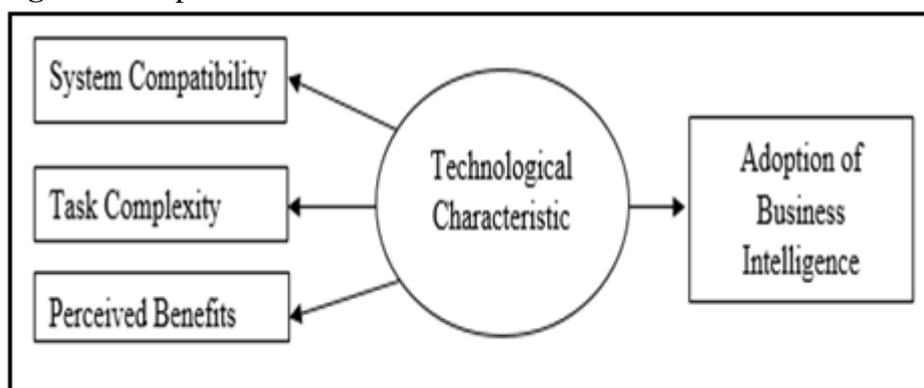
Methodology
Sampling and Data Collection

The target population comprised of ICT personnel Corporations in Malaysia. The choice of ICT departments in this organization was due to their familiarity with the subject of the proposed study. Simple random sampling (Sekaran, 2000) was used for this research study. The unit of analysis is an organization, and the sample will consider the viewpoints of vital organizational informants, including senior and mid-level executives from both the business and technological part of the organization. A total of 162 questionnaires were completed and returned as well as deemed usable after receiving a moderately acceptable rate.

Statistical Test

The simple random sample was chosen from a broader set of the population. A simple random sample is a subset of the statistical population in which each member of the subset has an equal probability of being chosen. A simple random sample is meant to be an unbiased representation of a group. There was a total sampling of approximately 280 Corporations in Malaysia. Data analysis for this quantitative phase of the research was effected using the SEM approach. The measurement model was used to explain or assess construct reliability and the validity of the current study. Secondly, the structural model was used to conduct bivariate correlation analysis and simultaneous regressions analyses to establish correlations, and relationship effects among the constructs under investigation. Additionally, the PLS mechanisms of algorithm and bootstrapping were used to examine the moderating effects. According to (Joseph F Hair, Black, Babin, & Anderson, 2010) partial least squares (PLS) is now well known as the alternative to the SEM method this includes AMOS, LISREL, and other programs (Ahmed, Majid & Zin, 2016; Ali & Haseeb, 2019; Haseeb, Abidin, Hye, & Hartani, 2018; Haseeb., 2019; Suryanto, Haseeb, & Hartani, 2018).

Results and Findings
Demographic Distribution of the Respondents

A sum of 162 questionnaires were completed and returned and deemed emphatically usable usinga decently worthy rate chosen to perform different factual tests and give a solid yield and arrangement (e.g., performing SEM) (J. F. J. Hair, Hult, Ringle, & Sarstedt, 2014). Questionnaires were circulated to assorted business intelligence client associations in Malaysia.

It was shown that the examination about IT reception identifying with business intelligence (e.g., KMS, information stockroom innovation) ordered profiles of respondent organizations into two principle enterprises: 1) manufacturing; and 2) servicing (Ramamurthy, Sen, & Sinha, 2008; Wong & Aspinwall, 2005). These included cover sub-industries including chemical, electronic, automotive, machinery equipment, consulting, construction, communication, financing, information technology, transportation, and retailing. Summary profiles of respondent organizations are exhibited in Table 1 below.

Table 1: Profiles of respondent

Main types of Industries	Number of Questionnaires		
	No. of Questionnaires Received	Response Rate (%)	Total Questionnaires Sent
Manufacturing (Chemical, Oil & Gas, Mining, Automotive, Machinery)	94	58%	158
Servicing (Retailing, Financing, Insurance, Transportation)	53	32.7%	94
Others (Educational, Private University)	15	9.3%	28
Total	**162**	**100%**	**280**

Testing the Measurement, Outer, Model Using PLS Approach

Before testing the study's hypotheses, the measurement model, the outer model, was assessed through the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique. This study followed the two steps approach suggested by (Anderson & Gerbing, 1988). Figures 3 and 4 below show the model of this study with structural dimensions.

Figure 3. PLS Algorithm Path Diagram for the Research Model
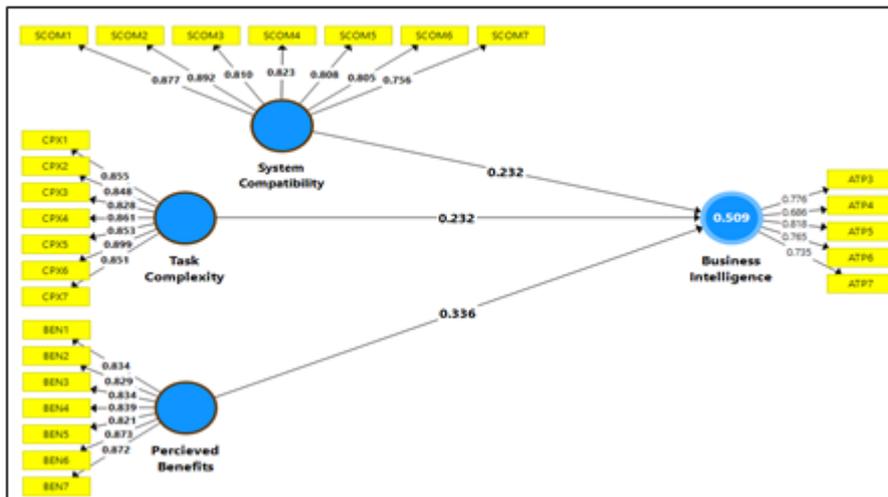
Convergent Validity

In order to verify the convergent validity on the construct level, (F. Hair Jr et al., 2014) suggested using the Average Variance Extracted (AVE) as it has become a widespread method. As a rule of thumb, the AVE of each latent construct should be higher than 0.50 for establishing adequate convergent validity (J. F. J. Hair et al., 2014; Joe F. Hair, Sarstedt, Ringle, & Mena, 2011). From this study, Table 2 below shows that all the values of AVE were in the acceptable range between 0.574 and 0.734 indicating an adequate convergent validity. Thus, the convergent validity was confirmed in the study.

Table 2: Summary of Cronbach's Alphas, rho_A, Composite Reliability and Average Variance Extracted (AVE) in the primary survey

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Business Intelligence	0.815	0.828	0.87	0.574
Perceived Benefits	0.932	0.933	0.945	0.711

System Compatibility	0.922	0.925	0.937	0.682
Task Complexity	0.939	0.941	0.951	0.734

The Discriminant Validity Analysis

To measure the discriminant validity, this study used the Discriminant Validity Fornell & Larcker criterion and Discriminant Validity, Heterotrait-Monotrait Ratio as suggested by (J. F. J. Hair et al., 2014). Its measures show the degree to which items differentiate among constructs. In other words, the discriminant validity shows that items used different constructs do not overlap.

In addition, the discriminant validity of the measures shared variance between each construct and, therefore, should be greater than the variance shared among distinct constructs (Compeau, Higgins, & Huff, 1999). For the purpose of this study, the discriminant validity of the measures was confirmed by employing the method as illustrated in Table 3 below, Discriminant Validity, Fornell & Larcker criterion and Table 4 below, Discriminant Validity; Heterotrait-Monotrait Ratio. As a result of the above testing for the construct validity of the outer model, it is assumed that the obtained results pertaining to the hypotheses testing should be reliable and valid.

Table 3: Discriminant Validity Fornell & Larcker criterion

	Business Intelligence	Perceived Benefits	System Compatibility	Task Complexity
Business Intelligence	0.757			
Perceived Benefits	0.637	0.843		
System Compatibility	0.633	0.639	0.826	
Task Complexity	0.640	0.659	0.802	0.857

Table 4: Discriminant Validity: Heterotrait-Monotrait Ratio

	Business Intelligence	Perceived Benefits	System Compatibility	Task Complexity
Business Intelligence				
Perceived Benefits	0.717			
System Compatibility	0.705	0.686		
Task Complexity	0.714	0.703	0.861	

The Analysis of the Constructs

In this study, three constructs are the focus: system compatibility, task complexity, and perceived benefits. Before testing the research model, the procedure was to examine whether the construct qualified to be conceptually explained. The constructs should be explained well by the hypothesized construct, and they should be distinct (Byrne, 2010). For the purpose of concluding whether the path coefficients are statistically significant or not, bootstrapping techniques are embedded in this study with SmartPLS 3. As reported in both Figure 4 and Table 5 below, the T-Values with each path coefficient were generated using the bootstrapping technique, and P-Values subsequently were generated.

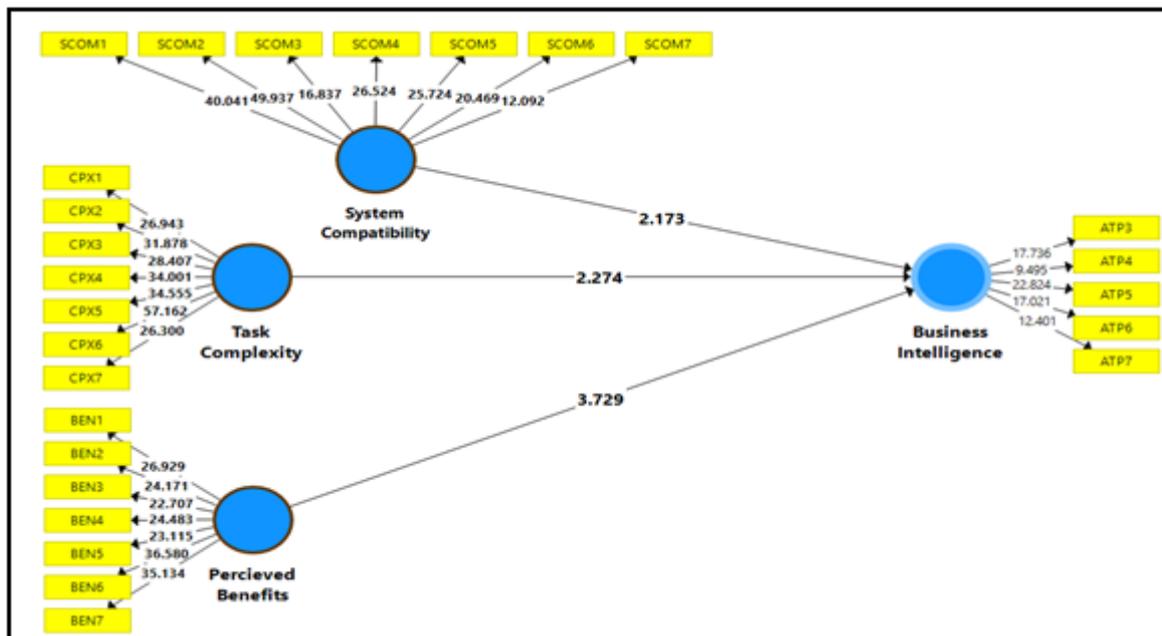**Figure 4.** Path Model Significance Result

Table 5: Bootstrapping result: Hypothesis Testing

	Relationship	Original Sample (O)	Standard Deviation (STDEV)	T statistics (|O/STDEV|)	Decision
H1	Perceived Benefits -> Business Intelligence	0.336	0.090	3.729	Supported
H	System	0.232	0.107	2.173	Supported

2	Compatibility -> Business Intelligence				
H 3	Task Complexity -> Business Intelligence	0.232	0.102	2.274	Supported

Conclusion

Technology advancement characteristics consist of system compatibility, task complexity, and the perceived benefit of how much the technology is seen as being balanced with the current vision, past encounters, and needs of business intelligence clients. At the point when a renewal, or new arrangement of business intelligence is required, these foreign technologies, equipment and computer programs initiate system blunders, postponements, and the requirement for support. At the end of the day, compatibility among business innovation and the clients and additionally the system are essential to operational enterprise method in that it impacts on the association's appropriation of creative innovation. Further, neglecting to consent to these innovations may solicit inappropriate procedure and demoralize the end users. As associations begin to understand that powerful and vital technological solutions exist for extensive capacities fundamental to their affluence, provision of and engagement in training will become a more coordinated business practice.

Business intelligence utilizes IT to accomplish an ability to design and incorporate all-inclusive assets. This system incorporation is an imperative method for accomplishing enterprise combinations for essential management. This requires that business intelligence be a network incorporating different systems, benchmarks and work methodology in the association. In other words, the business value of business intelligence lies in its use within management processes that affect operational processes that drive revenue or reduce costs, and in its use within those operational processes themselves. At a broader level, the use of business information to conduct business analysis is often an idiosyncratic, ad hoc practice that varies by industry and by the company within each industry. The critical question is whether a firm's investment in information technology is in harmony with its strategic objectives and thus builds the capabilities necessary to deliver business value. This state of harmony is referred to as alignment. It is complex, multi-faceted, and rarely wholly achieved. An organization needs technological-centric business intelligence methods that ensure business and IT managers are aware of three success factors of system compatibility; task complexity and perceived benefit.

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