

# ***BUSINESS VALUE OF INFORMATION TECHNOLOGY (BVIT): EXPLORING ATTAINED AND SUSTAINED BVIT***

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## **Abstract**

The dependent variable BVIT (business value of information technology) has been a point of significant debate among IT researchers and has proved to be difficult to operationalize [Wade and Hulland 2004]. Past IT research which was concentrated on conceptualizing or measuring BVIT, paid little attention to the multifarious perspectives of BVIT, both from the time-series aspect as well as from the multi-discipline nature of BVIT existence. Practically, IT researchers have tended to construct BVIT from RBV (resource-based view) elements, which cannot cover its broad nature, or to adopt a relatively narrow definition, which usually uses specific BVIT proxy measurements as growth rate, profitability or perceived corporate performance. This paper defines and explores two new major sub-variables for BVIT, Attained (short-term) BVIT and Sustained (long-term) BVIT, constructed on the fundamental theory of RBV and connected to the groundwork of SAM (strategic alignment model). Attained-BVIT can be originated in an **ex-ante** position to the firm's perceived performance and given competition, in which case IT investments can influence assets utilization, improve efficiencies, enhance short term-duration of competitiveness and reinforce endogenous firm manageability. Sustained-BVIT can be originated in an **ex-post** position to the firm's actual performance and evolving competition, in which case IT investments can leverage resources to form unique advantages, improve firm effectiveness, enhance long term-duration of competitiveness above IAE (industry average earnings), and can enrich the firm agility to cope with exogenous dynamic competitive forces.

**Keywords:** *Information Technology (IT); IT Resources; IT Strategy; Business Value of IT (BVIT); Attained BVIT; Sustained BVIT; Resource Based View (RBV); Strategic Alignment; Organizational Strategy; Competitive Advantage; Sustained Competitive Advantage.*

## **1 INTRODUCTION**

A recent review of research about the business value of IT (BVIT) by Melville et al. [2004] has identified two major open research questions associated with the BVIT concept. The first question concerns the relationships between IT resources and improved operational efficiencies or organizational effectiveness. The second question concerns how IT resources and strategies generate competitive advantage. While the former question has significant

operational implications, the latter bears paramount strategic implications. Following these two important themes, which marry both strategic and operational organizational merits, this paper aims to develop a broad definition of BVIT as a function of IT strategy and resources, and to operationalize the proposed definition, paving the way for future field testing.

BVIT conceptualization in this study is based on the Strategic Alignment Model (SAM) [Henderson and Venkatraman., 1993], which outline the influences and effects among Organizational Strategy, IT Strategy, Organizational Resources, and IT Resources, and their intersected impacts on BVIT. According to Wade and Hulland [2004], organizational and IT alignment is a critical bi-directional process which is a mandatory pre-condition required to gain and sustain BVIT. BVIT conceptualization in this study is also based on the Resource Based View (RBV) of the firm, which is a robust theoretical framework explaining how IT may be associated with value creation of any kind, and especially formation of competitive advantage [Barney, 1991]. Researchers of Strategic IT applied RBV to analyze implications of competitive advantage of IT [Barney, 1991], the main components of IT value creation [Mata et al. 1995], and to empirically assess the complementarities between IT and other organizational resources [Powell and Dent-Micallef 1997]. RBV was also exploited to build a unique distinction between *Attained BVIT*, which concentrates on short-term processes, efficiency-based activities, and more on organizational endogenous value creation, and *Sustained BVIT*, which concentrates on long-term processes, effectiveness-based activities and more on organizational exogenous competitiveness. In his analysis, Barney [1991] suggests three conditions for a resource to confer attainable competitive advantage: appropriability, value, and rareness, and respectively defines another set of three conditions necessary for a resource to confer a sustainable competitive advantage: inimitability, immobility and non-substitutability. Evidently, both SAM and RBV are adequate for assessment, development, and establishment of the relations between organizational and IT strategies and resources, and for differentiating between the two proposed sub-variables of BVIT: *Attained* (short term) *BVIT*, and *Sustained* (long term) *BVIT*.

The term BVIT has been commonly used to refer to the organizational-performance impacts of IT, including productivity enhancement, profitability improvement, cost reduction, competitive advantage creation, inventory reduction, and other measures of performance [Devaraj and Kohli 2003; Hitt and Brynjolfsson 1996; Kriebel and Kauffman 1988]. Much of the BVIT research has been based on the BVIT definition of Mukhopadhyay et al. [1995] as the impact of IT on organizational performance. Using the salience of the distinction between intermediate process-level measures and organizational final resultant-level measures, Barua et al. [1995] developed a model incorporating both first-order effects on operational level variables, such as inventory turnover, as well as higher-level variables, such as market share, and laid the ground for distinguishing between *Attained* and *Sustained* BVIT.

Business-value researches have considered both efficiency and effectiveness formulations of performance. The former formulation emphasizes an internal perspective employing metrics, as cost reduction and productivity enhancement in a given business process, or doing things right [Drucker 1966]. In contrast, the latter formulation denotes the achievement of organizational objectives in relation to the firm's external environment and may be manifested in the achievements of competitive advantage [Barney 1991]. Synthesizing these observations, BVIT can be created and measured by the IT impacts on attained (efficiency) organizational performance and sustained (effectiveness) organizational performance [Melville, Kraemer, Gurbaxani, 2004].

## 2 BVIT DEFINITION CHALLENGES

According to [Wade and Hulland \[2004\]](#), the dependent variable in BVIT research has been under significant debate [e.g., [Delone and McLean 1992](#); [Seddon 1997](#)] and difficult to operationalize. It becomes clear that there are at least two major hurdles in BVIT development: **1)** The multifaceted nature of BVIT; and **2)** BVIT dynamic evolution and change along the organizational lifecycle.

Past IT research that concentrated on conceptualizing BVIT based on RBV theory looked at a narrow dependent construct, with few financial or organizational performance metrics as appropriate proxies [[Wiggins and Ruefli, 2002](#)]. Similarly, early arguments suggesting that a first-mover IT advantage could allow a firm to attain BVIT [e.g., [Feeny and Ives 1990](#)], were later challenged in the absence of model to explain how. It has been suggested that in order to sustain a first-mover IT advantage, firms would need to become perpetual innovators, a role that may be untenable [[Ketinger et al. 1994](#), [Wade and Hulland 2004](#)]. Thus, broad assessment of IT value attainment alongside appraisal of sustainability attributes are clearly warranted [[Willcocks et al. 1997](#), [Wade and Hulland 2004](#)].

Researchers [e.g., [Jacobsen 1988](#); [Porter 1985](#)] have suggested that a sustained competitive advantage endures for a longer period of calendar time than an attained competitive advantage. [Barney \[1991, p. 102\]](#) clearly states that a sustained advantage is one that continues to exist after efforts to duplicate that advantage (in the short and mid terms) have ceased, and that this definition of sustained competitive advantage (SCA) is equilibrium-based. However, as noted by [Wiggins and Ruefli \[2002, p. 84\]](#), Barney's assessment, while theoretically precise, has neither been proven yet nor was it meaningfully and quantitatively operationalized.

As can be seen in Figure 1, the BVIT dependent variable is differentiated in this work into short-term Attained BVIT (ABVIT) and long-term Sustained BVIT (SBVIT). The development process is rooted in broad analysis of BVIT and related literature, and anchored substantially on RBV theory [[Barney 1991](#)] and SAM framework [[Henderson and Venkatraman, 1993](#)]. Both foundations provide the necessary roots for formulating the differentiation between first-level BVIT constructs (latent variables) and their narrated second-level constructs. RBV serves to connect IT resources and capabilities to support organizational strategy and to drive firm performance [[Mellvile et al., 2004](#)], and SAM defines alignments between IT strategy and organizational strategy elements, as well as between IT and organizational resources elements, as the most affective in shaping the multifaceted nature of BVIT. The SAM Framework facilitates definition of BVIT through analysis of multiple cause-and-effect relationships among Organizational Strategy (OS), IT Strategy (ITS), Organizational Resources (OR) and IT Resources (ITR).

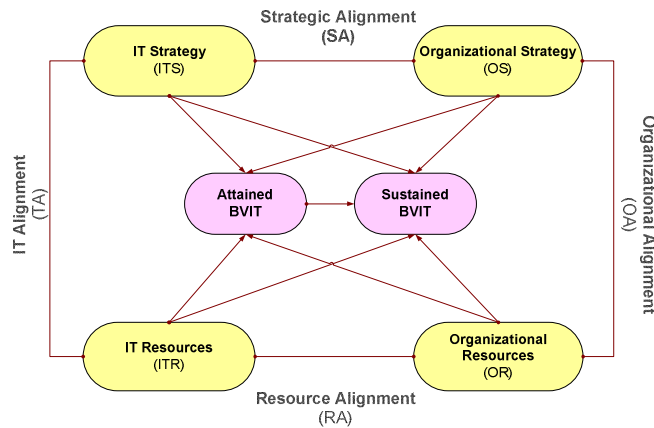


Figure 1. BVIT Dependent Variables Lean On SAM Framework

### 3 EXPLORING ATTAINED BVIT

Based on a broad literature review of BVIT, RBV and SAM, a new definition for Attained BVIT is proposed. ABVIT is defined as *the degree to which the use of IT is improving overall organizational performance to achieve its annual business goals and objectives, and to gain an attainable competitive advantage in the short-term of under two years*. Attained BVIT is posited to be positively affected by four second-level-independent-constructs: Utility, Performance-ability, Solidity, and Manage-ability (see Figure 2).

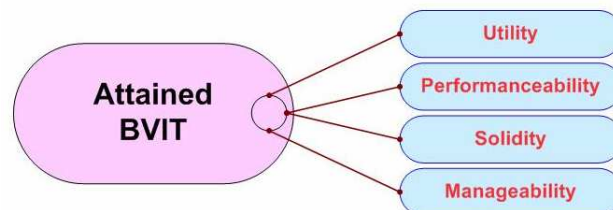


Figure 2. Attained BVIT Two-Level Constructs

**Utility** reflects the degree to which IT resources are utilized to fulfill IT Strategy and to realize a broad organizational resource alignment for improving organizational overall performance [Wade and Hulland, 2004]. The Utility level of BVIT can be assessed by the value, rarity and appropriateness of the IT resources [Amit and Schoemaker 1993; Barney 1991; Collis and Montgomery 1995; Grant 1991]. An IT resource is valuable in an RBV context when it enables a firm to implement strategies that improve organizational performance; an IT resource is rare if it is not simultaneously available to a large number of other firms; and an IT resource is appropriate if it is capable of creating premium earning or benefits with ascribed economic rent. Thus,

Proposition 1: Utility positively affects ABVIT

**Performance-ability** reflects the degree to which IT resources are contributing to organizational operational processes for improved operational efficiency as reflected in its accounting annual P&L (profit and loss) reporting and economic short term results [Dehning et al., 2003]. Measurements of the marginal or incremental value of IT via metrics such as

gross profit margin (GPM), operational profit margin (OPM), sales growth rate (SGR), and/or other annual accounting metrics gradients, are examples of organizational operational efficiency proxies to measure the incremental impact of IT investments [Bharadwaj 2000; Santhanam and Hartono 2003] .

Thus, Proposition 2: Performance-ability positively affects ABVIT

**Solidity** reflects the degree to which IT strategy contributes to maintaining a solid profitable enterprise and can be measured based on three elements [Dehning, 2004; Porter, 1979; 1980]: 1) Industry Average Earnings (IAE); 2) Firm-specific Average Earnings (FAE) indicating value creation; and 3) Duration of Competitive Advantage (DCA). While IAE measures the current status of the industry earnings, the FAE shows the current earnings status of a specific firm and can be benchmarked with the industry.  $FAE \geq 0$  implies total value creation but not yet a competitive advantage;  $FAE = IAE$  implies that the firm is creating value and equalizes its earnings to industry level of profits and therefore maintains a competitive parity;  $FAE < 0$  implies that the firm is destructing value and is positioned in competitive disadvantage. The Solidity level of BVIT implies that if IT strategy and resources are driving the firm to achieve essential positive earnings ( $FAE \geq 0$ ) which are not high enough to exceed the industry average earnings ( $FAE \leq IAE$ ), then the BVIT level is not robust enough to enable a leap beyond the industry benchmark (a proxy to the industry baseline for having competitive advantage).

Thus, Proposition 3: Solidity positively affects ABVIT

**Manage-ability** reflects the degree to which IT resources have managerial knowledge, experience, and capacity to create functional-alignment with IT strategy for developing organizational capital and distinctive competencies such as managerial practices [Bharadwaj, 2000; Mata et al., 1995]. IT can contribute to firm manage-ability over time through: 1) accumulation of explicit knowledge and experience [Katz, 1974]; 2) enhancement of the organizational-capital where knowledge and practices might be tacit and causally ambiguous [Castanias and Helfat, 1991; Mata et al., 1995]; and 3) support or reinforcement of socially complex organizational processes [Mata et al., 1995]. IT contribution to manage-ability level of the firm is thus difficult to measure, and its assessment would perhaps need to rely on capturing management perceptions on the IT disposition and organizational capabilities. Thus,

Proposition 4: Manageability positively affects ABVIT

#### 4 EXPLORING SUSTAINED BVIT

Based on a broad literature review of BVIT, RBV and SAM, a new definition for sustained BVIT is proposed. SBVIT is defined as the *degree to which the use of IT is improving overall organizational performance to achieve its strategic objectives, and to gain sustainable competitive advantage in the long term of over two years*). Sustained BVIT is posited to be positively affected by four second level independent constructs: Advantage-ability, Durability, Predominance-ability, and Agility (see Figure 3).

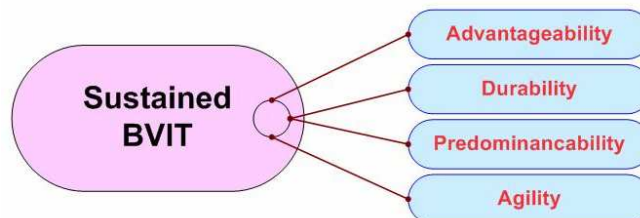


Figure 3. Sustained BVIT Two-Level Constructs

**Advantage-ability** reflects the degree to which IT resources are incorporating elements of sustained competitive-advantage to leverage IT Strategy and to realize strategic alignment for gaining sustainable organizational performance [Barney 1991, Mata et al., 1995; Wade and Hulland, 2004]. Advantage-ability can be assessed by the inimitability, non-substitutionability, and immobility levels of an executed IT strategy and sustained IT resources. An IT resource is not imitable in an RBV context if it is historically unique to the firm, causally ambiguous or socially complex [Barney 1991]. An IT resource is non-substitutable when there are few, if any, strategically equivalent resources [Barney 1991; Amit and Schoemaker 1993; Black and Boal 1994; Collis and Montgomery 1995; Mata et al., 1995]. An IT resource is immobile if it is not commonly, and/or is easily, and/or readily exchanged on the market [Barney 1991; Mata et al., 1995; Capron and Hulland 1999].

**Durability** reflects the degree to which IT is contributing to strategic organizational processes (as planning, budgeting, reporting, scorecarding and consolidation) for improving strategic effectiveness as reflected in the annual balance reporting and economic long term results. Return-On-Assets (ROA) [Bharadwaj 2000; Robins and Wiersema 1995], Economic Value Added (EVA), and Tobin's q are commonly used performance metrics in the strategic management literature [Bharadwaj 2000; Robins and Wiersema 1995]. ROA is a straight forward balance sheet measure. EVA measures the economic benefit derived from organizational investment and resource utilization [Stern et al., 2001]. Tobin's q is valuation ratio of market value and asset value [Tobin 1965; Bharadwaj et al. 1999; Brynjolfsson and Yang 1997; Dehning, Richardson and Stratopoulos 2005].

**Predominance-ability** reflects the degree to which IT strategy is contributing to obtain a strong leading profitable enterprise with relation to industry forces [Porter, 1979, 1980] and can be assessed based on IAE, FAE, and DCA [Barney 1991; Dehning et.al 2003; Mata et al., 1995; Dehning, 2004]. While a positive value of FAE can be used to describe a company creating business value; a positive FAE which is greater than IAE for DCA of over 2 years can depicts a firm maintaining sustained competitive advantage [Amit and Schoemaker 1993; Collis and Montgomery 1995; Grant 1991; Dehning et al. 2005].

**Agility** reflects the degree to which IT enables or supports on-demand flexible organizational capabilities to enhance competitive alignment, gain market responsiveness and fulfill dynamic strategies [Wade and Hulland, 2004]. The changing business environment requires adjusting the resource mix in order to sustain competitive advantage which, otherwise, might be quickly eroded [Eisenhardt and Martin 2000; Teece et al., 1997; Volberba 1996]. In an RBV context, there is a distinction between core and dynamic resources, with the latter considered more valuable in volatile environments and the former criticized for being fixed and non-agile [Miller and Shamsie 1996; Stinchcombe 2000]. Agility is demonstrated by the quality level in which dynamic IT resources are being managed, controlled, and regulated be responsive and flexible with organizational needs though: 1) IT ability to adjust the resource mix on-demand in order to cope with a changing business environment 2) IT ability to support an adaptive enterprise that is able to maintain continuous synchronization between resources and strategy (competitive alignment).

## 5 OPERATIONALIZATION OF CONSTRUCTS AFFECTING BVIT

Based on the aforementioned definitions of Attained BVIT and Sustained BVIT, we propose broad set of items in Table 1., which further refine each of the 4 sub-constructs for ABVIT and of the 4 sub-constructs for SBVIT, The items are leveraging assorted elements

from several disciplines including economics and accounting, industrial management, operational design and organizational behavior.

<b>Attained BVIT</b>	<b>Sustained BVIT</b>
<b>Utility</b>	<b>Advantage-ability</b>
Support <b>Resource-Alignment</b>	Support <b>Strategic-Alignment</b>
Resources with elements of <b>temporary CA</b>	Resources with elements of <b>Sustained CA</b>
<b>Valuable</b> IT resources	<b>Inimitable</b> IT resources
<b>Rare</b> IT resources	<b>Non-substitutionable</b> IT resources
<b>Appropriable</b> IT resources	<b>Immobile</b> IT resources
<b>Performance-ability</b>	<b>Durability</b>
IT improving operational <b>efficiency</b>	IT improving firm <b>effectiveness</b>
IT design organizational <b>operational processes</b>	IT design organizational <b>strategic processes</b>
IT value reflected in accounting annual <b>P&amp;L</b> metrics	IT value reflected in accounting <b>balance-sheet</b> reporting and economic metrics
IT influencing <b>GPM</b> (gross profit margin)	IT influencing <b>ROA</b> (return on assets)
IT influencing <b>OPM</b> (operational profit margin)	IT influencing <b>EVA</b> (economic value added)
IT influencing <b>SGR</b> (sales gross rate)	IT influencing <b>Tobin q</b> (MV/BV)
<b>Solidity</b>	<b>Predominance-ability</b>
IT strategy contribute to maintain a <b>solid profitable</b> enterprise	IT strategy contribute to obtain a <b>strong leading profitable</b> enterprise
(FAE $\geq$ 0), indicating value creation	(FAE $\geq$ 0), indicating value creation
(FAE $\leq$ IAE), revealing <b>competitive parity</b> or disadvantage	(FAE $>$ IAE), revealing <b>competitive advantage</b>
<b>Manage-ability</b>	<b>Agility</b>
Facilitate <b>Functional-Alignment</b> between IT resources and IT strategy	Enhance <b>Competitive-Alignment</b> between organizational resources and organizational strategy
Leverage of IT <b>core (stable)</b> resources	Leverage of IT <b>dynamic (adjusted)</b> resources
Development of <b>durable effective and efficient managerial practices</b> and organizational capital	Enablement of <b>flexible on-demand capabilities</b>
IT ability to create a <b>learning-organization</b>	IT ability to support an <b>adaptive-enterprise</b>
Gaining <b>intrinsic know-how</b> via accumulation of explicit and tacit knowledge and experience	Gaining <b>extrinsic market responsiveness</b> to fulfill dynamic strategies

Table 1. Attained and Sustained BVIT sub-constructs identifiers

## 6 CONCLUSIONS AND FURTHER SUGGESTED RESEARCH

This study attempts to develop a measurable model of BVIT, focusing on differentiating between attained and sustained contributions, when attained refers to the short term, whereas sustained implies long-term durability of business value accrued by IT. To this end, we have thoroughly surveyed the academic literature, spanning over several research domains, such as strategic management, marketing, organizational behaviour, economics, corporate accounting, and industrial operations. Focusing on RBV and SAM, we utilized these theoretical frameworks for this study, and propose four constructs as antecedents of ABVIT as well as four constructs as antecedents as SBVIT. We further elicit operational parameters to operationalize each independent factor, building upon measurable economic parameters where possible, and on management perceptions when quantifiable evidence is difficult to come upon.

Our next step is to further refine the proposed model definitions through panels of experts from both academia and practice, compose a measurement instrument in the form of a questionnaire, and then pilot-test the instrument among a sampled group of senior managers, both business and IT executives.

We are aware of the complexity embedded in such models, particularly expectations that independent constructs might be highly correlated, thus establishing discriminant validity is challenging. This would perhaps require several refinement rounds of the measurement items. Nonetheless, we believe that it is about time that an attempt is undertaken to empirically measure and assess BVIT, in spite of difficulties mentioned here and by the literature.

If proven successful, this study would substantially contribute to research and practice in several ways. Firstly, the suggestion to split BVIT into two major new dependent variables, Attained (short-term) BVIT and Sustained (long-term) BVIT, as well as their conceptualization, construction, and measurement. Secondly, the development of empirically testable propositions, pertaining to a comprehensive variety of organizational factors affecting BVIT. Thirdly, empirically modelling and measuring Attained and Sustained BVIT based on the RBV theory, overcoming most of the empirical shortages or deficiencies mentioned above. This will be achieved by concentrating on measuring the influence of RBV constructs (independent variables) on BVIT constructs (dependent variables), quantifying their potential influence on gaining an attained or sustained BVIT. Finally, we aim to create a 'BVIT magnitude test-scale', aspiring to assign a single numerical value to quantify company's BVIT in terms of the worthiness of IT investments and to benchmark BVIT levels among industries. This scale will be obtained by finding a way to calculate the combined influence of 'organizational and IT strategies and resources' on value creation related to IT (both attained and sustained), as aforementioned.

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