TO SPEND OR NOT SPEND: IT INFRASTRUCTURE CHALLENGES

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Abstract

Numerous studies have explored IT expenditure benefits and the options such expenditure creates. These options are seen as intangible assets created by investing in IT (Kholi et al, 2012). Benefits of IT Expenditure (BITE) are assessed by the perception of senior executives. Perceptions of BITE are subjective and are important as there is little objective measurement at the process level (Tallon and Kramer, 2007). If a consensus between executives can be established it improves the prospects for an accurate understanding of processes (Tallon, 2000). This research therefore develops a conceptual framework to facilitate consensus for executive perceptions that shape an understanding of benefits as well as expenditure under sense making (Weick et al, 2005, Tallon, 2014) and sense giving (Rouleau, 2005, Weick et al, 2005). The shaping of understanding of benefits (BITE) and expenditure (ITE) are needed for the *ex ante* contracting of a business case as well as the *ex poste* governance of IT infrastructure.

Keywords: IT expenditure, Infrastructure, IT benefits, Performance Perceptions, Governance

Introduction

Information Technology (IT) includes information and communication technologies, as well as the shareable technical platforms and databases related to these technologies (Ross et al, 1996). IT infrastructure is the platform of IT capabilities that are pivotal to long-term growth and success of a business firm. IT infrastructure budgets maintained or increased their expenditure (Luftman et al, 2012). Such expenditure requires linking management and financing of projects to keep the entire IT infrastructure working (Agarwal et al, 2014). IT infrastructure provides for businesses to engage and connect faster and more accurately with regard to decision making (Bharadwaj et al, 2013).

Prior research holds that IT contributes to firm level productivity (Kelis et al, 2012). However, a consensus about linking IT expenditure to a firm's financial performance has not been established (Bharadwaj, 2000). In particular, there is a gap between the *benefits* of IT expenditure (BITE) and linking financial performance (Mithas et al, 2016).

Gap in the Knowledge

Benefits frameworks have provided a view on BITE and IT expenditure but more recently, for infrastructure, such benefits frameworks have come under scrutiny. Consequently the validity of IT expenditure measurement and assessment of its influence on a firm's financial performance is unclear. Expenditure on infrastructure is expected to exceed $11,280 billion US dollars by 2030, yet the evaluation processes for such future expenditure need to be improved (OECD 2012 p 15). Flyvberg (2009) notes that the cost-benefit analysis for major infrastructure projects cannot be trusted, where the projects that look best on paper amass the highest cost over runs and the actual benefits fall short of the business case presented.

Literature Review:

Literature relevant to the research questions was identified under the following headings: IT expenditure; BITE; factors influencing both IT expenditure and its benefits; and IT infrastructure. In addition, executive perceptions, cognitive frames and executive mind sets about BITE are relevant.

IT expenditure is mentioned as a catalyst for IT investment (Bharadwaj, 2015) or as creating investments and options (Kholi et al, 2012). Shen et al (2015) argue that, though there is an increase in IT expenditure within organisations, very few studies examine the determinants of such expenditure.

BITE is usually presented as tangible and intangible benefits that can occur in a single accounting period, or over a series of accounting periods. Such benefits can be derived from expenditure for the procurement of IT related services and products (Bharadwaj et al, 2013, Kleis et al, 2012). BITE is affected by a variety of factors and characteristics. It can differ from industry to industry (Brynjolfsson et al, 2010). Decisions to internally source, versus external sourcing of IT products or services also affect BITE (Han and Mithas, 2013). Firm's market value and how it is measured can affect BITE (Kholi et al, 2012).

The use of accounting based performance measures such as return on investments, return on assets have been used to assess BITE (Ra'ed Masa'deh *et al*, 2015). BITE has also been assessed in terms of social capital methods (Wagner, Beimborn &Weitzel, 2014) where

measures of structural linkage, cognitive linkage and relational linkage form the basis of assessment.

Measuring BITE and ITE for infrastructure is usually done in two stages; recording the initial expenditure and afterwards updating records by additional, later expenditure (Agarwal et al, 2014, Peterson, 2013). Financial and IT executives often do not argue for accounting capitalisation, owing to immaturity of technology and complexity issues (Gananasambandam et al, 2014). Alternative measures suggest using a measure of capital services, where such services flow from the IT stock in constant, quality-adjusted dollars (Kleis et al, 2012). Nevertheless, such investments are seen as high risk owing to their uncertain payback, irreversibility and valuation difficulty (Khan et al, 2013).

BITE is claimed to come from various sources (Han and Mithas, 2013): firm performance frames (Ra'ed Masa'deh *et al*, 2015); business value (Wagner, Beimborn &Weitzel, 2014); intangibles accompanying the market value of firms Kholi et al, 2012); and as growth options in co-ordination activities of IT infrastructure (Shen et al, 2015). The widespread sources of BITE and the opacity of their identification is reflected in the variety of executive perceptions. By virtue of their seniority within the corporation, business executives are believed to be in an advantageous position to identify how and where IT creates value for their businesses (Tallon, 2014). If there is a lack of consensus or shared understanding of organizational reality between executives, there is a lack of clarity as to the benefits of IT (Mezias & Starbuck 2003).

Perceptions at the executive level form a basis of understanding BITE and IT expenditure. These perceptions are shaped by the executives understanding of organizational goals and strategies, as well as the reasons for why the expenditure is undertaken. IT managers will also be better equipped to communicate IT expenditure requirements in a way that aligns with the organisation perceptions and requirements.

IT has the potential to improve overall efficiency of organisational resources, making them more accessible (Bharadwaj, 2000). The significance of this research is that it aims to lend clarity to the link between executive perceptions of BITE and a benefits framework. A benefits framework is embedded in the business case (level of analysis for my conceptual framework) where the benefits (BITE) and expenditure (ITE) are captured.

Conceptual Framework:

We propose a detailed conceptual framework for identifying and analysing BITE. This is to act as an overarching framework that steers, aligns, governs and mediates IT expenditures, benefits of such expenditures and the perceptions of such benefit at various cognitive frame levels within an organisation (Shen et al, 2015, Weber & Myer, 2014) and draw upon infrastructure concepts only directly related to IT infrastructure (Agarwal et al 2014, Ganasambandam et al, 2014).

Also positivist views of the benefits of any IT services and products integrated into an organisational environment is assumed. Benefits of IT enabled innovation have been demonstrated in an academic network setting *(the academic network equated to an industry and knowledge contributions regarded as outputs)* (Kleis et al, 2016). Enabling working in global research clusters from remote locations occurs, encouraging the new pathways of output at reduced costs. Based on the theories of TCE and engaged scholarship and also reflecting the

literature that forming the research questions, a conceptual framework is developed in Figure 3.

Productivity measures and performance markers found in prior research have been included to form a more cohesive view of BITE and the perceptions of executives are evaluated against these measures and markers. Productivity measures include input, output measures along with time interval adjustments and redistribution tracking are performed (Kogan & Papanikolaou, 2014, Wagner, Beimborn &Weitzel, 2014). Performance markers include application, approach variables, impact typicality and reporting or feedback mechanisms (Shen et al, 2015, Bhardwaj et al, 2015).

The four parameters of this framework include namely benefit classification, benefit nature, performance markers and productivity markers will converge to allow the analysis of benefits. These four parameters are used to assess the perceptions of executives in this study. A convergence view of this framework to plot data will look something like the following;

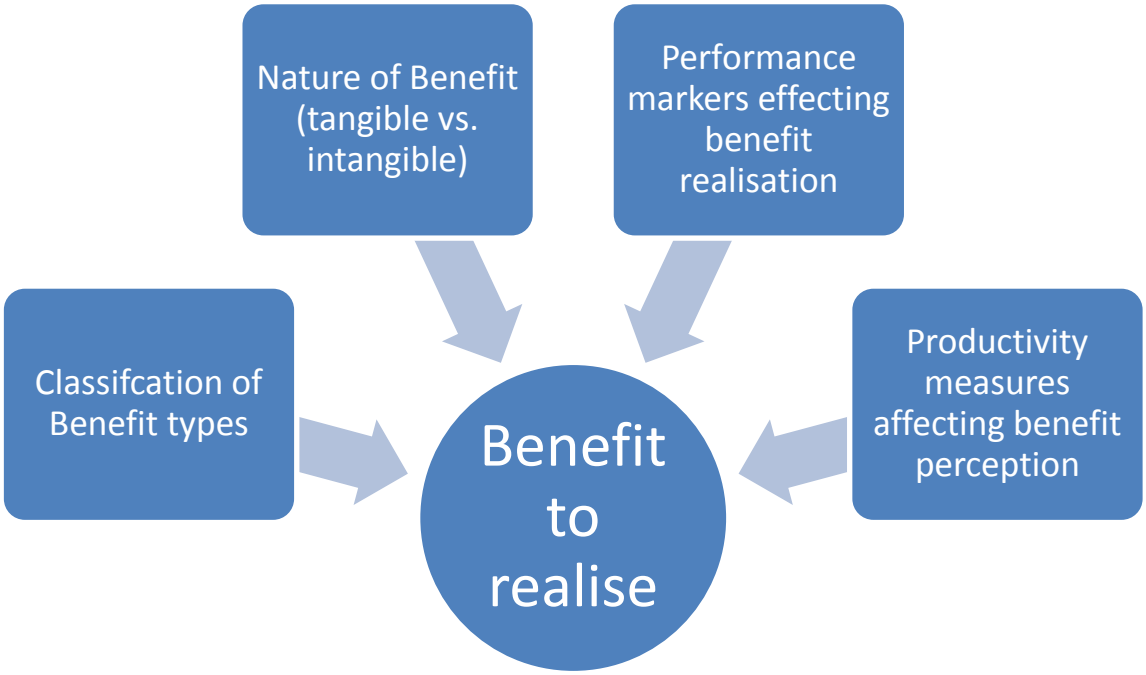

Figure 1: convergence view of benefit realisation theoretical framework.

Conclusion:

The challenges of the above conceptual framework are to include the uncertainty of the benefit types: time horizon needs to be long to realize any benefits (OECD, 2012); the *ex ante* benefits and expenditure are substantially different from the *ex poste* outcomes (Flyberg, 2009). The above conceptual framework argues that by specifying the performance markers as well as the productivity measures in the *ex ante* contracting (business case), helps the cognitive frames of the submitters (senior executives) to be explicit, The governance and performance management of large IT infrastructure can use the markers and measures to measure, analyse and evaluate each business case. Measure, Analyse and Evaluate (MEA) are an integral part of governance (COBIT 5). Therefore, BITE and ITE need to include measures both at the *ex ante* submission (business case) to match the *ex poste* governance of IT infrastructure.

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