Business process re-design methodology to support supply chain integration

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ABSTRACT

Although a number of methodologies exist for business process re-design (BPR), supply chain re-design (SCR), and e-business process design, there is a lack of an integrated BPR methodological framework to support supply chain integration (SCI). This paper proposes a detailed framework based on integrating a number of different methodological strands from the literature. A literature review was conducted in three different domains – business process re-design, supply chain re-design and e-business process design. The literature review revealed the potential for integrating elements of a number of different methods and techniques found in different methodological strands into a framework for conducting BPR to support SCI. Accordingly a number of relevant methodologies were identified, decomposed and compared at their stage and technique/method level to identify a combination for development of the integrated framework. The proposed BPR methodology can be applied in any company or sector; methods and techniques incorporated are not specific to any sector. The proposed BPR methodology proposed constitutes an aid for supply chain practitioners in the construction of SCI.

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1. Introduction

1.1. Supply chain integration

The necessity to coordinate several business partners, internal corporate departments, business processes and diverse customers across the supply chain gave rise to the field of supply chain management (SCM), (Turban, King, Lee, Liang, & Turban, 2011). At the core of gaining competitive advantage through SCM is supply chain integration (SCI); when integration is achieved, the supply chain operates as a single entity driven directly by customer demand (Farhoomand, 2005). However the supply chain literature shows the existence of a number of challenges associated with the integration of supply chains (Awad & Nassar, 2010; Bagchi & Skjoett-Larsen, 2005; Sweeney, 2011). Among these challenges, sharing of information, coordination of physical good flows, and integration of business processes appear to be most critical (Prajogo & Olhager, 2012; Robertson, Gibson, & Flanagan, 2002; Sahin & Robinson, 2002).

1.2. SCI construction

In search of solutions, which can facilitate the construction of SCI, companies have turned their attention to e-business technologies (Auramo, Aminoff, & Punakavi, 2002; Cagliano, Caniato, & Spina, 2003; Chen & Holsapple, 2012; Wiengarten, Humpreys, McKittrick, & Fynes, 2013). According to a study conducted by Auramo et al. (2002), organizations across different sectors have recognized the potential of e-business to share timely and reliable information, to enable business process integration and coordination of activities. Nevertheless evidence in the e-business and supply chain literature shows only a limited adoption of e-business for SCI, (Auramo et al., 2002; Bagchi & Skjoett-Larsen, 2005; Chen & Holsapple, 2012; Croom, 2005). Chen and Holsapple (2012) conducted a study on two hundred and sixty five articles published from 2006 to 2010 on organizational e-business adoption, and found only 1.1% dealing with supply chain integration. This limited adoption highlights the existence of challenges in the application of e-business to enable SCI.

New internet based e-collaboration tools allow the integration of multiple organizations, making it feasible to construct SCI systems. However, tools alone are not sufficient; it is necessary to

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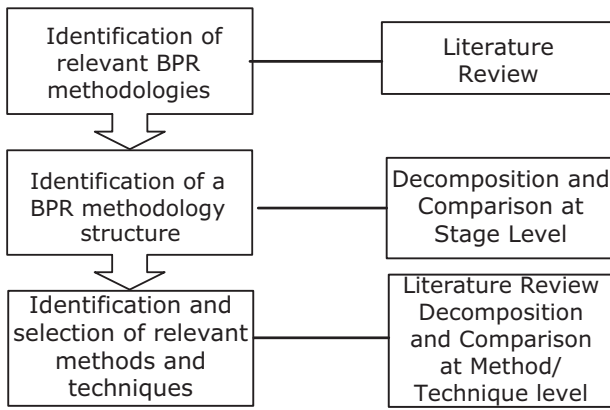 [1] Tel.: +44 024 765 24762.
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Fig. 1. Research methodology.

Fig. 2. Literature review: main domains.

undertake organizational and technological changes together with a co-alignment in structure, management processes, strategy, technology, and individuals/roles for successful e-business adoption (Chen & Ching, 2002). At the core of organizational changes from an operational point of view are business processes; when e-business technologies are implemented the business processes should be re-designed to support the new technology (Gunasekaran & Ngai, 2004).

1.3. Business process redesign to support e-business adoption for SCI

Redesigning business processes to support the adoption of e-business technologies is difficult. The increase of complexity in business processes in supply chains results in the need for new methodologies to handle this complexity, in particular, on how to integrate process information in enterprise networks (Roder & Tibken, 2006). Thus, based on the identified necessity to change business processes the following research question is posed: "How to change business processes in support of e-business adoption for SCI?".

2. Research methodology

To answer the research question the next steps were followed (Fig. 1).

First, a number of relevant methodologies were identified within the relevant domains shown in Fig. 2.

These methodologies were selected for their process re-design oriented approach (Tables 1 and 2). The review found that none of the methodologies provides a comprehensive solution to the research question, although it seems that a number of the methodologies reviewed could potentially be combined for that aim. Whilst considering different methodologies for a particular intervention, a number of methodologies tend to be more useful in relation to some phases than others, so it becomes attractive to combine different methodologies for a better result. When linking different
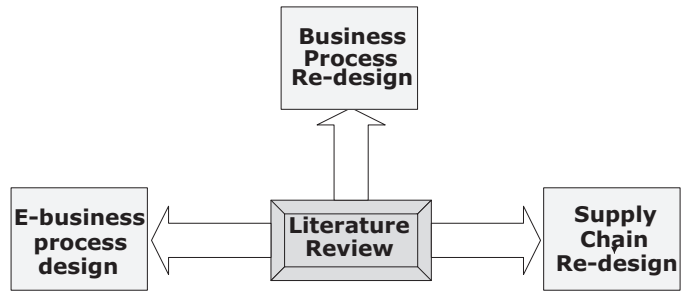
methodologies it is necessary to decompose them into detachable elements. According to Mingers and Brocklesby (1997), it is possible to decompose methodologies at the stage level (what) or at the technique level (how). Accordingly, the relevant methodologies (Tables 1 and 2) were first decomposed at their stage level. Next through an inductive approach of pattern recognition similar to the one used by Kettinger, Teng, and Guha (1997), the commonalities and differences between the decomposed methodologies were analyzed in terms of their stages and activities. This analysis identified a set of distinct stages included in each methodology. Then a set of common stages were identified to be present in all the methodologies reviewed. Finally a brief description for each common stage was elaborated, giving as result the identification of generic stages for the construction of a BPR methodology structure.

Lessons learned from the review conducted on the methodologies shown in Tables 1 and 2, is that no particular methodology exists to tackle the research question, although it seems that a number of the methodologies reviewed could potentially be combined for that aim. After being decomposed at stage level, it can be observed that the methodologies reviewed share common stages; these similarities can be used for the purpose of combining different methodologies for a particular intervention into a single BPR structure (Mingers & Brocklesby, 1997).

3. Business process re-design methodology: methods and techniques

The methodologies reviewed were decomposed a second time in terms of their techniques and methods employed in order to select the most suitable for each stage. Additional methods and techniques were adopted from the wider supply chain management and e-business literature. The resulting methodology is a multi-methodology, the essence of which is to link together parts of different methodologies to tackle a particular problem situation (Mingers & Brocklesby, 1997). First, the generic stages (Tables 1 and 2) were refined by splitting some as follows:

- Strategic vision: This stage was found to be present in most of the methodologies reviewed. The only modification, which appeared to be necessary, was to separate the top management commitment and visioning from the construction of a "rich picture" about
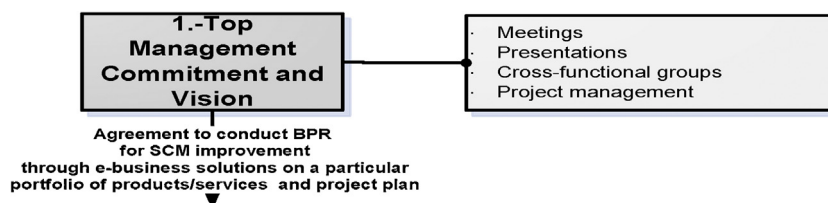

Fig. 3. Stage 1: top management commitment and vision.