

Supplier Development Literature Review and Key Future Research Areas

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Abstract

The purpose of this paper is to develop a Supplier Development (SD) literature framework and identify the main focus areas in SD research. To this end, a comprehensive review of the existing SD academic literature has been undertaken, which includes 62 research papers. These papers are classified according to their research content and the research methodology employed. A comprehensive list of future research areas is also presented. Thus, this paper will also briefly explore proposed future research. The review of the SD literature presented here identifies the following main areas of focus: Supplier Development Activities, Practices and Success Factors; Direct or Indirect Supplier Development; Supplier Development as a Reactive or Strategic Process; Supplier Development in a Lean Six Sigma & SME context.

Keywords: supplier development, supply chain management, literature review

1. Introduction

In order for firms to compete effectively and survive in the global market, they must maintain and build relationships with a capable and competent network of suppliers and extract maximum value from these relationships. To create and maintain such a network and to improve capabilities that are necessary for the buying organisation to meet its increasing competitive challenges, the buying firm may engage in SD (Carr and Pearson [1]; Chidambaranathan et al. [2]; Trent and Monczka, [3], Cox, [4]). According to Wagner [5] and Krause et al. [6], SD is one of three choices that could be employed to manage problems buying firms may experience in their supply networks. Problems arising within the supply chain may include a current supplier performing below expectation; a non-competitive supplier base; current suppliers unable to support a firm's strategic growth; or capable suppliers not available in a certain market. The three choices to manage these problems described in the literature are:

- (1) Supplier switching, i.e. search for alternative more capable suppliers.
- (2) Vertical integration, i.e. by setting up manufacturing capability in house.
- (3) SD i.e. assisting the supplier in improving the performance of services and products or enhancing the supplier's capabilities.

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There is strong evidence that organisations today are increasingly implementing SD programs to improve supplier performance and remain competitive (Modi and Mabert, [7]), and thus this is an important topic of research.

The aims of SD are generally twofold from the customer's perspective: firstly, to reduce cost, improve quality, and improve delivery; and, secondly, to educate suppliers in a systematic process to keep driving continuous improvement. Building on previous definitions of SD offered by Krause and Ellram [8] and discussed by Krause et al. [9], this paper defines SD as: "Any effort of a buying firm working with its supplier(s) to increase the performance and/or capabilities of the supplier and meet the buying firm's short- and/or long-term supply needs. Moreover, promotes on-going improvements that are intended to benefit both buyer and supplier(s)"

2. Methodology

In this literature review, the systematic literature review approach has been followed in selecting papers (Tranfield *et al.*, [10]). International peer reviewed journal articles were sourced from Business Source Premier (EBSCO), Science Direct (Elsevier) and ABI/Inform (ProQuest) academic databases. No limitation was used on the date or journal of publication. The use of search terms "Supplier Development" and "Supplier Performance Management" separately revealed circa 2200 hits for each. We further decreased this to a final list of 62 research articles by using systematic search criteria confining search phrase to "Supplier Development" limited to title, keywords and abstracts (Tranfield *et al.*, [10]).

In this paper, only 52 of these articles are referenced, as these make the greatest contribution to the existing body of knowledge. However, a full list of the 62 articles is available from the authors on request, and all of them have been included in the discussion in section 3 below in which the articles are classified according to research content and methodology. The classification used in section 3 below was derived inductively from reading the full set of 62 articles and analyzing the content.

3. Classification of Literature

According to Wagner [5] the "first wave" of SD research was started by quality management researchers during 1989-91 and the "second wave" began in 1995 when researchers started working on relationship issues. A similar trend can be demonstrated by the numbers of research articles reviewed in this paper as shown in Fig. 1. The graph shows that there has been an increased focus on SD in academic research, which might be due to buying companies becoming increasingly dependent on supplier performance for timely delivery of quality products and services and for driving improvements in competitive advantage (Wagner and Krause [11]).

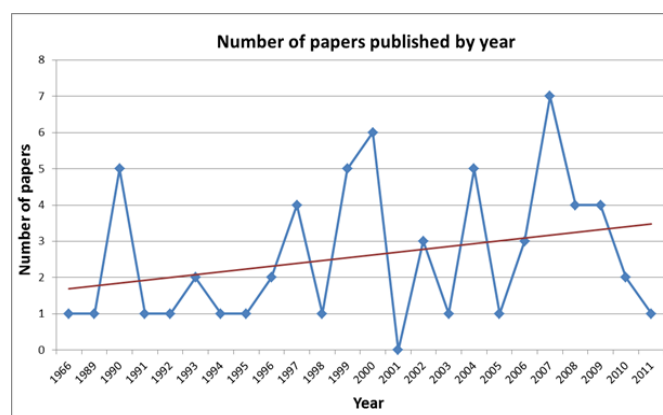


Fig. 1 Number of papers published by year related to Supplier Development

A categorization of the literature was undertaken firstly according to the type of article in terms of the research methodology employed and secondly according to research content. Fig. 2 depicts the overall classification of the literature with brief descriptions of each category given below.

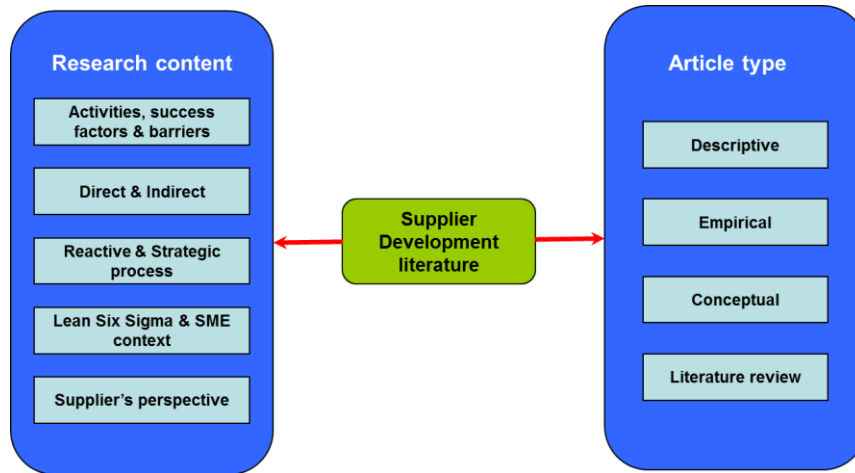


Fig. 2 Classifying Supplier Development literature

3.1. Article Type

In the literature review presented by Krause and Ellram [8], it was argued that SD research primarily used a case study approach. However, the literature review presented here identifies that in publications after 1997 researchers are using surveys as the predominant research method thus showing a change in the dominant approach over the last decade. A summary of the article type in terms of the research methods employed in the SD literature is presented in Table 1 below. It is noted that in the 62 research articles reviewed there are no research papers which have employed the Action Research method. Moreover, it is illustrated in Table 1 that 56% of the research papers published are empirical in nature and have used the survey method; 23% of research papers are empirical in nature have used the case study research methodology and there have been fewer descriptive (15%) and conceptual (6%) papers. Even though the article written by Krause and Ellram [8] has a significant literature review as indicated above, it is counted here as an empirical study as the authors have also used a survey as the main research method within the same article.

Table 1 Classification of literature by article types

Article Type	No. of papers	%
Conceptual	4	6%
Descriptive	9	15%
Empirical: Case Study	14	23%
Empirical: Survey	35	56%
Total	62	

3.2. Research content

This literature review found that the highest % of papers (45%) are related to activities, practices and success factors of SD, followed by Strategic or Reactive SD (23%) and Direct and Indirect SD (14%). Amongst the 5 identified categories there has been least focus on SD from the supplier perspective in current academic research.

4. Literature Focusing on Supplier Development Content Categories

4.1. Supplier Development Activities, Success Factors, Barriers and Pitfalls

4.1.1 Supplier Development Activities

The subject of SD activities and success factors is the most frequently discussed subject in the topic of SD. Various types of SD activities exist and are mentioned by many researchers, some of which require an intensive commitment of resources (Wang *et al.*, [12]; Krause and Ellram, [13]; Hemsworth, *et al.*, [14]; Prahinski and Benton, [15]; Krause & Ellram, [16]; Chidambaranathan *et al.*, [2]; Forker and Hershauer [17]; Trent and Monczka, [3]; Heide and John [17]; Fitzgerald [19]; Krause *et al.* [9]; Modi and Mobert [7]; McGovern and Hicks [20]; Humphreys *et al.* [21]; Watts and Hahn [22]; Kannan *et al.* [23]; Hahn *et al.* [24]).

In this literature review, only one article by Krause and Scannel [25] compare the SD practices between product and service firms. Product base firms used supplier evaluation and feedback, and supplier incentives to a greater extent than the service firms. On the other hand, the service firms used competitive pressure to a greater extent than the product-based firms.

It is noted that the literature focusing on SD activities lacks in-depth frameworks on how to select appropriate SD activities out of the many choices available to achieve the desired results. Therefore, there is a research gap to establish the direct or indirect impact of selective SD activities on suppliers' cost, quality, delivery and production innovation, and how these SD activities in turn link with improvements in the buying firm's performance. Buying firms would then better understand which SD activity is required to achieve particular outcomes and which supplier activities they need to focus on to acquire excellence. Although this issue has not yet fully answered in the literature, the following papers make a contribution for the issue. Trent and Monczka [3] present a hierarchy of activities in their descriptive article addressing the increasing importance of the supplier, particularly in supporting product and service quality requirements.

Carr and Kaynak [26] and Chidambaranathan *et al.* [2] investigated the relationships amongst various SD activities such as use of communication methods, information sharing within a firm, information sharing between firms, SD support (visits & training), supplier evaluation and capability improvement. Similarly Prahinski and Benton [15] investigated Supplier evaluations & communications strategies to improve supplier performance and have found that buying firms cannot expect supplier performance to improve by simply establishing the SD procedures. Research conducted by Kannan *et al.* [23] also analyzed the interactions among various SD activities in the automobile industry and have found firms are increasingly thinking in terms of competing as a part of a supply chain against other supply chains, rather than as a single firm against other individual firms. All these papers attempts to understand the relationships of various SD activities in various business settings; however, they do not present a systematic process of selection and evaluation of those SD activities.

4.1.2 Supplier Development Success factors, Barriers and Pitfalls

Given the importance of success & failures in the context of other initiatives, such as TQM, it is not surprised that this has attracted some attention in the SD literature. Research by Krause and Ellram [13] and Giannakis [27] suggest support from top management and proactive procurement management are key factors to the success of these SD programmes. The findings by Humphreys *et al.* [28] and Hemsworth *et al.* [14] concluded that there is a significant positive relationship between SD strength and purchasing performance; and the findings that SD have a predictable impact on purchasing performance is consistent with Hahn *et al.* [24] and Hartley and Choi [29]. However, a long-term partnership was found to be a significant predictor of performance improvement by Krause and Ellram [16] but not in the findings by Humphreys *et al.* [14].

There are a few papers which have investigated the pitfalls and barriers that occur during the SD deployment process. In some cases, it is observed that lack of buying firm power can be problematic, as measured in terms of the percentage of a supplier's output purchased by the buying firm (Krause and Ellram [16]; Krause et al. [6]; Lascelles and Dale [30]). Lack of effective communication has also been cited as a barrier to SD, as has lack of buying firm credibility (Krause and Ellram [13]). Rhodes et al. [31] has presented the pitfalls in SD that need to be avoided for successful SD, indicating that the top five pitfalls are: lack of supplier commitment, insufficient supplier resources, lack of trust, poor alignment of organisational cultures and insufficient inducements to the supplier. Krause et al. [6] has divided SD pitfalls into three categories: supplier-specific pitfalls, buyer specific pitfalls, and buyer-supplier interface pitfalls. In addition to the top five pitfalls presented by Rhodes et al. [31] unsupportive managers are mentioned as a common pitfall in the article by Krause et al. [6].

4.2. Direct (Transaction-specific) & Indirect (Infrastructure factors) Supplier Development

The review found 10 papers that have classified SD activities into direct (transaction-specific or internalised) and indirect (infrastructure factors or externalised) SD (Humphreys et al. [21]; Krause et al. [32]; Modi and Mabert [7]; Wagner [5]; Wagner [33]; Hines [34]; Giunipero [35]; Krause [36], Wagner [37], Inemek [38]). Wagner [33] defines Indirect SD as “*the buying firm commits no or only limited resources to a specific supplier. There is no active involvement of the buying firm in the supplier's operations, and know-how transferred from the buying firm does not occur.*” Instead, the customer firm may assess suppliers, communicate supplier evaluation results, provide incentive for future business, increase a supplier's performance goals, or instill competition by the use of multiple resources. Direct SD is defined as “*Provision of equipment or capital, on-site consultation, education and training programs, temporary personnel transfer, inviting supplier's personnel, taken as a whole the transfer of knowledge and qualifications to the supplier organisations*”. Both types are likely to have a direct effect on the performance of supplier and buying organisations in terms of supply chain competitive advantage, and supplier performance improvement (Humphreys et al. [21]). Although the Direct and Indirect SD look to be distinctively different approaches to improve SD performance and they can be classified as mutually exclusive, they can also be used alongside one another (Krause [38]).

Since direct SD requires significant time and resource investment by the buying firms, Krause et al. [32] and Krause et al. [9] presents the central idea that firms have been reluctant to invest in direct SD due to a perceived lack of immediate return on investment (ROI) associated with deploying the resources required to make it successful. This could be an important area for research as direct SD can be an enabler of more significant performance improvement (Humphreys et al [21]; Humphreys et al. [28]; Krause et al. [32]) for buying firms. Future research is required to find a correlation between direct SD, its ROI and associated performance improvement as outlined in the research gap below.

4.3. Supplier Development as Reactive or Strategic process

In the SD literature, several researchers have recognised that SD is strategically important for the overall success of the firm, and in turn contributes to maintain a sustainable competitive edge, and is considered a building block of supplier management practices (Krause et al. [39]; Carr and Pearson [1]; Chakraborty and Philip [2]; Monczka et al. [41]; Sanchez-Rodriguez [42]; Watts et al [43]). Wagner [5] and Krause et al. [39] suggested that it is important to identify a supplier strategy which suppliers are “key” suppliers and how they are to be treated differently. For example, SD is only viable for “key” suppliers and supplier switching might be an option for other suppliers. However, in the existing literature there is a knowledge gap to understand specific suppliers' motivations to participate in SD programs and how buyers can influence suppliers who are not dependent upon them to participate in supplier training and technology/ product development.

Krause *et al.* [39] have presented a differentiation between Reactive and Strategic SD, and have described a “reactive approach” that initiates actions only in cases of poor supplier performance and to eliminate existing deficiencies, i.e. when the supplier is not performing to the requirement, and can be classified as fire fighting in nature. On the other hand, using the “strategic approach” firms try to improve supplier performance proactively to address long-term capabilities that provide competitive advantage, i.e. before performance problems actually occur.

In the existing literature, it has been argued that SD activities should focus on developing supplier future capabilities in product and technology development rather than just on current cost and quality issues (Watts & Hahn [22]; Krause and Ellram [8]; Reed & Walsh [46]; Krause *et al.* [6]; McGovern and Hicks [20]; Trent and Monczka [3]). These authors insisted that developing future capability would be key for the long term strategic success of SD. However, research done by Reed & Walsh [46] shows that there is little direct focus on technology in SD programs and technology capability is a relatively low priority. Many authors have investigated factors that precede or influence a firm’s decision to invest and become strategically involved in SD (Krause [47]; Krause *et al.* [39]; Wouters [46]). The main aim of these antecedent factors relating to strategic SD is to undertake improvements in the performance of first-tier suppliers through proactive SD programs. However, the literature lacks operational frameworks on how to measure long term and short term SD success.

4.4. Supplier Development in Lean Six Sigma & SME context

Considering the importance of Small and Medium size Enterprise (SMEs) in global supply chains and the extensive use of continuous improvement (CI) methodologies in buying companies, SD activities in the context of Lean Six Sigma & SME are discussed in a separate section to create a better in-depth understanding from the buying firm perspective. However, during this literature review, only 8 articles which discussed SD in the context of Lean Six Sigma & SME were found, which therefore suggests a need for further in-depth study in this context.

Wang *et al.* [12] have used the Six Sigma DMAIC (Define, Measure, Analyse, Improve and Control) methodology to improve the SD process in organisations; the findings are a mere application of Six Sigma to Supply Chain Management (SCM) performance in the context of SD. Modi and Moberg [7] presented the example that Toyota manages their operational knowledge transfer activities via Toyota Supplier Support Centre (TSSC), which provides on-site assistance to help suppliers implement the Toyota Production Systems (TPS) and fix quality through joint problem solving. The authors have also listed the knowledge transfer topics showing that these include some Lean and Six Sigma tools. Similarly Sako [46] conducted case studies in three leading automotive manufacturers, i.e. Honda, Nissan and Toyota; showing that transfer of organisational capabilities, in terms of knowledge of and skill in using Lean Six Sigma deployment, from the customer to the supplier company requires not only financial and resource commitment, but also a distinctive organisational and governance structure that facilitates long-term cumulative learning.

Both the articles by Modi and Moberg [7] and Sako [47] suggest that Toyota has the most systematic way of sharing and learning tacit knowledge by using Jishuken (self study groups) in comparison to Honda and Nissan. The findings also indicate that the companies started with assistance in shop floor improvements, but activities extended to areas outside the shop floor into product development processes and management systems over time. Emiliani [48] also suggest focusing on improving suppliers’ operations by helping them understand and implement the fundamentals of Lean production which include 5S, total productive maintenance, set-up reduction, mistake-proofing, visual factory, standard work and cellular production. The author also explained the benefits of Lean production in relation to the suppliers’ own interest, such as reducing inventories, increasing cash flow, improving operating margins, marketing and competitiveness. These articles have not discussed the application of Lean Six Sigma tools in the context of the nature of SD efforts required, i.e. either reactive or strategic? Therefore, further

empirical research is required to understand whether buying companies have to adopt different approaches in selecting Lean Six Sigma tools and methodologies while considering the nature of SD effort required (i.e. reactive or strategic) linked with the buying firm supply chain strategy.

Quayle [49] and Edmondson et al [50] have reviewed SD in a variety of sectors and suggests the rationale and rewards of SD for small firms. The authors argue that corporations should concentrate on small suppliers to aid economic regeneration and increase the number of world-class suppliers. There is thus a need for small companies to recognize the benefits of SD rather than being suspicious of buyer's motives. A buying firm also needs to ensure strong commitment to SD programs that develop the SME's long term capability, rather than for immediate short-term gains, to strengthen the relationship between the SME with limited resources and the larger counterpart [51].

Quayle [49], Williams [51] and Krause et al. [45] presented key elements of SD in SME's as proactive customers and suppliers, commitment to long-term relationships, continuous improvement, creating learning opportunities that are appropriate to the smaller organisations and win-win philosophy. In the USA based research Krause et al. [45] further identified that some buying firms used minority suppliers to satisfy official government statistics rather than for genuine business reasons.

To conclude, the above discussion identifies a research gap regarding how buying companies should systematically select and evaluate the available CI methodologies to achieve the desired strategic or reactive SD goals as linked to supply chain strategy and furthermore, discover what approaches buying companies should adopt for successful implantation of SD activities within SMEs that have limited resources & financial budgets for investment.

4.5. Supplier Development- The Supplier Perspective

The predominant amount of research has been done from the buying firm perspective; several researchers have however identified the need for more research to be done on SD from the supplier's perspective (Krause et al., [6]; Modi and Moberg [7]; Wouters et al. [46]). In this literature review, only 3 published research papers have been identified so far that research SD from the supplier viewpoint. Forker et al. [52] and Forker and Stannack [53] have found substantial differences between the perceptions of the customer and that of the suppliers about the customer's SD practices. In both papers, the buyer in the customer firm considers quality as a more important aspect in selecting suppliers than the suppliers thought they did. The buyers also had shown more faith in their supplier rating system and the technical assistance which they provided than their suppliers. The buyers also thought they relied on a few dependable suppliers whilst the supplier seems to disagree with that. On the contrary, the suppliers rated the clarity of customer specifications higher than the customers firm did themselves. Given the close working relationship between buyer and supplier on a day to day basis, the authors suggest it is unlikely that the differences of insights are due to lack of awareness at the supplier's end. Most probably, differences in perceptions are due to differences in understanding the priorities, motives, and methods underlying the administration of the SD program. Thus, further research is required to explore the causes of differences in perception of customer's SD activities, while considering the strength of the relationship between the customer and supplier firm.

5. Conclusion and Future Research Areas

A key contribution of this paper is to classify research articles that are a source of scientifically generated knowledge regarding various problems and opportunities associated with SD, predominantly in the context of a manufacturing environment. Furthermore, this paper contributes towards the identification of the main focus areas in SD research and future research issues, which can act as a springboard for conducting further exploratory and confirmatory research on the research gap identified in

this paper in specific industries or in a service environment. The 10 research gaps, identified through an in-depth analysis of the literature in each of the five categories described above, are presented in Table 2 below, and there are some common threads identified in the following discussion.

Table 2 Future Research Issues in Supplier Development

Supplier Development Categories	Future research Issues.	Research Gap No.
Supplier Development activities, practices and success factors.	Identify direct or indirect impact of specific SD activities on suppliers' cost, quality, delivery and production innovation; and how these innovations are then linked to improvements in the buying firm's performance. Buying firms would then better understand which SD activity is required to achieve a desired outcome and which supplier activities they need to focus upon to acquire excellence.	1
	Gain further understanding of the barriers and pitfalls associated with SD deployment in order to overcome them in the future, and hence further research is required on how to overcome the negative factors associated with SD and what methods are available to manage the change associated with SD programs.	2
Direct or Indirect Supplier Development	Further empirical research is required to investigate the correlation between direct SD (e.g. human and capital investment), and its return on investment (ROI) in terms of funds invested within the given business and its associated performance improvement. Moreover, it is necessary to understand how direct investment in the development of suppliers is shared in the supply chain setting, i.e. amongst several firms in a value chain.	3
Supplier Development as a Reactive or Strategic process	Further study is required to investigate specific suppliers' motivations to participate in SD program and how buyers can influence suppliers who are not dependent upon them to participate in supplier training and technology/ product development.	4
	Empirical research to determine the relationship between direct & indirect SD activities with reactive and strategic approaches from the buyer firm's perspective. Further to investigate what is the difference between the content of knowledge transfer while pursuing either Reactive or Strategic SD.	5
	There is a further need to perform empirical research to investigate which SD practice & activities best suits to supporting the firm's product strategy i.e. cost leadership or differentiation strategy, hence contributing to a competitive advantage?	6
	Use longitudinal case studies or action research to validate and determine measures of SD success in terms of short-term key performance indicators and measures of long-term relationship-specific and competitive advantage outcomes.	7
Supplier Development in Lean Six Sigma & SME context	Investigate what processes buying companies should adopt to systematically select and evaluate use of available CI methodologies to achieve the desired strategic or reactive SD goal as linked to supply chain strategy.	8
	Explore what approaches buying companies should adopt for successful implantation of SD activities within SMEs that have limited resources & financial budgets for investment, especially in emerging countries.	9
Supplier Development-The Supplier Perspective	Further research is required to explore the causes of difference in perception of customer's SD activities, while considering the strength of the relationship between the customer and supplier firm	10

Firstly, there is the need for more empirical research to investigate the relationship between Direct & Indirect SD activities with Strategic and Reactive SD. Furthermore, there is a research gap to establish the direct or indirect impact of selective SD activities on suppliers' cost, quality, delivery and production innovation, and how its links with improvements in the buying firm's performance.

Secondly, the research territory to date has been commonly found to focus on the activities of SD with no real systematic process to measure the effectiveness of selective activities. Given the globalisation of many companies and their diverse supply base it would be important to research what are the valid measures of SD success, in terms of short-term key performance indicators and measures of long-term relationship-specific and competitive advantage outcomes. In addition, research is needed to estimate the correlation between direct SD, its return of investment (ROI) and associated performance improvement.

Thirdly, there is an on-going need to research rigorously approaches to overcome the negative factors & barriers associated with SD and what methods are available to manage the change associated with SD programs. Specifically such research should determine what approach buying companies should adopt for successful implantation of SD activities within SME suppliers.

Finally, given that SD is gaining focus in industry and academia it is important to learn how to systematically select and evaluate SD practices, activities & available CI tools and methodologies to achieve the desired strategic or reactive SD goals, as linked to supply chain strategy.

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