

SMALL AND MEDIUM ENTERPRISES' (SMES') ADOPTION OF TECHNOLOGY ALONG THE VALUE CHAIN

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Abstract

Small and medium sized enterprises (SMEs) are important to an economy and, in particular, to the high-tech sector. Unfortunately, little is known about the status of technology adoption by SMEs at the local level. The research examined the state of technology adoption by high-tech manufacturing SMEs. A detailed survey was conducted of SMEs in the Greater Boston area. The Greater Boston area is a top high technology area. This research is expected to provide policymakers with grounded knowledge to formulate effective policies and support systems applicable to high-tech manufacturing. The research results of the exploratory study will be presented at the conference.

Keywords: Small and medium sized enterprises (SMEs), Technology Adoption, Value Chain, High Technology.

1 INTRODUCTION

Small and medium sized enterprises (SMEs) are important to the US economy and, in particular, to the high-tech sector. SMEs employ half of all private sector employees, generate 60 to 80 % of new jobs annually, and employ about 39% of high-tech workers such as scientist, engineers and computer workers [8, 11]. Further, SMEs play a critical role in nurturing industrial innovation constituting 40% of highly innovative firms in 2002 [9, 10].

Although some work has been done at the national level little is known about the status of technology adoption by SMEs at the local level [2, 4, 12, 13]. Accordingly, the intent of the research-in-progress here is to investigate the current state of technology adoption by high-tech manufacturing SMEs in the Greater Boston area. It will examine the adoption of technologies across the entire value chain, including the primary activities of manufacturing and support activities such as administration, human resource management, and design. This work has several additional purposes, one of which is to identify those factors that influence the adoption of technologies by SMEs. The data analysis will emphasize the role of firm-size in technology awareness and adoption. This assessment of adoption can aid these firms in identifying technology solutions that they maybe lacking.

The surveys were administered to 655 firms in the Greater Boston area with the assistance of Greater Boston Manufacturing Partnership (GBMP). 158 firms responded of which 135 are usable responses. The responses is being categorized into three groups micro, small and medium enterprises. Firms employing 1-10 people has been categorized as micro; firms employing 11-100, as small; and firms employing 101-500 as medium. This study is an exploratory study.

2 VALUE CHAIN FRAMEWORK

The value chain “divides a company’s activities into the technologically and economically distinct activities it performs to do business” [5]. The firm’s primary activities are inbound logistics, operations, outbound logistics, marketing, and sales and service. The primary activities require support activities to provide inputs and infrastructure. Support activities are firm infrastructure, human resource management, technology development, and procurement (Figure 1).

The value activities have a physical and information-processing component. The information-processing captures, manipulates, and channels the data necessary to perform the activity [5, 6, 7]. The SMEs are constrained especially because of the size and revenues of the firm [3]. Since the research is investigating SMEs and their usage of technologies, it will be important to explain the results in terms of how they organize their activities. The value chain approach is being employed to contextualize and elucidate the role of technology in SMEs.

3 VALUE CHAIN AND TECHNOLOGY ADOPTION

3.1 Inbound Logistics

Inbound logistics involves actions associated with receiving, storing and supplying of raw materials. Inbound logistics is supported by supplier management and supply chain management (SCM) technologies. Supplier management is the use of software to store and process supplier-related data. SCM spans several activities in the value chain.

3.2 Operations

Operations involves actions and processes associated with transforming material inputs into a finished product. It is supported by materials management, production planning, computer numerical control (CNC), and computer aided manufacturing (CAM) technologies [1]. Materials management is the use of package software for planning and control of material storage and usage in production environment. For the purpose of this survey, CAM is defined as the use of computers for planning the manufacturing process.

3.3 Outbound Logistics

Outbound logistics is the actions associated with the storage and physical distribution of physical goods to buyers. This activity is supported by order-processing and SCM technologies. Order processing is use of package software to store and process customer orders.

3.4 Marketing and Sales

Marketing and sales involve actions associated with advertising, promotion, pricing and selling. This activity is supported by firm website and customer relationship management (CRM) technology.

3.5 Service

Service involves actions associated with providing service and assistance to the customer. This activity is also supported by CRM technology.

3.6 Firm Infrastructure

Firm infrastructure involves activities associated with general management, planning, finance and accounting. This activity is supported by accounting and finance software technologies.

3.7 Human Resource Management

Human resource management activities involve recruiting, hiring, training and compensation for employees. This activity is supported by human resources management software that monitors employee related data.

3.8 Technology Development

Technology development involves activities related to development of know-how, procedures and technology. This activity is supported by computer-aided-design (CAD) that assists engineers in their design and drafting activities.

3.9 Procurement

Procurement involves activities associated with purchasing raw materials and inputs for the firm. This activity is supported by electronic procurement systems that allow catalog search and transmission of orders to suppliers.

4 TECHNOLOGY AND NON-ADOPTION

The research is investigating the state of non-adoption with respect to various technologies relevant to the various elements of the value chain. For technologies not adopted, the respondents were asked to select one from the following states: no current activity, aware, interested, evaluated, and rejected.

5 DRIVERS IN THE ADOPTION OF IT IN SMES

Survey respondents were also asked to identify factors that influenced their decisions to employ particular technology solutions. Factors such as suppliers, media, vendors, government agencies, competitors, customers, personal and professional networks, and top management were investigated.

6 PRELIMINARY CONCLUSION

This research is expected to provide policymakers with grounded knowledge to formulate effective policies and support systems applicable to high-tech manufacturing. It is hoped that our efforts will bring into focus the role that the government agencies and vendors need to play in order to make this sector competitive. Since the micro and small firms are not particularly connected with professional and personal networks, it is incumbent on public sector agencies to provide the necessary knowledge and support.

The results of the study will be presented at the conference.

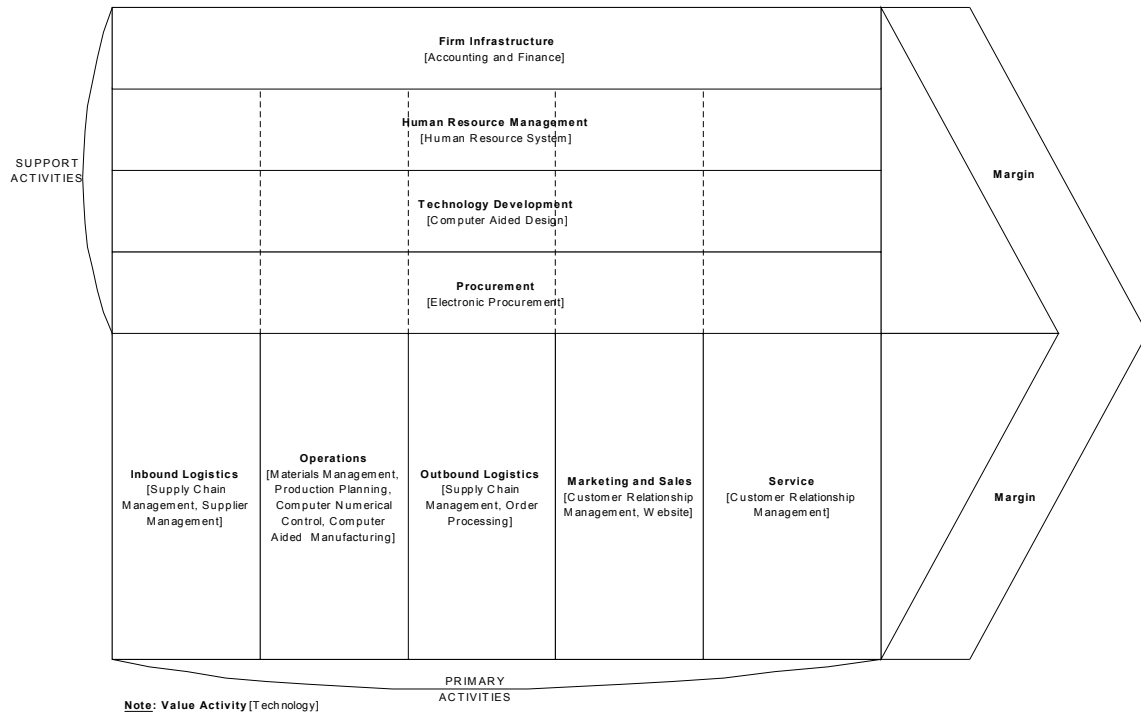


Figure 1: Value Chain with Technologies

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