

The Priority of Firm Competence Building: Technology Orientation or Market Orientation

Peng-Jung Lin^{*1}, Je-Yu Hsu¹, Joseph L. Y. Che², Yung-Fu Huang³

¹*Department of Logistics, Yang-En University, Fujian, China)*

²*Christ's College, Taiwan, ROC)*

³*Chaoyang University of Technology, Taiwan, ROC)*

ABSTRACT: *There are two perspectives referring to how firm build its competence: technology-orientation and market-orientation. Under the perspective of technology-oriented market, manufacturers need to build “technology competence”. Wernerfelt (1984, 2014) suggests to develop the resource (technology) in one market and then to enter another markets from a position of strength. However, in practice, we observe contradiction that flat panel display manufacturers, facing the huge manufacturing cost, choose the perspective of market-orientation rather than Wernerfelt’s technology-orientation so as to first respond to market demand for income, and then put the technology competence development. In order to solve the gap between theoretical and practical difference, we try to extend the view of “customer competence” (Danneels, 2002, 2007) by adding market factors to conceptualize “market competence”. Moreover, we explore the differences in firm’s competence building by asking the research questions: How to build the “technology competence and market competence” by competence leveraging? This article found that technology-orientation tends to emphasis more on research and development in order to enhance the competence, organizational learning, innovation and design, thus to create the foundation of competence. On the other hand, market-orientation emphasizes much on the relations with other manufacturer, reputation, and communication and knowledge-based competence.*

Keywords: *competence leverage, competence building, market competence, resources-based view technology competence*

I. INTRODUCTION

Firms need to continuously renew themselves if they are to survive and prosper in dynamic environments. And that requires a simultaneous thinking of from intra-firm to extra-firm (inside-out) and from extra-firm to intra-firm (outside-in), that is to say, firm competence building (renew) should integration of technology and market, the former bases on technology-oriented market (resources-based view) and the later focuses on market-oriented technology (marketing paradigm), cannot be understood as one or the other separately. Thus, it is necessary to address the impact of both on firm competence building simultaneously, rather than considering each separately. This renewal challenge is even more pronounced in the current business environment characterized by fast changes in extra-firm environments (markets), intra-firm environments (technologies), and so on. Therefore, it is necessary to first constitute technology orientation or market orientation competence and ‘really new’ competence is crucial to firm survival in the current fast-changing business environment. Particularly in flat panel display industry.

For the firm, resources and competence are two sides of the same coin. Most competence building requires the services of several resources and most resources can be used in several competence building. In sum, it is a central insight that competence building stems from the linkages among resources. The critical point is that different types of resources and linkages among resources constitute firm distinct competence. Specifically, we argue that resources may be useful for building technology and market competence. Moreover, by specifying the priority of the firm’s competence building, it is possible to infer the minimum necessary competence leveraging in the allocation and transformation of firm’s resources. Competence building is one of the mechanisms by which firms create, integrate, recombine, and shed resources.

The resource-based view (RBV) is a major theoretical framework that addresses the source of interfirm performance differences (Penrose, 1959; Wernerfelt, 1984, 2014; Barney, 1991; Peteraf, 1993; Makadok, 2001; Hoopes et al., 2003) and influences competence building differences. RBV clarifies understanding about why some firms continue to outperform others in their industry. Because of firms create competitive advantage and competence upgrade when managers develop resources that are valuable, rare, inimitable, and non-substitutable (VRIN) in a given market (Barney, 1991; Peteraf, 1993) and exploit them in additional markets (Wernerfelt, 1984, 2014; Barney, 1986, 1991; Amit and Schoemaker, 1993).

Although the general idea is to expand your position in a single strong technology, it is not always optimal to go full force for diversification in several markets simultaneously (Andrews, 1971). Wernerfelt modeled a resource-product matrix as a useful strategic tool for developing the fit between the firm's resources and product (market). The dynamic entry into new markets relies on the development of new technology competence and then enter other markets, sequential entry, from a position of strength (Wernerfelt, 1984:176). This is technology-orientation market.

Flat panel display manufacturers facing the huge manufacturing cost, in particular, to enter the era of large-size panels, manufacturing equipment more greater, more weight, and higher cost, choose the perspective of market-orientation rather than Wernerfelt's technology-orientation so as to first respond to market demand for income, and then to build technology competence, which is market-oriented technology perspective.

The resource-based view (RBV) is a major theoretical framework that addresses the source of interfirm performance differences (Penrose, 1959; Wernerfelt, 1984; Barney, 1991; Peteraf, 1993; Makadok, 2001; Hoopes et al., 2003) and especially on developing core resources that are valuable, rare, inimitable, and non-substitutable (VRIN) in a given market (Barney, 1991; Peteraf, 1993) and exploit them in additional markets (Wernerfelt, 1984, 2014; Barney, 1986; Amit and Schoemaker, 1993). However, most papers focused on *what* kind resources formation interfirm performance differences (Grant, 1996), very little on *how* firm to allocation and transformation resources, *how to apply* in the firm competence building of technology and market.

The purpose of this paper is to disentangle the differences of technology-oriented market and market-oriented technology, the mediating role of competence leveraging, and the priority factors of technology or market competence building.

II. THEORETICAL BACKGROUND

The priority of firm competence building requires both from intra-firm to have competences relating to technology and extra-firm relating to market and each of these competences is constituted by a set of resources. In sum, the firm key resources needed to accomplish them can be classified as technology-related and market-related (e.g., Danneels and Kleinschmidt, 2001; Mitchell, 1992; Moorman and Slotegraaf, 1999). From the resource-based perspective, firm competence building depends upon the deployment of resources or combinations of resources that are valuable (i.e., raise revenues or lower costs) in the context of a given market, rare (i.e., unique among firms in that market), inimitable (i.e., cannot be readily copied), and non-substitutable (i.e., other resources do not provide the same functionality) (Barney, 1991).

However, the resource-based perspective suffers from its neglect of product markets, which in turn explains the absence of any explicit view of the market (Knudsen & Madsen, 2002: 479–480). This is to say, firm must have competences from extra-firm relating to market.

Several definitions of resources exist. Some scholars define resources as organizational strengths and weaknesses that are tied to firms (Wernerfelt, 1984, 2014). Others define them as all assets, attributes, and knowledge controlled by a firm that help improve efficiency and effectiveness (Barney, 1991) and a firm's resources at a given time could be defined as those tangible and intangible assets which are tied semipermanently to the firm (Caves, 1980). Consistent with these definitions, we define resources as the tangible assets (e.g., location, plant, equipment), intangible assets (e.g., patents, brands, technical knowledge), and organizational processes (e.g., product development, country entry, partnering) from which managers can develop value-creating activities. Given this definition, resources include tangible resources such as the fabrication facilities, plant, equipment and the store locations, and intangible resources such as brands, pharmaceutical patents, animation skills, know-how of engine technologies and technical knowledge. They also include organizational processes by which firm allocation, transformation, reconfigure or exit resources (often termed 'dynamic capabilities') such as acquisition process, alliance partnering process, product development process and routes (Bingham & Eisenhardt, 2008:243).

The term of competence is used to refer to an ability to accomplish something by using a set of material and immaterial resources (Danneels, 2002:1102). My usage is consistent with Grant (1991), who defined a capability as the capacity for a set of individual resources (e.g., patents, know-how, brand names, equipment) to perform some task or activity: '... the capabilities of a firm are what it can do as a result of teams of resources working together' (Grant, 1991: 120). He uses the term 'capability' interchangeably with 'competence'. I follow the definition of competence formulated by McGrath *et al.* (1995: 254): '... a purposive combination of firm-specific assets (or resources) which enables it to accomplish a given task'.

By using firm resources to create superior performance is leverage (Prahalad & Hamel, 1990). When core resources are combined with complementary resources, firms can produce products faster, better, and/or more cheaply than the competition (Collis and Montgomery, 1995, 2005). A related point is that the complementary resources that enable value creation from core resources may vary across markets. Thus,

leveraging core resources into a new market or adding core resources to an existing market may also require leveraging existing complementary resources or building new complementary ones (Bingham and Eisenhardt, 2008: 245) .

This article makes advances in applying resource-based theory to the priority of firm competence building in several ways. First, it explicates which resources are necessary for firm competence building. At this point by upgrading firm competence and escaping from the trap laid by their current competences. Second, the article shows how competence building can serve as a vehicle for the renewal and accumulation of firm competence. The insight into the reciprocity of the resources–competence relation extends resource-based theory by examining not only how competence is used in upgrading, but how they are built as well, and by examining how one competence can be used to build another. The findings of this study show that building and upgrading new competences are activities that can expand the competence base of the firm, which in turn enables further new technologies and markets competence.

The above literature streams are used in this article to develop a framework “Competence Model” that depicts competence leveraging as a vehicle of allocation and transformation among firm resources and upgrading firm competences. After a description of the methodological procedure, the foundation of the framework is laid by describing the reciprocal linkages between firm resources and competences. Drawing on resources-based theory, competence building is depicted as serving to further develop technology and market competence. Then the framework developed in this article is evaluated in terms of its theoretical and managerial implications. The article concludes with noting the limitations of the present research, and makes suggestions for further research.

III. METHODS

My conceptual framework is based on field research and an integration of the scholarly literature regarding leveraging, organizational resources and competences, and resources-based view. I conducted a field study using interviews, observations, and documents as data sources from two high-tech firms that produce flat panel display manufacturing equipment (Danneels, 2002, 2007) . The research sites are briefly described in Table 1. Research sites were selected to achieve a diverse sample that provides many possibilities for comparison, which enables richer theory development (Glaser and Strauss, 1967; Strauss and Corbin, 1990). I intended to contrast firms that were different in terms of their variety of resources and products, competence building and upgrading. Rouse and Daellenbach (1999) called for a rich, detailed investigation of the nature of firm resources through comparative case studies. A multi-site study allows for cross-site comparison and allows the researcher to see idiosyncratic aspects of any one site in perspective.

Triangulation of various types of data collected through different methods can overcome the limitations of one method by counter-balancing the weaknesses of one method with the strengths of another (Jick, 1979). I used various types and sources of data to provide a rich and solid foundation for the theory development. I conducted 14 interviews with organizational members involved in existing resources and competence development to assess their perspectives on and experiences with new resources and competence development. Interviewees were drawn from multiple functional areas (e.g., R&D, marketing, manufacturing), and from various organizational levels. Data about development processes and projects were compared and integrated across informants. Interviews commonly lasted from 45 minutes to two hours, and were tape-recorded.

I used the extended case method (Burawoy, 1991; 2014) as a guide to data analysis. This methodological approach uses empirical data gathered through case study to reconceptualize and extend theory. This study helps to the integration of practical perspectives, concepts and theories by using the extended case method, which aims to integrate, synthesize and stretch existing practical perspectives, concepts and theories. The process involves the interplay of existing concepts/theories and analysis of empirical data. Data analysis points to relevant practical perspectives, concepts and theories in the literature, while simultaneously the literature provides conceptual frameworks to aid in the interpretation of the data. This approach to data analysing is highly similar to that of Rafaeli and Sutton (1991: 757), who developed their insights by ‘an iterative process of traveling back and forth between the data, pertinent literature, and emerging theory.’

To test the credibility of my interpretations of the data, I subjected my analysis to member checks. I checked my emerging insights on an ongoing basis with my informants, asking for their feedback, sometimes in a second interview. In addition, I made presentations of my findings to the participating firms. The member checks served to revise and hone the findings discussed below.

Choice of these two cases for the study, it is worth exploring the process of technology upgrading, because of ARET from lighter transition to automation equipment; so do Neda, due to innovative and R&D competence, the company has been undergoing constant restructuring to technology upgrading.

Competence for quality control

In the flat panel display industry, testing the capacity is very important. Because the manufacturing equipment is completed, the actual operation needs to see the status of the operation, if a link error, the loss will be very serious, the process requires constant testing, acceptance and sometimes more than one year, until the machine has no issues; to avoid the breakdown of the glass panels, resulting in loss of manufacturers of finished detection is also important, for example: broken glass panel, while the loss of about NT 40,000, how to make light of analysis, testing and improving yields. Interview quoted as follows:

(Competence for quality control) Manufacturing process there is a loss, the customer will ask you. To make some response to the analysis, to prevent these problems, and later entered the field of detection and improve yields (ARET Director) .

Competence for research and innovation

Flat panel displays need to continue research and innovation, Neda and ARET attaches great importance to both R & D talent, such as: ARET continuous innovation and R & D of micro-drill to significantly reduce manufacturing time and cost savings, but also increase revenue. Interview quoted as follows:

(Competence for research and innovation) MGP betting in the development of innovative cost, with the turnover will not decrease. The company's R & D manpower of the total staff number of 1 / 2 strong, from the human highlight the layout of the proportion of R & D and innovative entrepreneurship (Neda Director) .

Competence for integration and learning Company by the competence learned and resources earned to serve different markets (Miller, 2003: 971). On the manufacturing process equipment manufacturers, the learning ability of the training and training is more important, and will also enhance technical capacity. Interview quoted as follows:

(Competence for learning) The company has done a lot of industries, are also in transition, the need for many people, through continuous learning more R & D products and technology, a company in transition momentum (ARET Director) .

VI. COMPETENCE LEVERAGING

Firm competence building bases on firm existing competences, or requires competences the firm does not yet have. These options are conceptualized as competence leveraging. It requires current competences may be used as leverage points to add new competences.

Competence leveraging is the organization to consider their needs, the implementation of the company with the resources available, activities, capabilities, resource allocation and transformation, applied to the technology competence and market competence building. In addition, the organization through the coordination / integration, learning / upgrading and reconfiguration(Teece, Pisano & Shuen, 1997:518-521) the ability to carry out the distribution and conversion , applies to the technical capacity and market capability.

The allocation of resources means that the company's generic resources to facilitate the conversion into specific resources(Maritan, 2001; Noda and Bower, 1996; Noda and Collis, 2001), generic resources for the general purpose and possess a high degree of fungibility(Teece, 1986a).

In addition to confirmation of resources, the need to allocation and deployment, arrangement of resources in the technical capability to build and market capacity.

The conversion of resources is to the general resources (highly fungible) conversion for special resources (limited fungibility), for example: combination of existing technologies and new technologies, upgrading the technical level, and then apply for a patent. Coordination and integration of the company's internal resources, activities and ability to have the efficiency and effectiveness is a very important thing (Aoki, 1990); external coordination and integration are also as important, especially in external activities and technology, market integration. For example: flat panel display manufacturing equipment makers and other companies for technical cooperation, or distribution, customers, vendors and other market-level links.

Learning can enhance the ability of individuals and organizations, applies to the technology competence and market competence to construct, among other manufacturers will help motivate each other to avoid blind spots.

Flat panel display manufacturing equipment industry in a rapidly changing environment, companies must respond to the allocation of resources to carry out reconstruction of environmental change and transformation, which is to organize the necessary skills.

VII. Market Competence

Market competence gives the firm the ability to serve certain market and to executive certain customer need by the tangible and intangible resources posed by the existing market orders to development of new technology or in combination with the existing and new orders to develop new technology. 'Market' denotes a broader concept, namely the exchanges of goods and services between customers and suppliers, and the effects on these exchanges of environmental factors such as technology, laws, culture, and competition.

Market is constituted by such market-related resources and competences as: linking with interorganizations, customers, supply chain and distribution, communication with intra-firm and extra-firm, reputation of the firm and service innovation etc.

Flat panel display manufacturers in response to large-size panels era, the production costs of up to 60 billion yuan (8.5-generation sputtering machine costs), it is very difficult to invest huge amounts of companies engaged in production costs due to cost and risk too high, can only seek orders in response to market demand, and then build the technical capacity, which is from the perspective of market-oriented technology, companies must have market power; Danneels (2002:1102) "Customers competence" of customers talking about the company's services capabilities, the market did not factor into consideration, especially the flat panel display manufacturing equipment are huge in size and tonnage of heavy, high cost of delivery must be closer to sales network, as well as attention to customer service.

In this study, Danneels (2002) extends the concept of customer competence to construct a larger, wider application of market capacity, trying to infer to other from the perspective of market-oriented industries to import technology.

Linking competence

Flat panel display manufacturing equipment, organizations, customers, and third-party distribution and other aspects of pipeline link is very important. Because the customer's orders, the need for technical, planning, and other manufacturers co-ordination to complete, for example: some of the higher skill levels to A Company, relatively simple to B Company, said that a simple third-party or organization division of labor; the industry process equipment great, heavy, high input costs, in order to save distribution costs, will the customer side of distribution pipeline link. Interview quoted as follows:

(Linking competence) To have friends in this line, the other side before they are willing to talk, coupled with long-term arrangement, have a tacit understanding between. (Neda Deputy General Manager) .

Service innovation

Services will no longer be by telephone, the Internet to carry out customer service or advice that this kind of "oral" services are no longer appropriate, attention should be paid "to the foot" and "hand-to" services, that is, visit the site to assist customers to solve the problem, and practical exercises operational processes, such as service quality and interactive way to solve customer problems, meet customer demands. Interview quoted as follows:

(Service) Technical staff and operational staff to serve each other vendors, manufacturers will first find out where the technical staff to solve the problem, which is part of Customer Service (ARET Director)

Reputation Manufacturers in the selection of equipment suppliers, manufacturers attach great importance to the organizational culture, business ethics, and its evaluation of the company's intangible knowledge assets, as long as there is no problem with the company's reputation, they provide design drawings, engineers and equipment manufacturers with manufacturing, manufacturers will be able to learn professional skills, with the company's existing professional and technical capacity, develop new skills. Interview quoted as follows:

(Reputation) Foreign technology patent protection, he will pick your company, basically look at the company's culture, the operator of business ethics and its impact on the evaluation of your company, business ethics is no problem, he would dump capsule with delegated

(ARET Director) .

Communication competence Internal and external communication is very important, especially technical personnel, employees need to improve the technical level with the issue of ongoing discussion, communication, also need to maintain good interactions with customers, which involves inter-organizational coordination and communication, on the follow-up cooperation has far-reaching and direct impact. Interview quoted as follows:

(Communication) Neda to develop a knowledge management platform to provide professional engineers and staff-sharing, communication and problem-solving

(Neda Director) .

VIII.DISCUSSION

The goal of the paper is to integrate and extend existing theory by employing the empirical and practical data to fill in its gaps, reveal its flaws, elaborate its meaning, and extend its coverage.

The purpose of this paper is to disentangle the differences of technology-oriented market and market-oriented technology, the mediating role of competence leveraging, and the priority factors of technology or market competence building. Analysis of the following:

Costs and risks associated with the order of priority

The priority selection in technology competence or market competence lies in cost and risks. Reason for this is in response to demand for the advent of large-size panels, flat panel display manufacturing equipment expensive, large, overweight, with 8.5-generation sputtering machine as an example, the cost of six billion yuan,

machine length of 40 meters, 10 meters wide, weighs 200 tons, the cost has not yet been included in the trial, acceptance, distribution and services, such as hidden costs, sometimes as long as acceptance of one year, during which the cost and risk is not an ordinary company can bear.

Linking: coordination / integration, learning / upgrading and reconstruction

The key role of competence leveraging is in response to environmental changes, coordination / integration, learning / upgrading and reconstruction of the company internal and external resources, activities and competences, and to apply in technology competence and market competence building. This link features to help organizations "technology priority or market priority" decision-making.

Differences in competence building: priority of tangible competence v.s. intangible competence

Technology competence and market competence is posed of the basis competence, combination competence and architectural competences.

Basic competences refer to its existing enterprise resource-based general, developed the basic skills; combination competences is an enterprise with its existing resources and skills, by learning and the development of relations between the link of the new skills; architectural competences refer to enterprises in response to environmental change and organizational needs, through innovative thinking by the ability to construct.

Technology-orientation tends to emphasis more on research and development in order to enhance the competence, organizational learning, innovation and design, thus to create the foundation of competence. On the other hand, market-orientation emphasizes much on the relations with other manufacturer, reputation, and communication and knowledge-based competence.

The thinking of technology-oriented market, first construct tangible competence and then to build intangible competence. The reason is that flat panel display manufacturers have in their professional and technical advantages, manufacturing equipment, extended to other market; customer considerations manufacturers manufacturing, design, and R & D forces to measure the technology competence, and then decided to place an order, Consistent with the resources-based view.

The thinking of market -oriented technology, first construct intangible competence and then to build tangible competence. The reason is that flat panel display manufacturing equipment billion cost, manufacturers choose to respond to market demand orders to reduce the cost of risk. Flat panel display manufacturing cost typically exceeds 10 million NT dollars, manufacturers choose to first respond to market demand, creating income through outputs, and then build the technology competence to reduce the cost of risk. Customers attach importance to the reputation of manufacturers in the industry, evaluation, organizational culture and business ethics etc., is to determine the key under the orders, and customers have the patents and support to manufacturers, firms learn technology from customers, Consistent with the firms to respond to market demand orders , and then thinking to build technology.

It is particularly effective when intangible core competence is knowledge based. The reason is that knowledge-based competence may typically fungible across different markets and within the same market at different times. In contrast, tangible physical competence often has specific and limited use. Thus, knowledge-based resources are likely to be valuable in multiple markets. Thus, knowledge-based resources are likely to be valuable in multiple markets.

Table 1 Differences of technology competence and market competence

Categories	technology competence	market competence
Component		
basic competences	<ul style="list-style-type: none"> ⊙Manufacturing and design ⊙Quality control 	<ul style="list-style-type: none"> ⊙Reputation
combination competences	<ul style="list-style-type: none"> ⊙Integration and learning ⊙R & D 	<ul style="list-style-type: none"> ⊙Linking ⊙Communication
architectural competences	<ul style="list-style-type: none"> ⊙Innovation 	<ul style="list-style-type: none"> ⊙Service innovation

Theoretical Implications

Flat panel display industry faces major foreign competition, technology-intensive, capital-intensive and other challenges, by the technical capacity to build capacity and the market will help strengthen the manufacturing equipment in place and increase the rate of self-made process equipment, to help manufacturers enter the international, the face of rapidly changing environment and, more importantly, more manufacturers industrial competitiveness and competitive advantage.

Resource-based scholars have started to focus much more on the dynamic nature of competence, asking how competences and resources evolve over time (Helfat, 2000).

Resource-based view from intra-firm to extra-firm (inside-out) view, the lack of market thinking, this paper to build firm market competence to make up for its shortcomings, and to increase the dynamic learning competence and dynamic interactive competence, will enable firm fast respond to environmental changes.

Managerial Implications

Flat panel display manufacturers, facing the huge manufacturing cost, first be spent on technology research and development have orders and profitability concerns, even if the technology can support, in the absence of commitments under the premise of orders, high costs on behalf of a high degree of risk, together with the acceptance period of at least year, a greater burden on manufacturers, manufacturers choose to respond to market demand of orders is to first consider the factors of business survival.

The thinking of market-oriented technology, manufacturers should be strengthened to face the changing market *dynamic interaction competences*, including customers, other manufacturers, competitors, distribution mechanisms and action rapid response competence, in order to have the competitive edge in the market order to attract customers, build new technologies.

The thinking of technology-oriented market, manufacturers should enhance the face of technological change the *dynamics learning competences*, including manufacturing, design, and research and development, and integration of forces, such as the rapid absorption and transmission competence, in order to have the competitive advantage of technology order to exploit customers, explore new markets.

Limitations And Further Research

In this study, there are two questions for future research. At first, the mediating role of competence leveraging should be more accurate and detailed analysis and discussion, including the organization of past experience, environmental changes and organizational requirements and so on.

Second, the resource-based view by adding the cost factors. Flat panel display manufacturing equipment due to cost and risk considerations, manufacturers choose to respond to market demand orders, and then construct the technology competence, and resource-based view is obviously different, this is a topic worthy of further investigation, the cost factors how the resource-based view interfere?

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