

# **The Competitive Advantage and Strategic Configuration of Knowledge-Intensive, Small & Medium-Sized Multinationals: A Modified Resource-Based View**

## **Abstract**

This study employs a modified resource-based approach to examine the competitive advantage enjoyed by knowledge-intensive, small and medium-sized multinationals (KI-SMMs). Compared to larger knowledge-intensive multinationals, KI-SMMs possess both superior and inferior core capabilities.

The paper demonstrates how KI-SMMs compete globally by leveraging their relatively superior R&D capabilities and by choosing a *strategic configuration* that allows them to compete internationally despite their relatively inferior capabilities in marketing and production activities

Our results show that KI-SMMs internalize R&D activities, which we view as core capabilities, externalize production activities, which are viewed here as non-core capabilities, and internalize marketing activities, for which they have an inferior capacity, but which are, arguably, core capabilities. KI-SMMs compensate for their inferior capabilities in marketing activities by focusing on customers with whom a low number of high value transactions can be maintained.

Key words: Small and Medium-sized Multinationals; Knowledge-intensive Firms; Resource Based View; Internalization; Internationalization.

## Introduction

Small and Medium-sized Enterprises (SMEs) have been playing a progressively more important role in international business since the beginning of the last decade (Bell, 1995; Keeble et al., 1997; McNaughton, 2000; Oviatt and McDougall, 1994; Rugman and Wright, 1999). By the late 1990s about a quarter of SMEs around the world derived a major portion of their revenues from foreign countries (Oviatt & McDougall, 1999). The explanations for the accelerated internationalization of SMEs are numerous and include: entrepreneurial vision and capabilities, the prior foreign experience of entrepreneurs (Oviatt & McDougall, 1994), the emergence of global demands for goods and services that enables small firms to adopt an international perspective regardless of age and size (Oviatt & McDougall, 1997), the need to reach markets of sufficient size and exploit first mover advantages (McNaughton, 2000) and the ability to rely on international networks and strategic alliances (Bell, 1995; Bonaccorsi, 1992; Coviello & Munro, 1997; Gomes-Casseres, 1997; Kaufmann, 1995).

However, the international performance of these relatively small firms remains paradoxical, as it is difficult to explain how firms with limited financial resources and with little managerial experience (Buckley, 1989; Kaufmann, 1995; Lu & Beamish, 2001) are able to compete globally against larger and more experienced firms. It is therefore not surprising that most literature on the performance of firms in the international business arena relates to large, well-established multinational corporations (MNCs) that are perceived as firms that operate internationally because of their size and experience (e.g. Agarwal & Ramasawi, 1992; Buckley & Casson, 1976; Caves, 1971, 1996; Chandler, 1986, 1990).

The current study contributes to the question of how relatively small and young firms create and sustain competitive advantages in the international business arena by focusing on the determinants of the competitive advantage held by small and medium-sized, knowledge-intensive companies that have become multinationals. We label these firms: *knowledge-intensive, small and medium-sized multinationals* (KI-SMMs).

The term KI-SMMs does not exist in the literature, yet we felt a need to introduce it to denote a group of firms that does not conform to traditional definitions. These firms cannot be classified as MNCs because of their comparatively small size and limited scope of operations. They cannot be viewed as exporting SMEs (e.g. in Aaby & Slater, 1989; Bilkey & Tesar, 1977; Bonaccorsi, 1992; Cavusgil, 1984; Gemunden, 1991; Reid, 1982, 1984) because they are larger than most accepted definitions of SMEs. They also use a variety of strategies to compete internationally in addition to exports, such as the establishment of greenfield subsidiaries, the use of international strategic alliances and mergers and acquisitions. Moreover, this group of firms cannot be classified as international new ventures (Oviatt & McDougall, 1994), as they are not necessarily new. Thus, these firms have unique characteristics that set them apart from MNCs on the one hand and from exporting SMEs and international new ventures on the other. As a result we decided to coin the term *knowledge-intensive small and medium-sized multinationals* in order to denote knowledge-intensive firms that are small or medium-

sized compared to traditional MNCs but that use international strategies that are similar to those employed by MNCs.<sup>1</sup>

Taking into account the high failure ratio for knowledge-intensive start-ups (Ruhnka et al., 1992; Timmons, 1999), KI-SMMs are assumed to be those SMEs that survived the fierce competition of the international marketplace and succeeded in creating and sustaining a competitive advantage. Moreover, while small and medium-sized multinationals need not necessarily be knowledge-intensive, they are frequently characterized in the literature as firms that sell innovative, self-developed, technology-based products (Bell, 1995; Jones, 1999, 2001; Keeble et al., 1997; Oviatt & McDougall, 1994; Rugman & Wright, 1999; Stray et al., 2001). We assert that ‘size’ and ‘knowledge intensity’ are central attributes in explaining the *strategic configuration* chosen by these firms. As detailed below, by ‘strategic configuration’ we refer to firms’ decisions regarding the internalization of their value activities as well as their selection of target customers.

Conceptually, the strategic configuration of KI-SMMs can be compared to those of *non*-knowledge-intensive SMMs, *larger* knowledge-intensive MNCs and *larger non*-knowledge-intensive MNCs (see Chart 1). In the current study we focus on demonstrating how the strategic configuration of KI-SMMs differs from that of larger knowledge-intensive MNCs (KI-MNCs). We use the Resource-Based View of the firm to explain how KI-SMMs create and sustain competitive advantage.

[Insert Chart 1 about here]

Next, we use the resource-based view to assess the capabilities of KI-SMMs against those of KI-MNCs in terms of their performance of R&D, production and marketing activities. Subsequently, our proposed framework is empirically tested on a sample of Israeli KI-SMMs and finally our findings and their implications are discussed.

## A Modified Resource Based View

The Resource-Based View (RBV) of the firm has come to wield significant influence during the last decade (Connor, 2002; Medcof, 2000). Scholars adhering to the resource-based view (e.g. Barney, 1991; Peteraf, 1993; Wernerfelt, 1984) suggest that firms’ competitive advantages may be best explained by the heterogeneity of firm-specific resources and their application, rather than by differences in industry characteristics.

According to the RBV (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984), a firm may be perceived as a set of interconnected tangible and intangible resources that create organizational capabilities. We refer to capabilities as the capacity to perform a particular function or value activity (Grant, 1998). This capacity is believed to be a positive function of the firm’s resources. Thus, if firm *A* possesses superior resources

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<sup>1</sup> Operational measures of the term KI-SMM are presented in the Data section of the paper.

relative to firm *B*, and if firm *B* cannot access equivalent resources, then firm *A* is expected to have superior capabilities.

Firms are particularly interested in having superior *core* capabilities, often referred to as 'core competencies' (Prahalad and Hamel, 1990). Core capabilities are those that make a disproportionate contribution to ultimate customer value, or to the efficiency with which the value is delivered, and they provide a basis for entering new markets (Hamel and Prahalad, 1992). Superior core capabilities enable firm *A* to gain higher Ricardian rents than firm *B* (Peteraf, 1993). This in turn implies that firm *A* has a competitive advantage over firm *B*, i.e. firm *A* is able to create a higher economic value for its customers.

The RBV further proposes that *sustainable* competitive advantage (SCA) stems from having a set of unique resources that create value in the marketplace (Medcof, 2000). Sustainable competitive advantage is defined as the firm's ability to outperform its competitors in the long run, i.e. when competitive advantage persists despite efforts to duplicate or neutralize it (Barney, 1991). Thus, firm *A* will be able to sustain its competitive advantage over firm *B* only if the resources that create superior core capabilities are durable and inimitable, being non-transparent, non-transferable or non-replicable (Barney, 1991; Dollinger, 1999; Peteraf, 1993).

Although the insights of the RBV are powerful in explaining how competitive advantage is created and sustained, the main flaw of the RBV is that it overlooks the case where some of the firm's core capabilities are superior compared to those of its competitors, while other core capabilities are comparatively inferior (e.g. when a firm has a technological advantage but lacks marketing experience). This case is particularly important for the analysis of a firm's competitive advantage since inferior core capabilities may neutralize the competitive advantage created by superior ones. Hence we assert that in order to achieve a competitive advantage over firm *B*, the above-mentioned firm *A* should not only maintain the positive gap it has over firm *B* in its superior core capabilities, but also compensate for any relatively inferior core capabilities it has compared to firm *B*. However, this is by no means a trivial task.

Firm *A* is likely to maintain the gap it has in its superior core capabilities as long as the resources that create these capabilities remain durable and inimitable. However, how can firm *A* close the gap and neutralize its disadvantage with respect to resources that produce inferior core capabilities?

One way for firm *A* to close the gap with respect to inferior core capabilities is to reconfigure its resources so they create upgraded capabilities (Itami, 1987; Porter, 1991). While this view is consistent with the emergent literature on dynamic capabilities (Eisenhardt & Martin, 2000), the basic notions of the RBV imply that often this task is extremely difficult, requires tremendous resource investment over long periods of time and is sometimes even impossible.

Firm *A* can try to acquire the required core capabilities from firm *B* or from the market. However, capabilities that are available in the market are not likely to be particularly superior since they are already possessed by others.

Hence the only option that allows firm *A* to compensate for inferior core capabilities is to target customer groups in such a way that the inferiority of its capabilities is minimized. For example, if firm *A* has an inferior technological capability compared to firm *B*, it may aim to target customers that are price-, rather than quality-sensitive. Alternatively, if firm *A* is disadvantaged in its capabilities to perform marketing activities, it may choose to focus on repeat sales to a small and limited customer base, rather than interacting with a large number of customers in an expanding customer base.

Following the above discussion, the current study argues that KI-SMMs create and sustain competitive advantage *not only* by maximizing the advantages that stem from their superior core capabilities, but also by compensating for the disadvantages arising from their having core capabilities in which their capacity is inferior to that of larger KI-MNCs. We pose that while inferior capabilities that are not core capabilities may be acquired in the market (i.e. via external organizations), inferiority in core capabilities cannot be neutralized by using external organizations. Instead, it should be compensated for by focusing on specific customer groups that enable the firm to minimize the impact of its inferior capability. This view is depicted in Chart 2.

[Insert Chart 2 about here]

### **Assessing the Capabilities of KI-SMMs**

The two dominant characteristics of KI-SMMs are their relatively small size and their knowledge-intensity. The combination of these two characteristics is expected to have a substantial impact on these firms' capabilities.

For reasons of simplicity, we follow Buckley & Casson (1976), Jones (1999) and others and focus on assessing the capabilities of KI-SMMs to perform three major value activities: (1) R&D – creation and development of knowledge and consumable technology, (2) production – transforming inputs into outputs, (3) marketing - which is specifically defined as the interaction between the firm and its customers, during the processes of promotion, sales, distribution and pre- and post-sales services. Next, we analyze the KI-SMMs' capabilities to perform each of these value activities.

#### R&D

Proprietary technology is a resource around which distinctive capabilities and the firm's profit-earning potential are developed (Grant, 1998). Technology-based firms will usually enjoy first mover as well as monopolistic advantages, denoted by Wernerfelt (1984) as resource position barriers. Thus, unique know-how and proprietary technology are a significant resource upon which a competitive advantage can be created.

Although this is true for both KI-SMMs and KI-MNCs, the relatively smaller size of the former implies that they are often much more flexible than the latter (Narula, 2002; Peng, 2001). This flexibility may help KI-SMMs to be quicker to develop unique technologies, to be more innovative (Acs et al., 1997), to better focus on the specific technological needs of customers and to be quicker in their response to these needs than

KI-MNCs. Moreover, their small size usually encourages KI-SMMs toward innovation in specific areas that are likely to be less attractive to KI-MNCs. The latter may often wish to develop applications that are of interest to the mainstream market and neglect applications that have a limited market potential. In turn, opportunities are opened for KI-SMMs to introduce new and unique technologies in unexplored fields.

This point of view is supported by numerous studies that assert that KI-SMMs have superior technological capabilities that drive them to international markets in order to exploit first mover advantages and monopolistic gains (Acs et al., 1997; Amin & Thrift, 1994; Keeble et al., 1997; McNaughton, 2000). While, on the whole, KI-MNCs have more financial resources that enable them to sustain substantial R&D expenses; studies show that a specific KI-SMM frequently may have a superior capability to perform R&D activities in the *sufficiently narrowly defined* technological field in which it specializes (Buckley and Mirza, 1997; Manalova, 2003).

### Production

While the production processes for knowledge-intensive products vary considerably from one product to another, it is possible to classify them into three broad categories. The first category includes the production processes for intangible products, e.g. the reproduction of software. Such production processes involve transferring developed knowledge into a medium that is then distributed to customers (e.g. copying software onto a CD-ROM or e-mailing software to customers). The second category consists of products that are based on knowledge that is embedded in a larger system (for instance knowledge embedded in a chip that allows high quality digital photography). The third category relates to products in which mass manufacturing of the product is required (e.g. mass production of microprocessors or drugs).

In the first case, production is virtually non-existent, or production skills are so common that no particular competitive advantage is expected to arise from engaging in production. The second and third categories require substantial economies of scale and/or production efficiency based on a superior position along the experience curve. While KI-SMMs may have a superior capability to conduct a particular proprietary part of the production process, on the whole their capability to produce large systems or to engage in mass production is quite limited. Due to their small size, KI-SMMs have limited financial and managerial resources (Buckley, 1989; Kaufmann, 1995; Lu & Beamish, 2001), which hamper their capability to either exploit economies of scale or rapidly ride the experience curve. KI-MNCs are expected to be larger and more experienced and thus better positioned to exploit these advantages. We therefore conclude that KI-SMMs are expected to be inferior in their capabilities to perform production activities than KI-MNCs.

### Marketing

In order to exploit first mover advantages and achieve monopolistic gains from superior technological capabilities, KI-SMMs are driven early to international markets (Amin & Thrift, 1994; Jones, 1999, 2001; Keeble et al., 1997; McNaughton, 2000; Stray et al., 2001). The relatively small size of KI-SMMs becomes critical when we consider the need for international market dispersion. International market dispersion requires the ability to operate and control multiple and scattered operations and serve

customers that are situated a considerable distance from these firms' home countries (Calof, 1993).

When comparing them to KI-MNCs, KI-SMMs have relatively inferior capabilities in marketing activities because of the paucity of their resources. KI-MNCs have more resources and experience that enable them to establish and coordinate an internationally dispersed marketing infrastructure, to control a greater market share, to ride the learning curve faster, to enjoy a stronger bargaining power with customers and to weather more mistakes without incurring failure (Agarwal & Ramasawi, 1992; Aharoni, 1966; Porter, 1985).

While the above discussion mainly addresses size, we argue that inferior capabilities in marketing activities have a greater impact on knowledge-intensive firms than on non-knowledge-intensive ones. Knowledge-intensive firms need to interact more frequently with their customers than non-knowledge-intensive firms. This interaction is vital for knowledge-intensive firms because their products are frequently unknown, new and based on proprietary knowledge. Interaction with clients facilitates the provision of firm-specific services (Hirsch, 1989), which may include creating awareness of the product, demonstrating its attributes and, when necessary, 'tailoring' the product to specific customer requirements, as well as providing training, installation, running-in, maintenance and repairs on the product. Most of these activities need to be controlled by the knowledge-intensive firm because they are based on proprietary knowledge (Hirsch, 1989; Almor & Hirsch, 1995).

The fact that knowledge intensive firms have more frequent interactions with their customers implies that KI-MNCs' greater marketing resources place them at an even greater advantage vis-à-vis KI-SMMs. We therefore conclude that the capabilities of KI-SMMs to perform marketing activities are expected to be inferior to those of KI-MNCs.

The above discussion raises the question: how do KI-SMMs compensate for their inferior capabilities in production and marketing and compete globally with KI-MNCs? We propose that the answer to this question lies in their choice of *strategic configuration*. By strategic configuration we refer to the firm's decisions regarding: (i) whether to externalize or internalize each value activity; and (ii) the nature of the customers it wishes to target.

### **The Strategic Configuration of KI-SMMs**

Table 1 outlines our expectations regarding the strategic configuration of KI-SMMs. As detailed below, the rationale for Table 1 is that the KI-SMMs' size and the knowledge-intensity of their products are the major triggers that stimulate them to pursue this particular strategic configuration in order to create and sustain competitive advantage.

[Insert Table 1 about here]

Since ownership of technology is one of the most important bases for the development of competitive advantage, KI-SMMs are expected to exploit their superior

capabilities in R&D activities to create a competitive advantage around their unique know-how and proprietary technology (Amin & Thrift, 1994; Jones, 1999, 2001; Keeble et al., 1997; McNaughton, 2000; Stray et al., 2001). Thus, we expect that the performance of KI-SMMs will be positively correlated to their R&D expenses (Qian, 2002).

The need to control R&D resources by developing them internally stems from the desire of KI-SMMs to make these resources durable and inimitable. R&D activities lead to technological developments that create value to customers. Hence, the capability to perform R&D activities is expected to be a core capability of KI-SMMs and thus become a major determinant of their competitive advantage. Internalization of R&D will enable KI-SMMs to keep technological knowledge proprietary and thus secure the sustainability of their competitive advantage (Tallman, 1991). This is consistent with the major contention of transaction cost theory regarding internalization of R&D activities (Pisano, 1990) as well as Madhok's (1997) view on the positive link between internalization and organizational capabilities. We therefore expect that R&D will be performed in-house (i.e. internalized), so that firms' capabilities remain hard to copy and rare for as long as possible.

On the other hand, KI-SMMs' inferior capabilities in production activities compared to those of KI-MNCs lead us to expect that strategic alliances (e.g. outsourcing) may be preferred over in-house production, since they enable access to complementary assets (Teece, 1986). Our previous discussion lead us to the conclusion that production is not a 'core' capability for KI-SMMs and may therefore be externalized as long as proprietary know-how is protected (e.g. by patents). In order to protect firm-specific proprietary know-how, KI-SMMs may choose to produce the components in which proprietary know-how is embedded while using collaborations to manufacture standard components, which make a minor contribution to value creation for customers. The above reasoning is again consistent with the basic notion of transaction cost theory (Williamson, 1985).

Following the same logic, KI-SMMs should also pursue strategic alliances in marketing in order to compensate for their inferior capabilities in marketing activities. However, we argue that this is *not* the case. As noted earlier, KI-SMMs are expected to have frequent interactions with their customers in the process of providing pre- and post-sale services. The nature of these interactions (as described above) implies that marketing activities are expected to make a major contribution to the process of creating customer value. Hence, marketing activities, unlike production, are expected to be a core capability of KI-SMMs. We expect that KI-SMMs will perform marketing activities in-house in order to maximize the benefit they gain from customer-related technological spillovers and to prevent potential diffusion of propriety technological and marketing know-how to partners in the process of joint operation (Anderson & Gatignon, 1986; Agarwal & Ramasawi, 1992; Root, 1994; Simonin, 1999). This argument is consistent with the vast literature on marketing channels integration (Aulakh & Kotabe, 1997; Heide, 1994; Heide & John, 1998; Klein et al., 1990; Madhok, 1997).

Marketing activities constitute the basis for a firm's interactions with its customers. Tight supplier-customer relations allow firms to protect their proprietary know-how, to receive feedback regarding their technology through the processes of

distribution and after-sales services and may lead to further technological innovations, customer loyalty and a strong client base (Almor & Hirsch, 1995; Hirsch, 1989). These interactions require unique skills and specific expertise in the processes of promotion, sales, distribution and post-sale services, and therefore are likely to be better performed by skilled employees who receive on-going training from the firm, rather than by external organizations. Therefore KI-SMMs are not only expected to internalize marketing activities, but also to incur high distribution and after-sales services expenses, since they need to interact frequently with their customers, who are dispersed internationally. Thus, we further expect that the performance of KI-SMMs will be positively correlated with their marketing expenses.

The above discussion leads us to the following hypotheses:

**Hypothesis 1: The propensity of KI-SMMs to internalize R&D and marketing activities is higher than their propensity to internalize production activities.**

**Hypothesis 2: The performance of KI-SMMs is positively correlated with their R&D and marketing expenses.**

However, the limited size of KI-SMMs makes it nearly impossible to serve multiple foreign markets by using internal marketing entities, since the collection, transmission and interpretation of market information is very costly and time consuming (Carson & Gilmore, 2000). This task becomes even harder considering that managerial skills, international experience, human resources and finance are all expected to be scarce resources for KI-SMMs. The solution to this dilemma lies in these firms' customer selection.

Let  $M$  denote the potential market size of a specific product and  $T$  denote the average transaction value in this market. The potential number of transactions ( $N$ ) that a KI-SMM faces can then be denoted by:  $N=M/T$ .

We argue that due to their resource constraints, KI-SMMs will aim to minimize the number of transactions ( $N$ ) they execute thereby forgoing the need for extensive marketing operations. This can be achieved in two ways. One option is to limit the size of  $M$  by targeting a specific market niche that consists of a few customers worldwide (Gomes-Casseres, 1997; Kohn, 1997; McNaughton, 2000). This concept of deep-niche strategies is well established in the literature. A second option is to increase the value per transaction ( $T$ ) by targeting a few large, commercial customers. While such commercial customers may represent the mainstream market (or even all of the market) the number of transactions with these customers is expected to be fairly low.

When serving commercial customers and specific market niches, the absolute number of customers is much smaller than when mass-market consumers are targeted. The need for a substantial marketing infrastructure is also reduced and a modest marketing entity may suffice. Thus, a KI-SMM is expected to internalize its marketing activities, but to reduce its dependence on its relatively inferior capabilities in marketing activities by focusing on a few transactions that provide maximum value per transaction. We therefore hypothesize that:

**Hypothesis 3: The propensity of KI-SMMs to perform marketing activities in-house is positively correlated with their choice to serve commercial customers and market niches.**

Returning to Chart 1, we conclude that KI-SMMs are expected to have superior capabilities in performing R&D activities; these capabilities contribute heavily to customer value creation and thus are considered to be core capabilities (Quadrant I). Superiority in R&D is preserved and strengthened by internalization. The capabilities of KI-SMMs in performing production activities are inferior to those of KI-MNCs, are of minor importance to customer value creation, and thus are considered to be non-core capabilities (Quadrant II). It follows that production activities may be externalized. Finally, whereas KI-SMMs are inferior in their capabilities to perform marketing activities, these capabilities are extremely important to customer value creation and hence are considered to be core capabilities (Quadrant IV). KI-SMMs may endanger their competitive position if they externalize these activities, therefore they internalize them and compensate for their inferiority by targeting customers with whom a low number of high value transactions can be maintained.

## **Data**

Our sample consisted of Israeli KI-SMMs that were traded publicly on stock exchanges outside Israel during the year 2000, so enabling us to examine firms with a proven track record of business activity. We regard the ability of such firms to go through an Initial Public Offering (IPO) outside Israel as an indicator that (1) they have passed successfully through the initial growth phases; (2) they possess some sort of competitive advantage and (3) they have a strong international orientation.

First we identified the research sample, which was defined according to the following criteria:

1. *Knowledge-intensity.* We chose firms that operate in industries defined as technology-based by the Central Bureau of Statistics (2003). These include the software, information and communication technology, electronics, pharmaceuticals, biotechnology and medical technology industries.
2. *Size.* Since we aimed to focus on KI-SMMs that have operated for several years, we expected these firms to be small and medium-sized compared to large MNCs. We therefore decided to limit ourselves to firms that: i) own at least one foreign subsidiary (Fujita, 1995) and ii) enroll less than 1% of the average number of employees found in the world's 100 largest MNCs (UNCTAD, 2001). Thus, the largest KI-SMM in our sample employs about 1000 employees.

The above criteria were intended to ensure that our sample would contain firms that are knowledge-intensive and are small to medium-sized compared to large MNCs.

Initially, 140 Israeli industrial firms that are traded outside Israel were identified. Firms that, during the year 1999, did not belong to the aforementioned technology-

based industries; did not own a foreign subsidiary or employed over a thousand employees were excluded from this list.

The senior management of the remaining 75 firms was approached and asked to take part in a face-to-face interview. In-depth interviews with CEOs or VPs took between 60-120 minutes and were conducted as focused interviews. They were based on semi-structured questionnaires that were used to elicit the views of the interviewee, untainted by the interviewer's preconceptions to the extent possible. The response rate was 69% (52 firms).

Basic comparisons between the 52 participating firms and the 23 non-participating firms did not show evidence of any response bias in terms of firm sales, number of employees, age, industrial classification and percentage of international sales.

Descriptive statistics presented in Table 2 show that the firms in our sample are fairly young and small to medium-sized (both in terms of sales and number of employees). These firms have a strong international orientation: most of their revenues are generated from multiple international markets rather than from the Israeli market. The firms in the sample may be characterized as knowledge-intensive both in terms of the ratio of R&D expenses to sales and the percentage of products that were developed in-house during the three years prior to our study.

[Insert Table 2 about here]

In addition, an examination of the internationalization of our sample firms' value activities indicates that marketing activities are the foremost internationalized activities (only 9% of the firms locate marketing activities exclusively in Israel) and that R&D activities are mostly located in the home country (64% of the firms locate their R&D activities exclusively in Israel). Production activities were moderately internationalized (44% of the firms locate their production activities exclusively in Israel). These internationalization patterns confirm to the expectations of the Uppsala model (Johanson & Vahlne, 1977) regarding the internationalization of marketing and production activities, as well as the extant perception regarding the 'stickiness' of R&D activities to the home country (Benito et al., 2003; Patel & Pavitt, 1991).

Since we focus on KI-SMMs with a proven track record of business activity, the firms in our sample are somewhat larger than SMEs that have been investigated in previous studies (e.g. Coviello & Munro, 1997; Keeble et al., 1997; McNaughton, 2000). However, Gomes-Casseres (1997) and Knight (2001) relate to firms of a similar size to ours.

## **Findings**

Our first hypothesis stated that the propensity of KI-SMMs to perform R&D and marketing (including post-sales service) activities in-house is higher than their propensity to perform production activities in-house. Every firm in our sample was asked to report if it was conducting its R&D, production and marketing activities exclusively in-house or not (see Appendix 1). We then used the Cochran-Mantel-

Haenszel (CMH) statistic to test the hypothesis. The CMH statistic is a non-parametric measure that serves for testing hypotheses regarding the equality of two matched distributions, measured on a categorical (nominal) scale. In this study, the CMH statistic was used to compare chi-square tests on binary variables. Of the firms in our sample, 80% performed their R&D activities exclusively in-house and 72% performed marketing activities exclusively in-house, whereas only 28% performed production activities exclusively in-house. The CMH statistic indicates that a significant difference exists between the propensity of KI-SMMs to internalize R&D and marketing activities and their propensity to internalize production ( $\chi^2 = 15.70$ ,  $df=1$ ,  $p < .0001$ ), thus supporting Hypothesis 1.

Hypothesis 2 posed that the performance of KI-SMMs is positively correlated to their R&D and marketing expenses. We tested this hypothesis by means of Ordinary Least Squares (OLS) regressions. We used two common profitability ratios as proxies for KI-SMMs' performance: i) the ratio of operating profit to sales (denoted as *Model 1*); ii) the ratio of operating profit to firm assets (denoted as *Model 2*). In order to ensure a normal distribution of both dependent variables ( $y_i$ ), they were transformed into an exponential form ( $e^{y_i}$ ). The normal distribution of  $e^{y_i}$  was confirmed by the Shapiro-Wilk test.

Our explanatory variables were: the ratio of R&D expenses to sales (in 1999) and the ratio of marketing expenses to sales (in 1999). These variables indicate the expenses of KI-SMMs on R&D and marketing, respectively, normalized by sales volume. We also included the following control variables: (1) firm size (measured by number of employees) - in order to control for possible size effects; (2) firm age – in order to control for possible age effects; (3) the ratio of the cost of goods to sales – in order to control for product characteristics and operational efficiency effects; (4) industry – in order to control for industry effects on profitability and (5) location of R&D, production and marketing activities (exclusively in Israel or also abroad) – in order to control for possible cost effects that result from the internationalization of value activities (see detailed measures in Appendix 1).

We used various OLS techniques such as backward, forward and stepwise regressions in order to identify the best regression model for the dependent variables. Table 3 details the explanatory models in terms of their adjusted  $R^2$  values and the values of the F statistic (ANOVA). These models were also checked to verify that no multi-collinearity exists between the independent variables and for lack of heteroskedasticity.

[Insert Table 3 about here]

The data in Table 3 indicate a significant positive correlation between the ratio of marketing expenses to sales and firm profitability. The ratio of R&D expenses to sales was significant only in model 1. Hypothesis 2 is therefore mostly supported.

Hypothesis 3 asserted that there is a positive correlation between the internalization of marketing activities and the nature of the firm's customers, in terms of serving commercial customers and market niches. We employed a binary logistic regression model to test this hypothesis, where the dependent variable indicated whether a firm internalizes marketing activities (i.e. performs them exclusively in-house) or not.

In addition each firm was asked to report whether it primarily targets market niches (rather than the mainstream market) and whether the majority of its customers are commercial ones (i.e. either OEM, end customers that are businesses or resellers). Firm size, firm age and industry were chosen as control variables (see detailed measures in Appendix 1). We used a backward stepwise regression procedure to test the validity of the regression model, the results of which appear in Table 4.

[Insert Table 4 about here]

Table 4 indicates that targeting market niches and commercial customers are both significant explanatory variables for conducting marketing activities exclusively in-house. The value of the Cox & Snell  $R^2$  and Nagelkerke  $R^2$  (which are the equivalent of an adjusted  $R^2$  in binary logistic regressions) are also fairly high. Hypothesis 3 is therefore confirmed.

## **Discussion and Conclusions**

In this study we assert that KI-SMMs create and sustain their competitive advantage not only by securing and protecting superior capabilities but also by compensating for inferior ones. This approach is different from the standard interpretation of the resource-based view that relates only to superior capabilities as the source of competitive advantage. We have demonstrated how KI-SMMs create and sustain a competitive advantage against KI-MNCs by employing a strategic configuration that secures their relatively superior capabilities (in R&D activities), while minimizing disadvantages arising from their relatively inferior capabilities (in production and marketing activities).

The empirical findings mostly support our hypotheses. KI-SMMs aim to secure superior and core capabilities in R&D activities through internalization. KI-SMMs tend to compensate for their inferior capabilities in production activities, which are viewed as non-core capabilities, through externalization. The main challenge for KI-SMMs is how to handle their marketing activities, which are considered a core capability for these companies, but one for which they have a relatively inferior capacity. We have shown that KI-SMMs tend to resolve this challenge by internalizing marketing activities and focusing on market niches and/or commercial customers, thereby forgoing the need for an extensive global distribution and servicing infrastructure. When we linked the strategic configuration of KI-SMMs to performance (measured by two profitability ratios), our findings indicated that R&D and marketing expenses were positively correlated to performance, further supporting our above arguments.

It is noteworthy that since we chose to study publicly traded KI-SMMs with a proven business record, our results may be somewhat biased. This bias stems from the fact that we studied only ‘successful’ firms and did not include KI-SMMs that failed or did not go public.

Previous literature has often argued that small firms are able to compete globally by exploiting alliances in marketing activities (Bell, 1995; Kaufmann, 1995; Coviello & Munro, 1997), whereas the size and experience of larger firms is expected to enable them to internalize foreign marketing operations (Agarwal & Ramasawi, 1992; Buckley & Casson, 1976). While alliances may provide a good solution to non-knowledge-

intensive small and medium-sized firms, we have shown that the case of KI-SMMs is different. These firms need to internalize marketing activities in order to protect proprietary know-how and secure their customer base. KI-SMMs compensate for their disadvantage in size by trying to minimize the number of transactions they conduct, while maximizing the value of each transaction. This is achieved not only by targeting market niches (Gomes-Casseres, 1997; Kohn, 1997), but also by focusing on large, commercial customers.

When we compare the strategic configuration of KI-SMMs to that of KI-MNCs, several differences emerge. Similarly to KI-SMMs, large KI-MNCs (e.g. Microsoft, Intel, HP, IBM, and Cisco) are expected to create and sustain competitive advantages based on their R&D and marketing activities and to internalize these activities in most cases. As a result of their size however, KI-MNCs are able to internalize their production activities as well. This enables KI-MNCs to better exploit scale economies and to create synergies across the value chain. Moreover, KI-MNCs may use the superior financial and managerial resources and greater experience that they have compared to KI-SMMs to develop a wide distribution and services infrastructure in host markets, allowing them to target mass-market consumers across countries and continents. Hence, an important avenue for future research is to empirically compare the strategic configuration of KI-SMMs and KI-MNCs and to evaluate the impact of these strategic configurations on the performance of the two groups.

Although beyond the scope of this study, the fact that KI-SMMs target mainly market niches and commercial customers raises the question of firm growth. How, if at all, can KI-SMMs become large MNCs? If KI-SMMs wish to grow, they need to penetrate a larger variety of customers. Since we have argued that constraints of size and experience may inhibit KI-SMMs from targeting mass consumer markets, it seems that these firms have little option but to pursue strategic marketing alliances to enable rapid growth. However, strategic alliances may play a contradictory role. While they compensate for the cost and difficulty of creating a distribution and after-sales services infrastructure in host markets, they threaten the ability of KI-SMMs to protect their proprietary technological know-how and their market base. Is this conflict inevitable? Will KI-SMMs need to risk their proprietary know-how and client base if they wish to grow rapidly? Are there any particular strategic configurations that enable firms to protect their know-how while leveraging on the marketing infrastructures of larger MNCs? All these are critical questions that should be addressed in future studies.

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**Chart 1 – Types of multinational companies according to their knowledge-intensity (KI) and size**

		<i>Size</i>	
		<b>Small</b>	<b>Large</b>
<i>Knowledge Intensity</i>	<b>High</b>	KI SMM	KI MNC
	<b>Low</b>	Non KI SMM	Traditional MNC

**Chart 2 - Core capabilities and their comparative position**

		<i>Comparative Position of Capability</i>	
		<b>Superior</b>	<b>Inferior</b>
<i>Core Capability</i>	<b>Yes</b>	<b>I</b> Preserve/ strengthen capability's superiority	<b>II</b> Target customer groups to minimize inferiority
	<b>No</b>	<b>III</b> Contingency decisions	<b>IV</b> Acquire capability from external organizations

**Table 1 – Strategic configuration as a determinant of KI-SMMs’ competitive advantage**

<i>Value activity:</i>	<i>Internalization of value activities</i>	<i>Nature of target customers</i>
<i>R&amp;D</i>	Performed in-house.	} Serve market niches and/or commercial customers.
<i>Production</i>	Outsourced and conducted through strategic alliances.	
<i>Marketing</i>	Performed in-house.	

**Table 2 – Descriptive statistics of Israeli KI-SMMs (for the year 1999)**

<i>Variable</i>	<i>Average</i>	<i>Range</i>
Year of establishment	1989	1977-1996
Sales (\$, M)	46	0-338
No. of employees	274	15-1020
Percentage of sales in Israel	11	0-60
No. of foreign markets	32	1-86
Ratio of R&D expenses to sales (percentage)	25	5-246
Percentage of products developed in-house within the last 3 years	54	0-100

**Table 3 – Performance of KI-SMMs and their expenditure on R&D and marketing activities: Results of OLS regression models**

<i>Dependent Variable:</i>	<i>Model 1</i> <i>Operating</i> <i>profit/Sales</i>	<i>Model 2</i> <i>Operating</i> <i>profit/Assets</i>
<i>Independent variables:</i>	Coefficients	
Constant	-0.724 **	1.350***
Ratio of R&D expenses to sales	2.526***	n.s.
Ratio of marketing expenses to sales	1.804***	0.671***
No. of Employees	n.s.	n.s.
Firm age	n.s.	n.s.
Ratio of cost of sales to sales	-2.143***	-0.686***
Industry 1 (Telecommunication)	n.s.	n.s.
Industry 2 (Electronics)	-0.338 *	n.s.
Industry 3 (Software)	n.s.	n.s.
Industry 4 (other-pharmaceuticals, biotechnology, medical technologies)	n.s.	n.s.
Location of R&D (exclusively in Israel/ in host markets)	n.s.	0.127**
Location of production (exclusively in Israel/ in host markets)	n.s.	n.s.
Location of marketing (exclusively in Israel/ in host markets)	n.s.	n.s.
Adjusted R <sup>2</sup>	0.752	0.626
ANOVA (F value)	27.48	20.01

Legend:

\*\*\* - Significant at  $p < 0.001$ ; \*\* - Significant at  $p < 0.01$ ; \* - significant at  $p < 0.1$ .  
n.s. - not significant

**Table 4 – Internalization of marketing activities:  
Results of a binary logistic regression model**

<u>Dependent Variable:</u>	Internalization of Marketing
<u>Independent variables:</u>	Coefficient
Constant	-34.664*
Serving market niches (yes/no)	12.242*
Serving commercial customers (yes/no)	11.277*
No. of Employees	n.s.
Firm age	n.s.
Industry 1(Telecommunication)	n.s.
Industry 2 (Electronics)	n.s.
Industry 3 (Software)	n.s.
Industry 4 (other-pharmaceutics, biotechnology, medical technologies)	n.s.
Cox & Snell R <sup>2</sup>	0.474
Nagelkerke R <sup>2</sup>	0.691

Legend:

\* - Significant at  $p < 0.05$ ; n.s. - not significant.

## Appendix 1 – Details of measures

Variable	Measure	Notes
Performing R&D activities exclusively in-house	1-Yes 2-No	'No' implies: alliances or joint ventures in R&D
Performing production activities exclusively in-house	1-Yes 2-No	'No' implies: alliances, outsourcing or joint ventures in production
Performing marketing activities exclusively in-house	1-Yes 2-No	'No' implies alliances, licensing or joint ventures in marketing
Ratio of operating profit to sales	Operating profit/sales	Taken from the firms' financial reports for 1999
Ratio of operating profit to assets	Operating profit/(current assets + long-term assets)	Taken from the firms' financial reports for 1999
Ratio of R&D expenses to sales	R&D expenses/sales	Taken from the firms' financial reports for 1999
Ratio of marketing expenses to sales	Marketing expenses/sales	Taken from the firms' financial reports for 1999
Ratio of cost of goods to sales	Cost of goods/sales	Taken from the firms' financial reports for 1999
Firm Size	Number of employees in 1999	
Firm Age	1999 minus year of establishment	
Industry	Classified into 4 dummy variables representing whether a firm belongs to one of the following industries: (1) software, (2) information and communication technologies, (3) electronics and (4) 'other', which includes pharmaceuticals, biotechnology and medical technologies.	Each firm was classified into a single industry
R&D activities exclusively located in Israel	Firms were requested to define the location of their R&D activities as follows: 1-Israel, 2- USA, 3-EU, 4-South East Asia, 5- Rest of the world, 6- Israel and a foreign region.	Item 1 was converted into: 1- 'Yes'. Items 2-6 were translated into: 2-'No'.
Production activities exclusively located in Israel	Firms were requested to define the location of their production activities as follows: 1-Israel, 2- USA, 3-EU, 4-South East Asia, 5- Rest of the world, 6- Israel and a foreign region.	Item 1 was converted into: 1- 'Yes'. Items 2-6 were translated into: 2-'No'.
Marketing activities exclusively located in Israel	Firms were requested to define the location of their marketing (including post sales services) activities as follows: 1-Israel, 2- USA, 3-EU, 4-South East Asia, 5- Rest of the world, 6- Israel and a foreign region.	Item 1 was converted into: 1- 'Yes'. Items 2-6 were translated into: 2-'No'.
Primarily targeting market niches	Firms were requested to indicate whether their market is defined as : 1- Niche market 2- Mainstream market 3- Both	Item 1 was converted into: 1- 'Yes'. Items 2 and 3 were converted into: 2- 'No'.
The majority of customers are commercial	Firms were asked to identify their customer type as follows: 1- OEM customers 2- End customers – private 3- End Customers – Businesses 4- Resellers 5- Others	Items 2-4 were converted into 1- 'yes'. Items 1 and 5 were converted into 2- 'No'.

