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Organizational Knowledge and Localized Competition: A Case of a High Performer that is Socially Constructed*

JONGHOON BAE**
Seoul National University
Seoul, Korea

Abstract

This study seeks to elucidate conditions under which high performers emerge independent of their internal resources even when competition in the output market is intense. In particular, I present an extended model of localized competition in which 'ill-informed' producers compete with each other by 'observing' the actions of their rivals and 'inferring' the association between the cost and benefit of their action from observable market response to the action of their rivals. To this end, I combine three independent streams of research, including the ecological model of localized competition, organizational knowledge and Harrison White's model of market (Carroll and Hannan 2000; Garicano 2000; Grant 1996; Nelson and Winter 1982; White 1981). An analytical strategy chosen is to parameterize the interplay of organizational knowledge and localized competition so that this study seeks to theorize a general competitive process that underlies the emergence of high performers without ignoring the role of firm heterogeneity in internal resources. In particular, this study characterizes market competition with respect to four parameters, including (1) the size of the neighborhood of a firm, (2) the upper and (3) lower bound of knowledge bases, and (4) a type of the market. The implications of this model are further explored in the context of multimarket competition as well as resource-partitioning.

Keywords: Localized Competition, Knowledge-based View, Interfirm Rivalry, Social Construction

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** Seoul National University, Graduate School of Business (58-509), Seoul, 151-916, Republic of Korea. Tel: 82-2-880-2553. jbae01@snu.ac.kr

INTRODUCTION

As is the case with the romance of leadership (Meindl et al., 1985; Weber et al. 2001), practitioners tend to overstate the role of internal resources as to the source of a high performer, whether it is effective leadership at the individual level or competitive advantage at the firm level. Managerial models of high performers have accordingly pointed to the unique bundles of internal resources that are not competitively available in the input market and that yield sustainable competitive advantage for the owner of those resources when competition in the output market is high so that the influence of institutional pressures is negligible, an account that is summarized as an umbrella concept, a resource based view of the firm (Peteraf 1993; Wernerfelt 1995).

Such models however are not without limitations. One important problem in contemporary writing in the field of management is that managerial efforts to improve internal resources is assumed to have a positive net impact on organizational performance and that it leaves as a black box the interplay of cost and benefit related factors that are attributable to the assumed net effect on performance. Such models are justifiable only when the cost effects of managerial efforts are closely associated with the benefit-side effects. If so, any account that unveils the working of the cost-side effects should be complete without further explicating that of the benefit-side effects. Yet, it is rather restrictive assumption that the cost-side effects are not independent of the benefit-side ones. For example, cost-reducing R&D does not always help create innovations that are welcomed by consumers.

In this study I seek to elucidate conditions under which high performers emerge independent of their internal resources, i.e., cost-side effects, even when competition in the output market is intense, a contingency that should strengthen the association between benefit and cost-side effects. In particular, I present an extended model of localized competition in which *ill-informed* producers compete with each other by *observing* the actions of their rivals and *inferring* the association between the cost and benefit of their action from observable market response to the action of their rivals. To this end, I combine three independent streams of research, including the ecological model of localized competition, organizational knowledge and Harrison White's model of market (Carroll and Hannan 2000; Demsetz 1988; Garicano 2000; Grant 1996; Nelson and Winter 1982; White 1981, 2002).

An analytical strategy chosen is as follows. I begin with a well-known empirical finding of the size distribution of the firm, which reflects the nature of market competition. I review alternative models that explicate the competitive source of the size distribution and present a model of socially constructed competition where high performers emerge independent of their superiority of rivals. In particular, I parameterize the interplay of organizational knowledge and localized competition so that this study helps theorize a general competitive process that underlies the emergence of high performers without ignoring the role of firm heterogeneity in internal resources. The implications of this model are further explored in the context of multimarket competition as well as resource-partitioning.

SIZE, KNOWLEDGE, AND COMPETITION

Ecologies in Localized Competition

A widely established empirical regularity in competition is that the distribution of organizational size in the industry follows a lognormal distribution (Greene 1993; Simon and Bonini 1958). A lognormal distribution differs from a normal distribution in that a lognormal distribution is not symmetry around its mean. In other words, a medium sized firm is relatively hard to find in a lognormal distribution than in a normal distribution. One implication of this observation is that most organizations are relatively small (Aldrich 1999). This also implies that the probability distribution of the change in size is the same for firms of all sizes (Simon and Bonini 1958). Taken together, this empirical observation suggests that an industry consists of a few large-scaled organizations and many small-sized ones. Given that every firm seeks to grow (Penrose, 1995), it remains to be answered why most of small firms fail to grow large.

One explanation is that the very nature of competition yields this lognormal distribution of organizational size. An ecological model of competition is a case in point. According to this model, competition among organizations of similar sizes is attributable to this lognormal distribution of size (Amburgey et al. 1994; Baum and Mezias 1992; Hannan and Carroll 1992; Hannan and Freeman 1977; Hannan and Ranger-Moore 1990). The reason is that organizations of different sizes occupy different niches and that organizations of similar size will compete with one another intensively, namely, size-localized competition (Amburgey et al. 1994; Hannan and Freeman 1977, 1989). The structure of ecological explanation for the size distribution of organization is as follows. Larger organizations, although their direct rivals are the other larger organizations, also compete with medium-sized organizations more frequently than smaller organizations. These larger organizations build on relatively similar resources that medium-sized organizations employ. In the same way, medium-size organizations suffer from competition by smaller organizations due to the overlap in niches between smaller organizations and medium-sized organizations. As a result, the life chance of middle-sized organizations decreases, leading to a bimodal distribution.

For example, Amburgey et al. (1994) in their analysis of the credit unions in the US from 1980 to 1989 found that the association between the risk of organizational failure and the size of organization is not linear. In particular, they showed that this association is generally negative, yet there is a sudden increase in the failure risk around the medium size. This competition results in a bimodal frequency distribution of organizational size (Carroll and Hannan 2000). Note that this bimodal distribution is compatible with a lognormal distribution if p.d.f. in the latter is defined on the size of an organization, not the frequency of organizations of a size. A defining feature of a bimodal distribution of organizational size is that it underrepresents the middle-sized organizations relative to a lognormal distribution.

An early model of localized competition points to size similarity as a determinant of interfirm rivalry (Hannan and Freeman 1977), and yet researchers extend this model by addressing other similarity dimensions such as geographical similarity and resource similarity. Baum and Mezias (1992), for example, studied the organizational failure in the Manhattan hotel industry from 1898 to 1990 and reported that organizations within a certain distance of size, location, and service price would compete more fiercely than outside the distance, namely, *strategic widow* (Hannan and Ranger-Moore 1990).

Is the ecological model of localized competition compatible with a conventional view of competition? Among popular models of competition, the strategic group research offers a closest picture of the market where multiple subgroups of producers serve different niches and compete with one another (Cool et al. 1999; Hatten and Schendel 1977; McGee and Thomas 1986). A long history of strategic management delivers consistent verdicts that firms differ in their strategy even within the same industry (Cool and Dierickx 1993; Dranove et al. 1998; Peteraf 1993; Wernerfelt 1995). In a way to unveil the variation in firm profitability within the same industry, researchers of strategic group propose that a market consists of different groups of producers whose business strategies differ across groups and yet are similar within the group. Owing to mobility barriers (Caves and Porter 1977), this between-group difference in strategies leads to the variation in profitability between firms. Competition is thus likely to be intense for the members of the same strategic group (Cool and Schendel 1987), which is predicated upon mutual recognition among member firms (Farjoun and Lai 1997; Fiegenbaum and Thomas 1995).[1] In other words, competition within a strategic group is *basically* more intense than between strategic groups (Cool and Dierickx 1993; Dranove et al. 1998)

However, the problem with the size-localized competition is that unlike the strategic group research, it fails to explicitly account for the input factors or internal resources that help distinguish one rival from another. Although much research on the localized competition uses an organizational size as a proxy for a firm's resource requirements (Amburgey et al. 1994; Hannan and Freeman 1977, 1989), size is rather an unreliable indicator of resources, meaning that organizations of the same form or niche may end up with different sizes (e.g., Amburgey et al. 1994; Baum and Mezias 1992; Lee 2002).

Besides a tenuous link between organizational size and market niche, a testable model of localized competition requires a priori theory to calibrate similarity between firms, a theory that such model lacks in. Moreover, organizational size itself is a choice variable for the firm, which means that unless organizations adapt passively to their niches, they employ a variety of strategies,

1) For the micro-process of coordination of beliefs among competitors, see Ingram & Roberts (2000).

including its size such as production capacity. Indeed, ecological researchers acknowledge that when intrapopulation competition as well as interpopulation competition follows size-localized competition, organizations of a form or niche may end up with different sizes (Amburgey et al. 1994; Baum and Mezias 1992).

In what follows, I seek to extend the ecological model of localized competition by incorporating the concept of organizational knowledge into organizational form (Demsetz 1988; Grant 1996; Nelson and Winter 1982). In particular, this study parameterizes the interplay of organizational knowledge and localized competition. These parameters include the size of the neighborhood of a firm, the upper and lower bound of knowledge bases, and a type of the market.

The Firm and its Knowledge

As a knowledge-based view of the firm suggests (e.g., Bae and Koo 2008; Grant 1996), production activities inside the firm are relegated into an organizing process of converting individually-held knowledge into organizational knowledge. Unlike physical resources, organizational knowledge, codified or not, is a bundle of work procedures that are needed to solve a given problem, namely, organizational routines. The firm incurs the following two types of organizing costs: helping and learning costs (Garicano 2000). The former refers to the cost of advising or consulting colleagues at the workplace, whereas the latter concerns that of learning from others. Note that these two types of costs refer only to organizing costs, i.e., transaction costs inside the organization. Each person's cost of deciding, i.e., production cost, is exogenously given in this discussion.

Organization scholars have long suggested that the cost of these organizing activities is subject to a firm's past experience of organizing activities as well as the routines or investment policies that a firm employs (Cohen and Levinthal 1990; Dierickx and Cool 1989; Lane and Lubatkin 1998; Nelson and Winter 1982). This in turn suggests that the cost of organizing is dependent upon the quality of past experience as well as that of organizational routines. The following limiting cases illustrate the interplay of organizational knowledge and organizing cost.

Suppose that any producer fails to remain active in the market unless he or she knows to produce a minimum viable product, i.e., a product whose quality exceeds a threshold set by the majority of consumers in the market. Denote organizational knowledge that helps produce a minimum viable product by 'α', which is the lower bound of organizational knowledge that is maintained by any active firm in the market. The presence of α serves as a natural barrier to entry since consumers will not place an order to a producer, whose product quality is below the threshold level of their preference. The value of α will vary across industries and product life cycles. In a mature industry α is likely to be high, whereas α in an early stage of product life cycle is expected to be low. Alternatively, α in a generic product market would be relatively low.

In the other extreme, the marginal value of organizational knowledge would be zero when the performance effects of additional knowledge such as quality improvement or productivity gains are not translated into the increase in demand for their products. Denote organizational knowledge that helps produce a maximum viable product by 'β', which is the upper bound of organizational knowledge that is economically valuable. This parameter indicates that consumers will not recognize quality difference between products when the quality of a product is too high for consumers to appreciate. Performance overshooting in technology rivalry is a case in point. For example, the value of β may increase at a decreasing rate, thus being stable at the later stage of product life cycle, when consumers tend not to pay additional money for newly introduced functions of a product.

The effects of α and β are reflected into a firm's organizing cost in the following way. The marginal effects of both α and β on organizing cost are negative, indicating that the productivity of a firm's knowledge assets is diminishing in α and β. For example, an increase in α reduces the perceived quality of a firm's product. Similarly, an increase in β may lead the quality of a firm's product to be far below customers' ideal point. Either way, the firm needs to obtain more resources and craft better routines to upgrade its ability to satisfy customers. All these processes incur additional costs to the firm. Of course, α and β alike are determined by what consumers want in a given point in time, which is exogenously given to a firm.

Localized Competition in Action

Localized competition may takes two different forms depending on the level of α and β. One is localized competition when α is a dominant factor. The other is localized competition when β is a dominant factor. Let me explain one by one.

When technological uncertainty is high, i.e., firms do not know which technology is to increase their survival chance, they are vulnerable to any increase in minimum requirement of quality, i.e., α. Firms whose knowledge assets are not sufficient for this lower bound should either make divestiture or seek alliances with others. Therefore, firm behavior that is affected mainly by α is called the localized competition in α-phase. Of course, these technological uncertainties are aggravated by consumer preference, which by itself is unstable and shifting. Moreover, a governmental regulation is the source of uncertainty. For example, potential entrants in the telecommunications industry in Korea in 1996 were requested to prove their qualifications set by the government before getting licenses (Bae and Lee 2000). Entry decisions, thus, are mostly influenced by the value of α. As an industry becomes mature, α may increase owing to consumer learning. Yet in a mature industry, technological uncertainty is not an issue. Rather, α is expected to be critical in an earlier stage of industry evolution, where products are ill-defined (Utterback and Abernathy 1975).[2)]

On the contrary, priority in business strategies would be different when firms seek to differentiate themselves from other competitors. Competition for functional superiority or for symbolic differentiations may induce firms to acquire additional organizational knowledge, leading to over-engineered products or products with unnecessary fringe benefits. This runaway process will account for the negative consequence of organizational inertia, where tight adaptation to demand inhibits firms to adapt to new environments (Boyd and Richerson 1985; Leonart-Barton 1992; Levitt and March 1988). Firm behavior that is affected mainly by β is called the localized competition in β-phase.

2) Note that this discussion doesn't have to be confined to the early stage of industry evolution. That is, the lower or upper bound of organizational knowledge is not a time-based construct.

In this case additional acquisition of knowledge does not improve the life chances of an organization. In particular, the level of β will play a more important role than that of α after the emergence of dominant design. It is because dominant design will fix the level of α and improvement on dominant design will shape the basis of competition (Anderson and Tushman 1990; Suarez and Utterback 1995; Tushman and Romanelli 1985). The level of β then reflects what is the ideal point for consumers after the emergence of dominant design. Of course, when β increases over time, it is reasonable for a firm to continue acquiring new knowledge bases since it may lag behind competition otherwise (Adner and Levinthal 2001). However, if β stabilizes at a certain value, this expansion strategy leaves a firm core rigidities, not core competence.

So far I draw on a knowledge based view of the firm and identify two possible contingencies that shape the interplay of organizing cost and organizational knowledge, i.e., α-phase and β-phase. The next step is then to relate these contingencies to the causal mechanism of the size distribution of the firm, which will be discussed in below.

Niche Overlap and Localized Competition

Insofar as organizational size reflects the difference in organizational knowledge (Bae and Kang 2010; Lomi and Larsen 2000), the logic of size-localized competition is readily extended to knowledge-localized competition such that organizations of the same size draw on identical knowledge and that the intensity of rivalry decreases in size difference between firms, which in turn reflects difference in knowledge between them. I define niche overlap between two firms as the extent to which the organizational knowledge of these firms is redundant, from which the following three propositions are derived as to knowledge-localized competition:

First, for a given niche, i.e., a given type of consumers, organizational size increases with the amount of knowledge that the firm needs to integrate in its operation. That is, as a firm gets larger, it faces more production problems to solve, which in turn requires more organizational knowledge to obtain. The reverse is also true.

Second, an organization whose knowledge is closer to β is more likely to produce better.

Third, organizations with perfect niche overlap produce products of the same quality with the same probability.

Fourth, organizations compete more intensively with each other as their niche overlap in organizational knowledge increases.

Note that niche overlap between two firms is positive as long as each firm's knowledge is larger than a lower bound in the market, i.e., α. This in turn suggests that the boundary of a market is determined by a pair-wise niche overlap that is positive. From the logic of size-localized competition, however, the following holds true:

Fifth, organizations do not always compete with all the others whose niches overlap with theirs.

The reason is as follows. Suppose that the decision-makers of the firm estimate their probabilities of winning competition. Suppose also that its own estimated probability of success is also known to its rivals. Then, firms with different probabilities of success may not compete directly; one with less probability suspects that he or she would be selected out in the market. To the extent that firms base their estimated probabilities on organizational knowledge, rivals are those who have perfect niche overlap, i.e., identical probabilities of success. For the simplicity of discussion, hereafter, I will let a firm's potential rivals of identical knowledge be its neighborhood.

A bimodal distribution of organizational size arises from the combination of the above five propositions. The following set-up illustrates this conclusion.

Suppose, for example, that there are ten discrete types of organizational knowledge available in the market. Suppose also that each type of knowledge is identical with respect to its impact on productivity gains or quality improvement. Other things being equal, rivalry among organizations is reduced to the acquisition of as many types of knowledge as possible. Niche overlap increases as each firm integrates additional types of knowledge into its operation. Accordingly, two firms are assumed to have perfect niche overlap as long as the size of their neighborhood is identical. Suppose also that the size of a firm's neighborhood is not fixed so that there is no limit to the density of a population in the market.

With this set-up, let α and β be one and ten, respectively. For a firm with two types of knowledge, the size of its neighborhood is 44 (i.e., ${}_{10}C_2 - 1 = 44$). The maximum size of neighborhood is found in a firm with five different types of knowledge (i.e., ${}_{10}C_5 - 1 = 251$). Hence, a firm with a medium size of neighborhood, and thus medium number of knowledge types, is likely to face more competition. Given the positive association between competitive intensity and organizational failure, knowledge-localized competition leads to the emergence of a bimodal distribution of organizational size.

One issue that remains however is that each type of knowledge is equally likely to be drawn from the pool of available knowledge in the market: a process of random mixing. In contrast, for various reasons, the actual process of drawing knowledge type is less likely to be random. Managers under uncertainty tend to imitate what others do so that the draw of knowledge type is biased. Given this discussion, it is theoretically relevant to include in a model the process of social influence, i.e., the way that decisions made by managers are interrelated. In what follows, I extend a Harrison White's (1981) model of market and present a model of market competition where ill-informed producers choose their business model, i.e., competitive roles, by making an *inference* about the *unknown association* between the observed benefits and costs of the competitive roles that their rivals have chosen.

Market Typologies and Social Bias in Market Positioning

The quality of products is performance feedback from consumers, which evolves over time (e.g., Carpenter and Nakamoto 1989). Firms observe how their products are evaluated by consumers after looking into the sales volume of their products. In reality, a consumer's perceived quality difference between two firms is not identical to the actual difference between them owing to information asymmetry that plagues consumers. Indeed, one of major sources of the liability of newness is that new entrants have a great difficulty in signaling their quality to consumers or at least in letting consumers know of their products (Lieberman and Montgomery 1988; Stinchcombe 1965). Although information asymmetry is critical to quality-related issues, one important aspect has been neglected in the literature. That is, not only consumers have a limited knowledge of each producer's products, but producers also have a limited understanding of what consumers really want. Information asymmetry on the both sides of the market participants sets the ground for competition in any market.

This discussion suggests that a better description of the firm involves a process of deciding their qualities in advance, signaling their product quality to the market and sustaining the quality in the market. Given demand uncertainty as to quality as well as consumers' ignorance of product quality, how does a firm choose its quality of a product, signaling and sustaining this quality? Drawing on White (1981, 2002), I propose a model of quality decision and propose the last parameter for the localized competition, that is, a type of the market.

Harrison White, in his seminal paper (1981), proposed that producers respond to their competitors whose actions are observable, not to their target consumers whose preferences are unobservable, and slowly position themselves into a specific market position that is indexed by the quality of a product. What is unique in his model is that firms are active decision makers, whereas consumers are passive and aggregate in the sense that they are allowed to have only a binary choice, i.e. to buy or not to buy. This does not mean that producers freely choose their strategies. Rather it only suggests that producers make actively an inference about potential response from the demand. Note also that some consumers may express their dissatisfaction with products to producers. Yet, this kind of voice option (Hirschman 1970) is incorporated indirectly as performance feedback on the quality of a product in his model.

Out of interaction among firms searching for their own niches, namely social roles, a market is socially constructed. In particular, White (1981, 2002) construed a market as a set of competitive roles, each of which defines a firm's niche and is characterized as a vector of financial performance – W(y) – and production capacity – y. Hence, to occupy a niche means that a firm is able to sustain a stable vector of sales revenue and production volume in the market. More specifically, he characterized the cost function of the firm as follows:

$$C(y;\, n) = q[\frac{y^c}{n^d}]$$

where q is constant, y is the volume of output, and n is a quality index for a given firm. Parameter c is always positive because cost will rise as outcome increases. On the other hand, parameter d is either positive or negative, suggesting that the cost of sustaining the quality of a product will vary across different markets. For example, if d is positive, then the market is so-called a paradox market, where high quality producers will have lower cost structures (White 2002). In contrast, negative d implies that occupying a high quality niche is more costly than occupying a low quality one.

From a neoclassical economist's point of view, White's (1981) model is re-written in the following way. The task faced by each firm in White's model is to identify a sustainable market position out of available observations of performance feedback, i.e., a pair of production volume and sales revenue.

Let a level of outputs be y and a vector of inputs be x with input price vector w. There is only one goods with price p in the market. The consumer's choice is discrete, i.e., purchase or no purchase. The cost function is then expressed as the value of the conditional factor demand. That is,

$$C(w, y) = w * x(w, y)$$

Assume that each input has a different quality. Also assume that these differences in quality are unknown to producers and observable indirectly from the choice behavior of consumers. Then, w, which varies with the qualities of inputs, can be replaced by an exogenous quality index, n, such that:

$$w = n^d$$

Taken together, the cost function is rewritten as:

$$\begin{aligned} C(w, y) &= w * x(w, y) \\ &= n^d x(w, y) \\ &= n^d y(n)^c \end{aligned}$$

where the conditional factor demand is defined as $x = y(n)^c$.

The utility function here is assumed to increase in the volume of consumption, which is weighted by product quality:

$$u(y, n) = \mathrm{r} * y^a n^b$$

where r is constant.

The true profit function for producers is exogenous given and partially known to producers. It is then given by:

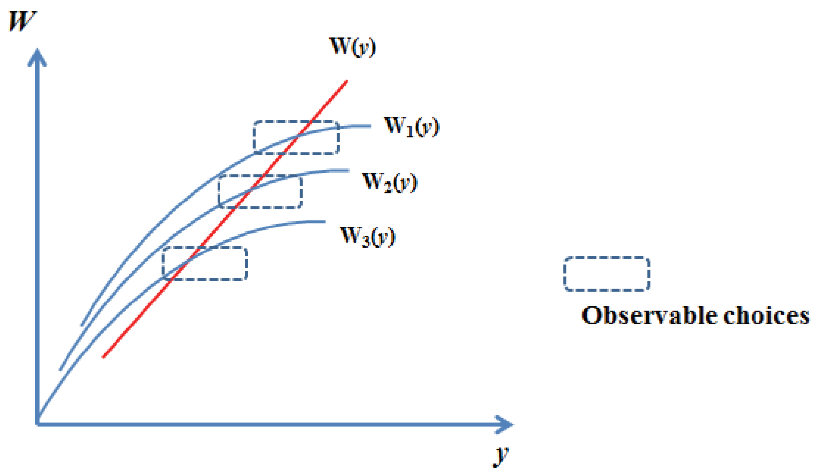


Figure 1. A Neoclassical interpretation of White (1981)

$$\pi = W[y(n)] - C[w, y(n)]$$

Note that W in White's model refers to a firm's sales volume, i.e., $W = p * y$.

Lastly, the indirect utility function, i.e., max $u(y, n)$ with a budget constraint is defined as:

$$v(\theta) = \theta W[y(n)]$$

where $u(y, n|\ p) = \theta W[y(n)]$.

From these conditions, it follows that the emergence of a market is reduced back to the question of whether $W[y(n|p)]$, namely, a market schedule, is sustainable or not. Figure 1 illustrates this reasoning.

For example, when a producer's cost function is convex in y, it does not sustain a given market schedule, i.e., W. You cannot infer W from observations of each firm's production choice. That is, W is unbounded. In contrast, a concave cost function with negative d does not sustain W either unless there are barrier to entry across niches. That is, a high-end producer is vulnerable to a low-end disruption.

As mentioned above, each firm in White's (1981) model begins with its own cost function and searches the market for most profitable niche while *watching* what other competitors do. In other words, niches in the market are *socially* constructed by producers with incomplete information (e.g., Hannan et al. 2007; Rindova et al. 2006; Yogev 2010; Zajac and Westphal 2004). A market emerges as a byproduct of individual efforts to figure out and make up a set of niches, which promise a certain association between the benefits and costs of each firm's capital investments. Hence, a market cannot be sustainable if organizations fail to identify a profitable set of niches, i.e., $W(y)$. In the same way, an organization cannot survive if it fails to locate a relevant niche. In a similar vein, Zuckerman (2000) reported that a firm whose line of business does not fit niches collectively accepted by the market participants is likely to be undervalued by analysts in the banking.

This discussion has the following implication for knowledge-localized competition. Each firm draws observations from its neighborhood before deciding how much to produce at which price. Of course, the membership of a firm's neighborhood may vary as the firm seeks to grow or diversify. Then, how can we know whether a given neighborhood remains stable or not? Here comes the last parameter – d.

I propose the following: the neighborhood in a positive d is more stable than in negative d. As is illustrated in Figure 2, a market in a positive d embeds a higher quality-volume producer with a lower cost structure, which means a higher profitability. A low quality-volume producer is then unable to move upward. They do not have cost advantage or unused resources to push them up to a new niche. In this market, a market share leader becomes more profitable. The reverse is true in a market with a negative d. Apple in the smartphone market is a case in point.

In summary, the knowledge-localized competition posits that organizations of similar knowledge constitute similar niches and that the competitive dynamics in a market is subject to the following four parameters: the size of a firm's neighborhood in a knowledge space, the lower bound of organizational knowledge, the upper bound of the knowledge, and the type of a market. Specifically, four propositions are suggested.

First, other things being equal, organizations with more knowledge are more productive.

Second, organizations with perfect niche overlap in knowledge

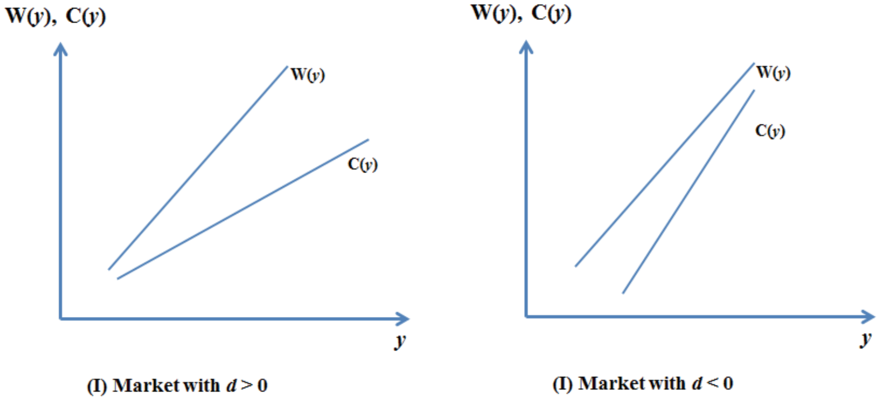


Figure 2. Firm Profitability and Market Typologies

Table 1. Examples of Industries Relevant to Localized Competition

	$d > 0$	$d < 0$
α-Phase	G-3 Telecoms	*e*-business
β-Phase	Banking	Auto Industry

are likely to produce goods of the same quality with the same probability.

Third, organizations with perfect niche overlap are likely to compete more intensively.

Fourth, the size of a firm's neighborhood is likely to be stable in a market with a positive d.

Lastly, with the two types of localized competition, alpha and beta, the following four contingencies of competitions are feasible. Table 1 gives these four possible contexts of localized competition with respect to the three parameters α, β, and d.

The telecommunications industry for 3-G technology in the nineties would fall into a case of α-phase with positive d. Despite technological uncertainty as to the functionality of mobile services, R&D investments in this industry exhibited an increasing return to scale. On the other hand, much of e-commerce business suffers from a scalability issue. The increasing demand for your service often leads your profitability to decrease whenever the marginal cost of upgrading service capacity is on the increase. Moreover, this industry with a relatively low level of α allows firms with inferior technology to enter more easily. Typically, α-phased firms tend to shield against technological uncertainty by forming alliances or making acquisitions to sustain their niches in the market.

Banking industry is the typical example of β-phased competition with a positive *d*. Every player in the industry fully recognizes the minimum standard of services and offers additional personalized services to customers. As Podolny (1993) suggested, a winner-takes-all process persists in this market such that a high quality bank realizes more profitability. In the automobile industry, the situation is reversed. This mature industry consists of manufacturers with standardized technologies. Furthermore, the cost of production increases substantially as the quality of a car is enhanced with additional functions such as luxury cars. Although those two industries have experienced a wave of M&A, the changes in status among firms have been rare.

A Crowded Bus Model of Competition: Intra-population Rivalry

The above mentioned model has the following implication for the emergence of high performers. They emerge independent of their superiority over rivals. Rather, search for profitable niches and its associated inference about market schedules leads to an early established signal, i.e., a market role, to become a high performer irrespective of its initial quality. This takes place when rivals are engaged in alpha or beta-phased competition in a bid to differentiate their market roles. This prediction makes a sharp contrast to resource-partitioning theory where a profitable center is also crowded (Carroll 1985; Reis et al. 2013; Swaminathan 1995). The following example further illustrates this reasoning.

Suppose that Mr. Kim in Seoul is waiting for a bus to go to work in the morning. Suppose also that there is no empty seat on the bus. When the bus arrives, the passenger randomly spots a place and stands on the bus. At the next stop, another passenger is on board and stands next to Mr. Kim yet makes a distance from him. At the subsequent stops, the same process repeats until the bus is fully packed. In equilibrium, the positional distribution of passengers on the bus is that most of passengers stand shoulder to shoulder in the front door of the bus, whereas Mr. Kim stands with some space on the other side of the bus. The efforts of the passengers not to stand closely to the others underlie this dynamics on a crowded bus where only one person, i.e., Mr. Kim, enjoys pleasantly a less crowded spot on the bus and the others are packed with each other on the bus. This metaphor is directly transferrable to a market competition where a less crowded and thus more profitable niche emerges as a result of rivals to search for a niche yet in a differentiated manner.

Figure 3 shows a Monte Carlo simulation of competition when each firm engages in either alpha or beta-phased competition. The X axis refers to the order of entry, whereas the Y axis refers to the W(*y*) of each niche chosen by the firm. A firm's production capacity is normalized such that it is rescaled with a corresponding quality, *n*. Suppose that this quality-adjusted capacity follows a uniform distribution with an interval of zero and one. Suppose also that a quality adjusted capacity is mapped onto a market schedule such that:

$$W[y, n] = (\frac{y}{n})^d$$

and *d* is set to be positive, i.e., 0.2.

Each firm's search strategy is defined as follows. First, alpha-phased competition is the following. The i^{th} firm that enters a market may draw its quality adjusted capacity independently from , where L_i is the quality adjusted capacity chosen by a rival that entered the market just prior to the i^{th} firm. Second, beta-phased competition involves each firm's *iid* draw from from . Note that the degree of differentiation between rivals is randomly determined while being bounded by L_i.

With this definition, competition unfolds such that late entrants tend to face imitative entries even though they seek to differentiate from others. The dashed line in Figure 3 depicts the results of beta-phased competition, whereas the straight line at the bottom gives those of alpha-phased competition. The third line in between them indicates a case where every 6^{th} entrant opts for beta-phased competition and otherwise for alpha-phased competition. All the observations of Figure 3 are obtained from an initial condition where the L_i of the first mover is 0.2356.

First-mover advantages take place clearly irrespective of the quality of the first movers, i.e., high performers. Late entrants, while locating a profitable niche, seek to differentiate yet their bias in search, i.e., by L_i, aggravates competition in a narrow

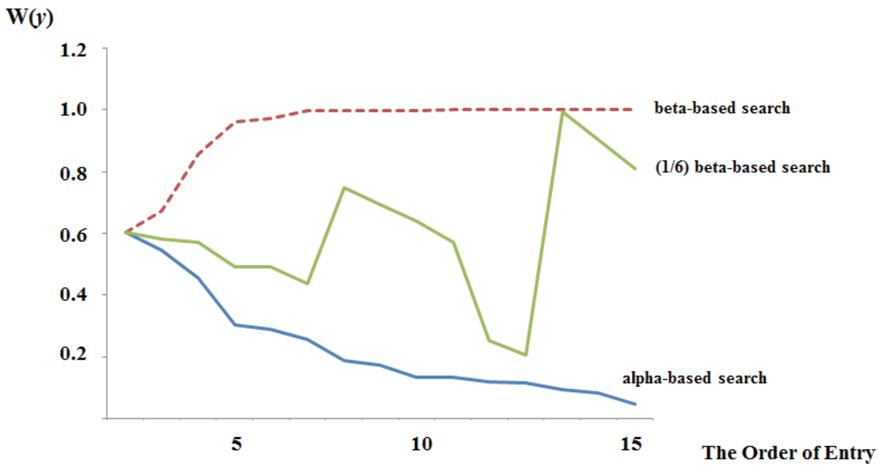


Figure 3. A Crowded Bus Model of Competition

range of niches, i.e., crowded niches. Profits drop accordingly with competitive crowding, which in turn leaves the first movers to enjoy profits without the interference of rivals. Note that the first mover here is one who establishes successfully a market niche or social role in the market and is accepted by the demand. Whether or not the type of competition differs across firms, the results remain largely intact: a case depicted by the graph of (1/6) beta-phased competition.

Note also that social bias in positioning, i.e., either alpha or beta-phased competition, underlies the variation in firm heterogeneity in quality-adjusted capacity. Against a baseline model where the probability of engaging in alpha-phased competition is 0.5, both alpha and beta-phased competition help increase firm heterogeneity with respect to quality-adjusted capacity. The mean value of standard deviation in the realized quality-adjusted capacity is 0.1488 for alpha-phased competition and 0.1426 for beta-phased competition, whereas it is 0.2751 for the baseline model. Note that the first mover is relatively an outlier in the choice of capacity, as is shown in Figure 3. Henceforth, the fact that a high level of firm heterogeneity results from either alpha or beta-phased competition should indicate that the inference process of late entrants about profitable niches may aggravate the competitive intensity among late entrants by introducing social bias in their searching for a better

Table 2. Monte Carlo Simulation of Firm Heterogeneity [a)]

	The mean of standard deviation in the observed quality adjusted capacity
α-phased competition	0.1488
β-phase competition	0.1426
50% α-phased competition	0.2751

a) Note that the number of simulation runs was 100.

niche. One direct consequence is that owing to social bias in market positioning, the first mover remains a high performer irrespective of whether it controls superior resources or not.

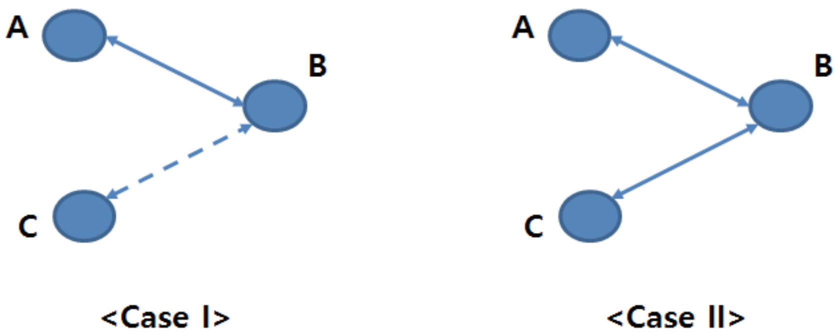
Multimarket Contact and Inter-population Rivalry

In this section, I further evaluate the theoretical implications of a knowledge-localized competition with respect to the phenomenon of multimarket contacts. I also examine the empirical issues for measuring parameters of this knowledge-localized competition.

Insofar as a market consists of more than one niche (White, 1981), the duality of niche and form (Carroll and Hannan 2000; Hannan and Freeman 1989), leads to the observation that a market includes more than one population of organizations. Indeed, competition among organizations with different niches is not rare in the market. For example, diversified large incumbents may seek to grow and to intrude on the market segment of smaller specialized ones. Mutimarket contact would be a general context to apply a knowledge-localized competition to inter-population rivalry.

Mutimarket contact refers to a case where firms compete in more than one market simultaneously, pooling the incentive constraints for unilateral deviation from tacit collusion, and allowing for others the spheres of influence (Bernheim and Whinston 1990; Karnani and Wernerfelt 1985). As a result, firms with multimarket contact avoid competition in an expectation of cross-market retaliation that an advantage in a market will be offset by the risk of retaliation in the other markets. Such an expectation is reciprocal, reducing the intensity of competition (Gimeno and Woo 1996, 1999).

Although the opinions are divided as to the source of tacit collusion, empirical evidence abounds with a measure of exit rates or financial profitability (Baum and Korn 1996, 1999; Boeker et al.



* Note a dashed line indicates one market contact and a straight one indicates multimarket contact.

Figure 4. Multimarket Contract and Transferablity of Collusion*

1997; Gimeno 1999; Gimeno and Woo, 1999; Korn and Baum 1999; Van Witteloostuijin and Van Wegberg 1992). From a knowledge-localized competition, the sources of tacit collusion that arise from multimarket contact are re-cast in the following way. In a market with a positive *d*, tacit collusion will be sustained by absolute difference in cost structure among rivals. This market with scale economies induces higher quality producers to have cost advantage. In contrast, mutual forbearance in a market with a negative *d* is not related to efficiency gains but to the exercise of market power, including investment in entry barriers. By definition, a market with a negative *d* does not favor organizational learning, including scale economies.

Besides the issue of collusion source, a better test of multimarket contacts would be one to examine the competition with firms of multimarket contacts and those with no contact, both of which are likely to present in many of observable markets. What is important here is whether firms with no multimarket contact will free-ride the outcome of tacit collusion among firms with multimarket contact, a question that is hardly addressed in the literature on multimarket competition.

Figure 4 shows hypothetical relations among competitors with respect to multimarket contact. Case II is a simple extension of multimarket contact, where Firm A has multimarket contact with Firm B, which in turn has multimarket contact with Firm C. In this case, firms A and C will develop ‘seemingly’ collusive behavior if and only if firms A and C meet at least one market where Firm B is operating. Note that whether two firms are explicitly aware of each other is not important. Case I is interesting in that Firm C has no multimarket contact with either Firm A or B, yet both firms A and B face multimarket contact. While the current literature on multimarket competition is silent on this case, the analysis of it is important because a collusive price set by two firms with multimarket contact will enable others with single business to set similar price and reap the free-riding benefits. In a market with a negative *d*, the effect of multimarket contact will be transferrable to the third party with no multimarket contact if α or β is smaller enough. In other words, if the distance between α and β gets shorter, the third party with inferior cost structure has no reason to avoid the collusive price generated by multimarket competitors.

The last question that should be addressed is how to empirically test the behavior of four parameters in this knowledge-localized competition.

First, niche overlap in knowledge is indirectly inferred via a selection equation. Let the intensity of rivalry between two firms, *i* and *j* be π_{ij}. Then, we have a performance equation to estimate that is $\pi_{ij} = f(\kappa_{ij}; X)$, where X is a set of control variables. A selection equation is given such that $\kappa_{ij} = g(S)$, where S is a set of covariates, describing the similarities in R&D intensity, advertising intensity and organizational age. All of these covariates are widely used by studies on resource profiles of firms (Carroll and Hannan 2000; Cohen and Levinthal 1990; Montgomery and Wernerfelt 1988; Schoenecker and Cooper 1998). One limitation of this approach is to ignore the qualitative differences in R&D projects and marketing expenditures. Of course, the direct analysis of patent applications, a proxy for organizational knowledge, would be considered as long as each firm's propensity to patenting is relatively higher in a given market. To measure niches more directly, a family of hetegrogeneous logit models with a priori factor structure would be used in addition to κ (Chintagunta 1994; Elrod and Keane 1995).

Second, the behavior of α and β, both of which are difficult to observe, depends on the function of each firm's organizing cost. To the extent that the output, y, is affine transformation of c.d.f. of a firm' knowledge, measured by its probability to solve organizational problems (see Bae and Koo 2008), the variation in revenue growth among firms after controlling for market conditions will reveal the changes in α and β in an indirect manner. Assume a market with a positive *d*. Because the organizing cost diminish in this kind of a market, *h* and *c* are decreasing in *S*, covariates used for estimating κ. Let the growth rate of the firm at time *t* be $y_t^{\bullet}$ (= $[y_t\text{-}y_{t-1}/y_{t-1}]|X$), where *X* is a set of market condition variables. Then, $y_t^{\bullet} = p(q(\lambda))$ and $q(\lambda) = 1 - e^{-\lambda^{*}t}$ and $\lambda = l\ (\alpha, \beta)$. The lambda will be zero if a firm's knowledge is below than α, yet will be one if the knowledge exceeds β. From these conditions, $\lambda(\alpha, \beta)$ is estimated for each firm.[3)]

CONCLUSION

This paper applies a knowledge-localized competition to understand conditions under which high performers emerge independent of their internal resources even when competition in the output market is intense. In doing so, this paper also sheds a new light onto an old question of organizational size distribution, i.e., why middle-sized firms are rare. The unique feature of this approach is that the behavior of organizational knowledge, a latent and unobservable construct, is examined in terms of four parameters: (1) the size of the neighborhood of a firm, (2) the upper and (3) lower bound of knowledge bases, and (4) a type of the market. Henceforth, this approach allows researchers to test a model of localized competition without calling for industry specific measures of organizational resources (see White 2000). On the theoretical side, the following merits further discussion.

First, it would be interesting to examine further the interplay of α and β across various domains of firm decisions. The low value of α increases the number of new entrants, reducing the life chances of incumbents, whereas a lower β makes it difficult for incumbents to differentiate themselves from others. What if both alpha and beta decrease? Does this condition favor new entrants or incumbents? Second, it would be interesting to examine possible transitions between the two phases of localized competition. For example, it is likely that over time the basis of competition changes from α-phase to β-phase. On the other hand, for some industries, the market may be characterized β-phase in the beginning. Which factors will influence the transitions? These transitions may create differential

3) This cannot be applied to a market with negative d.

impacts on profitability across firms, including incumbents and new entrants.

Third, is it possible for a market to switch between one with a positive *d* and one with a negative *d*? The role of innovation and organizational learning needs to be incorporated into any attempt to address this question. Finally, a model of knowledge localized competition is extended to addressing the issue of status change: how does a firm's status in the market evolve over time? Firms in a market with a positive *d* are less likely to change their market status easily because this market is stabilized with extant niches. In contrast, firms in a market with a negative *d* search for or even develop new niches more frequently.

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