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Abstract

Over the past few decades, the international construction industry has proved a dramatic development. However, the unstable international circumstance has enhanced the risks of this industry, where proper strategies are critical for the survival of international contractors. Based on organizational ecology theories, which initially stemmed from ecology and then introduced to business management and economics field, proper competitive positioning for international construction companies are investigated in this study. Niche width has been introduced as an indicator to reflect the resource utilization of international construction companies while location is defined as the contractors’ distance from the market center. Using Engineering News-Record data on top 225 international contractors from 1992 to 2009, the U-shaped relationship between niche width and performance of contractor is proved in both product and geography dimensions, indicating the performance of contractors enhance with the expansion of niche width initially, and then subside. In addition, location shows significant effect on performance of international contractors. The proper location for contractors with narrow niche width is close to the geographic market center and far from the product market center; while the appropriate positions for contractors with wide niche width are opposite to those with narrow niche width. Although this research focuses mainly on top international contractors, the results may reflect the profile of the whole industry. Furthermore, the research method of this study could be replicated in other studies to enhance the understanding of the organizational competitive positioning in a complicated environment.
Introduction

Over the last decades, the world has witnessed a dramatically expansion of international construction industry. The globalization of the world economy, fast transportation and convenient communications have all helped to lower traditional barriers and transform construction into a flourished but competitive international marketplace. According to statistics published by the Engineering News-Record (ENR)(2011), the international revenue of ENR’s top 225 international contractors (TIC 225) has reached $383.7 billion in 2010, representing a three-fold increase over the US$106.5 billion in 2001.

However, recently uncertain international environment such as unpredicted recession and recovery have all heavily hit the development of the international construction industry as well as the contractors enrolling in this market. ENR (2011) reported that the international contractors are enduring difficult economic conditions. As traditional strong markets are declining, many contractors are looking for the new regions and new growth point. Jung et al.(2012) demonstrated that international contractors will show quite different performance in this uncertainty environment even though they may achieve similar revenue performances in the boom period. In such a circumstance, a proper competition positioning is critical for the survival of international contractors.
Competitive positioning defines a firm’s relative posture in a competitive space. It enables a firm to create a defensible position by making offensive or defensive moves based on the firm’s characters and the environment (Kale and Arditi 2002). Many researchers and studies have been involved in this topic. Based on Porter’s 5 forces model, diamond framework and Dunning’s eclectic paradigm, Han et al. (2010) investigated the strategies for contractors to sustain growth in the global construction market. It was found that contractors tend to respond to the changing markets by increasing their overseas revenues and enhancing their competency through more diversified products. With a combined perspectives of strategy choice and environmental determinism theories, Korkmaz and Messner (2008) compared competitive positions of Turkish and U.S. construction firms in international markets. Low and Jiang (2004) analyzed and compared international contractors’ competition strategies and performances within the framework of Dunning’s eclectic paradigm. Besides, tremendous studies on the strategies of contractors have been conducted with SWOT analysis (strengths, weaknesses, opportunities and threats) (Lu 2010; Lu et al. 2009; Zhao and Shen 2008).

The debates on competitive positioning can be addressed into two categories, environmental determinism and strategic choice perspectives (Korkmaz and Messner 2008). The environmental arguments are in favor of environment driven structures for the survival of organizations. It emphasizes the evolutionary role of nature, arguing that a proper position or environment is the primary mechanism to explain the performance of an organization (Hannan and Freeman 1989). While the strategic choice perspectives consider that a better competitive position is achieved from deliberate planning, calculation and formulation.
instead of the unpredictable environment. Whittington (2001) classified the traditional
Porter’s generic strategies into the strategic choice perspectives, and the organizational
ecology theory into the environmental determinism category. The main difference between
these two theories is the process they concerned with. Porter’s generic strategies follow the
strategic choice discipline, highlight deliberate processes, and demonstrate how the
performance of the company is determined by endogenous factors, such as the organizational
structure, product categories, managers’ decisions etc. Korkmaz and Messner (2008) opined
that Porter’s generic strategies mainly investigate the strategic analysis, strategic plan and
strategic choice process and their effects on the performance of organizations. On the contrary,
the organizational ecology is concerned more with the emergent process of environmental
selection, which considers environment as the primary mechanism to explain the performance
of an organization (Whittington 2001). The environment here is a nonobjective conception,
which indicates the survival environment of the companies. Within a proper environment,
organizations are more likely to obtain better performances. Meanwhile, the selection effect
of environment tends to eliminate organizations within non-proper environment (Boone and
Witteloostuijn 1995). With this selection effect and evolution, some organizations are
sustained while others are eliminated. The diversity of organizational forms are caused by the
environmental selections while the managers do not make choice (Hannan and Freeman
1989). These assumptions are stemmed from Darwinian perspective in ecology field. Carroll
and Hannan (2000) considered that organizational ecology recognize the exogenous factors
(environment resources and the fit with the environment) as the key determinants. Therefore,
compared with other mainstream strategic management theories, organizational ecology is
categorized as environmental determinism typology. By using organizational ecology, this study analyzes the international proper competitive positioning from a environmental selection perspective. Resource utilization of international contractors and its location in the international resource environment are the main concerns in this study.

Niche width theory and resource partitioning theory are two main sub theories in organizational ecology. Both of them concern on the important conception of “niche”. Niche is initially defined by ecologists as “the many ranges of condition and resource qualities within which the organism or species persists”(Tisdell and Seidl 2004). Similar to its conception in ecology, the niche in organizational ecology is denoted as a proper statue or competitive positioning for organization to survive or gain better performances. Mainly based on the niche width theory and resource partitioning theory, the remainder of this paper is structured into four parts. Firstly, history of the international construction industry is reviewed in product and geography dimensions. Secondly, original niche width theory and resource partitioning theory are introduced. By following these theories, hypothesizes are proposed in the international construction context. Thirdly, following a description of data source, dependent, independent and control variables in this study are defined separately. And a growth model is chose to test the predictions. Fourthly, based on the data and methodology, implications among the niche, position and the performance of international contractors are detected, discussed and concluded.

**Historical Overview of the International Construction Industry**
Normally, international construction is defined as where a company, resident in one country, performs work in another country (Ngowi et al. 2005). Likewise, according to ENR, international construction is the part of construction business that is achieved by companies from projects outside their respective home countries. Although most international construction companies have business both in the international and their domestic market, the concept helps to investigate construction business from an international perspective by focusing their performance in the overseas market (Lu et al. 2009).

According to ENR, international construction resources can be divided into eight parts in terms of its product dispersions, including general building, manufacturing, power, water/sewer waste, industrial process/petroleum, transportation, hazardous waste, and telecommunication. From geography perspective, multinational construction can be further divided into six regional segments: North America, Europe, Latin America, Asia, the Middle East and Africa. The evolutions of these markets are shown in Figure 1 and 2.

It can be concluded from Figure 1 and 2 that the international construction market soared up around the year of 2002. The main supports for the flourish of international construction in this period are strong business of developed countries, and continue investing intending of developing countries with their own money and foreign investors' cash in infrastructure. Besides, this round of growth also benefits from the Euro, Japanese Yen, and several other currencies surging against the U.S. Dollar, which has boosted the TIC 225 revenues (ENR, 2007).
As Figure 1 and 2 shown, general building, industrial process/petroleum and transportation are the three most important sub-markets in international construction, while the Europe, Asia and Middle East are the most flourished sub-market in the geography dimension of international construction industry. These sub-markets with the most prolific resources are supposed to be the market center in the international construction market.

Nevertheless, it also noticed from Figure 1 and 2 that the ascending trend for international construction industry has stopped in 2008. The complicated international circumstance has intensified the risk of this industry. First of all is the fluctuated economic environment. For example, the financial tsunami in 2008 and following European sovereign-debt crisis have all heavily hit the international construction market. Secondly, steadily rising material price and personnel cost exerts much pressure on international contractors. Thirdly, fluctuant currency is another emerging risk factor for international contractors (Dikman et al. 2007; Han et al. 2010; Lu et al. 2009). Considering these adverse factors, a proper competitive position is crucial for international contractors.

Theories and Hypotheses

Original niche width theory and resource partitioning

Hannan and Freeman (1977) firstly defined the niche width of an organization as its variance in resource utilization. In terms of this conception, organizations pursuing strategies based on
performance over a wide range of environmental resources possess a wide niche width and would be classified as **generalists**, whereas organizations following strategies based on performance within a tight band of resources hold narrow niche width and are considered as **specialists**. In this study, the resources are assigned as market resources. International contractors who straddle a number of market segments, for example, general building, transportation, power etc., are termed as generalists. While contractors who focus on one or a few market segments are defined as specialists.

Resource partitioning is another important theory in organizational ecology which is highly related to niche width theory. Carroll (1985) established resource partitioning theory, explaining how market concentration relates to the mortality of generalists and specialists. It is assumed that environmental resources are distributed unevenly within and across relevant dimensions. The joint distribution of the unevenly environmental resources forms the market centre with abundant resources and the periphery associated with comparatively low resource levels (Carroll et al. 2002). At the beginning of the industry, all organizations are crowded in the center of the market. With competition, only a few organizations survive and possess the greatest scale and scope, resulting in large generalists finally. At the same time, highly idiosyncratic preferences in the periphery area prevent the generalists from serving this area, creating survival opportunities for specialists. Increasing concentration of the industry are predicted to intensify this process, indicating that fewer generalists control the power in the market center, and the survival space for the specialists in the peripheral area are more feasible. It further presents by increasing mortality rate of generalists and
declining mortality rate of specialists, accompanied with ascending of concentration.

Organizational niche width and performance

Boone et al. (2009) advocated that one of the most necessary boundary conditions set for resource partitioning is that there is a clear market centre where the scale or scope advantages could be large enough to ignite size-based competition among generalist organizations. Generalists in market center may not be burdened by straddle of different resource fragments. For example, products in international construction range from general building, transportation to industrial and petroleum projects. Though it seems to straddle several different resource fragments, the similarities among these markets are obvious both in terms of technological competencies and commercial market (Carroll et al. 2002). The international contractors with wide niche width may benefit their performance with scale or scope advantages.

Meanwhile, the peripheral area is supposed to be dissimilar or heterogeneous enough to prevent generalists straddle the market centre and peripheral niches at the same time (Boone et al. 2009), indicating that international contractors straddle two or more dissimilar resource fragments may pay a price in terms of overhead or excess capacity. Thus, contractors have to give up some resources in peripheral area to ensure their most benefit market resources. Thus,
Hypothesis 1: The performance of international contractors will firstly enhance with the increase of niche width, and then subside.

Organizational niche width, location and performance

As emphasized in resource partitioning theory, environment resources are divided into central and peripheral area. Center of the market is considered to occupy more resources than the peripheral area. Therefore, relative location to the market center becomes another important variable for the performance of contractors. Dobrev et al. (2002) has demonstrated that with market concentration enhancement, the effect of location away from the market center on organization’s hazard of mortality shifts from positive to negative, offering an important reference for this study. On the one hand, market center is prolific with resources and opportunities. On the other hand, however, market center also attracts a large amount of competitors, resulting in high mortality rate for most of the companies which cannot sustain the power in center place. Since fierce competition is a common feature in the international construction industry (Ye et al. 2009), the competition threaten is considered as the dominant power in the center of the market, thus:

Hypothesis 2a: The performance of international contractor improves with the distance away from the center of the market.

Dobrev et al. (2002) observed that a location in the resource-rich sector provides
generalists with the potential to reap scale advantages, it is more likely for them to be centrally located when compared with other firms. Furthermore, generalists are more likely to offset the serious competition in center with success in less competitive regions covered by their “big” niche width span. Carroll et al. (2002) emphasized that for generalists, center of the market is their destination, as the idiosyncratic and barren periphery does not support its “big” niche width. In contrast, specialists located in the center of the market are more likely to encounter the threat of mortality than their generalist competitors as their assets are fully exposed to the intense competition. Baum and Singh (1994) also opined that generalists represent a greater competitive threat to specialists. Based on the above discussions of niche width theory and resource partitioning theory, it is reasonable to accept that:

**Hypothesis 2b:** The effect of location away from the center of the market to enhance contractors’ performances is negatively moderated by the niche width of the international contractors.

Organizations will be adversely affected when they violate their organizational form’s identity characteristics (Swaminathan 2001), such as position in resource spaces. The relationship between niche width and location is a substantial understanding for resource partitioning theory. Besides, this study will also test whether the classical hypothesis of resource partitioning is appropriate for international contractors:
**Hypothesis 3:** The performances of generalists are reduced by the concentration of the market, while the performances of specialists are improved by the concentration of the market.

**Data and Method**

**Data source**

The main data set for this study comes from the *Engineering News-Record* (ENR). ENR provides a comprehensive and historical database of international construction activities and the major actors (Drewer 2001). ENR annual survey started in 1979 following the expansion of international demand for construction. It collects data for top international contractors 225 (TIC 225), including total revenue, international revenue, sub-market revenue of each firm and comments on regions and markets, as well as industry view and prediction. The data on construction activities are usually poor and erratic both in domestic and international contexts (Ruddock 2002; Ye et al. 2009), ENR, however, offers a relatively objective and comprehensive historical database for studies on international construction. Though it only collected the data of top international contractors 225, Ye et al. (2009) argued that contractors outside the top 225 have negligible market power, and have little involvement in overseas works and international market.

The international contractors of this study mainly based on TIC 225. In order to have a comprehensive understanding of international contractors, both product and geography
dimensions are involved. The empirical setting for product study is from 1992 to 2009, while the setting for geography dimension is from 2004 to 2009, charting the time frame of this study.

Dependent variables

The performance of international contractors are usually quantified by absolute measures such as market shares, profitability, or turnover (Cuervo and Low 2004). However, most of these indicators often lack integrity and standardization across different countries to evaluate and compare international contractors’ actual performance. As this paper mainly focuses on the contractors’ performance in the international construction market, indicators that relate to their international performance are preferred. With ENR database, the international revenue of contractor was chosen to measure the performance (per.) of international contractors in this study. Though this indicator may not comprehensively reflect the performance of contractors, it is the most available and trusted indicator since ENR is one of the most important historical databases in international construction studies. Furthermore, it offers the possibilities to compare contractors from different countries at the same level. With international revenue data of international contractors, Low et al. (2004), Korkmaz and Messner (2008) have compared the performance of international contractors.

Independent variables

Both dimensions of product and geography are important in niche width calculation in this
study. For the product niche width of organization i \( (NW_{ip}) \), this study follows Hannan and Freeman’s (1989) definition on the niche width as:

\[
NW_{ip} = \sum_{r=1}^{R} u_r \log u_r 
\]  

(1)

where \( u_r \) stands for the revenue of product \( r \) within the total international revenues. \( R \) is total number of products, including general building, manufacturing, power, water/sewer waste, industrial process/petroleum, transportation, hazardous waste, and telecommunication.

Because of a data limitation of ENR, revenue data for each sub-market in geography dimension cannot be collected, the formula (1) for \( NW_{ip} \) cannot be applied to geography niche width of organization i \( (NW_{ig}) \). Proxy calculation has to be made to overcome this limitation. The span covered by the niche has been introduced to reflect the resource utilization of the company. With this method, Baum and Singh (1994) defined the niche width of day care center as the span of ages that they are licensed to enroll. Dobrev et al. (2001) and Dobrev et al. (2002) characterized the technology niche of an automobile manufacturer as the difference in sizes between the largest and smallest engines that they produce. This study, similarly, defines the \( NW_{ig} \) as geographical span of organization i:

\[
NW_{ig} = n / N 
\]  

(2)

Where \( n \) is the number of countries that organization i entered in, N is the total number of countries with multinational activities in.

Market center is an important factor for the measurement of organizational location, which
has to be ensured firstly. According to Dobrev et al.’s (2001) definition, which assumes that
the largest organizations form the market center, it thus can be defined as:

\[ Center_r = E^{4\text{min}}_r + (E^{4\text{max}}_r - E^{4\text{min}}_r) / 2 \]  \hspace{1cm} (3)

where \( Center_r \) represents center for product/geography r. For product analysis, for
example, \( E^{4\text{min}}_r \) is the minimum revenue of product r among the top four TIC 225, while
\( E^{4\text{max}}_r \) is the maximum revenue of product r among the top four firms. For geographical
calculation, r denotes the six regional markets, including North America, Europe, Latin
America, Asia, the Middle East and Africa. \( E^{4\text{min}}_r \) is the minimum project number in
region r among the top four, and \( E^{4\text{max}}_r \) is the maximum project number in region r among
the top four firms. With this definition, centers for both product and geography dimensions
have been confirmed as Figure 3 and Figure 4.

Although fluctuating, it can still be concluded that the market center in product dimension
is general building, transportation and industrial process/petroleum, and that market center
for geography dimension is Europe, Asia and Africa. This result is highly matched with the
historical overview of international construction industry, indicating these sub-markets
possess more resources than others.

The location of contractor i \((L_i)\) is defined as its distance away from the market center.
According to the definition of centers, location of contractor is calculated by Euclidean
distance. Log-transformed has been taken to smooth the data in this study:

\[ L_i = \ln \left( \sqrt{\sum_{r=1}^{R} (U_r - Center_r)} \right) \]  \hspace{1cm} (4)
For contractor $i$’s $L_{ip}$ in product dimension, $U_i$ is revenue of product $r$ ($r=1,\ldots,9$), while for $L_{ig}$ in geographical dimension, $U_i$ is numbers of project in region $r$ ($r=1,\ldots,6$).

Concentration ratio ($CR_i$) as a normal index to represent the concentration of an industry, has been chosen in this study to calculate the concentration of the multinational construction industry (McCloughan 2004):

$$CR_i = \sum_{i=1}^{4} S_i$$

Where $S_i$ is represented by the international revenues of company $i$. Top four MNCCs have been chosen every year for calculation of this variable.

Interactive variables have been introduced as $NW*L$ and $NW*C_i$ (Hannan et al. 1998; Hannan et al. 1998), in order to reflect the interactive effect of niche width (NW) and location of contractor (L), and the interaction of industry concentration ($C_i$) and niche width (NW) in shaping the international contractors’ performance.

**Control variables**

The control variables have been corrected for the effect of covariates at both the macro environment level and micro individual level. At the macro environment level, as mentioned above, performance of international contractors have been deeply influenced by the world economy, thus, logarithm form of Gross Domestic Product of the world has been selected to control for changes of the world economy, expressed as $GDP$ in this study. At
the micro individual level, years for an international contractor has been listed in the top international contractors 225 are chosen as a control variable to reflect the Experience of an organization. The years here mean international contractor are backward to the earliest year that can be reached, which is 1982 in this study. For example, if an international contractor was listed in the top international contractors 225 in 1982, and continued to appear in the top international contractors 225 till 1992, its experience was computed as 11 years.

Based on the definitions above, descriptive statistics for the variables are shown as Table 1.

**Modeling**

Observations of this study are structured as a pooled cross-sections (contractors) and time-series (1993-2009 or 2004-2009) data set. Following Barnett (1994), Barron et al. (1994) and Boone et al. (2004)’s methodology, growth models have been chosen for estimation in this study. The proportional growth rate \( \left( \frac{\text{Performance}_{t+1}}{\text{Performance}_t} \right) \) is assumed to depend on (a) the performance at time \( t \) and (b) an exponential function of independent variables impinging on that growth rate. To simplify estimation, such growth models are log-transformed, implying estimation models of the following type (Boone et al. 2004):
\[ \ln(Per_{i,t+1}) = \theta \ln(Per_{i,t}) + \gamma_{i,t} + \varepsilon_{i,t+1} \]  

(6)

with

\[ \gamma_{i,t} = X_{i,t} \pi \]  

(7)

where \( X_{i,t} \) represent independent and control variables for company \( i \) at time \( t \).

Furthermore, considering the panel database structure in this study, **fixed effect model** has been chosen for analysis. According to Boone et al. (2004), this model has been chosen for the following reasons, as (a) it is an appropriate method to deal with the standard problem of autocorrelation generally resulting from the pooling of cross-sections and time-series data (Barron et al. 1994); (b) it is a conservative estimate as it controls for any type of unobserved heterogeneity across organizations. As the database structure of this study contains large cross-section data (225 organizations for each year) but short time-series (18 years for product analysis, 6 years for geography analysis), cross-section effect becomes a more important effect that should be focused on. Thus, Hausman test has been taken for cross-section effect (Gao 2007). With Eviews 5.0, it is found that for all models, random effect has been rejected (Gao 2007), cross-section fixed model has been chosen in this study. With Eviews 5.0, results are shown in Table 2.

**Finding**

**Insert Table 2 here:** Fixed-effect model for top 225 international contractors
As Table 2 shown, hypothesis 1 has been proved by model 1 & 2 for product and geography dimensions separately, and hypothesis 2a has been tested by model 3 & 4 on product and geography dimensions. Furthermore, the interactive effect of distance away from the market center and niche width has been testified by model 5 & 6 in product and geography dimension respectively. Finally, model 7 has been established to investigate the resource partitioning process in the product dimension.

It is manifested from Table 2 that hypothesis 1 has received strong support in both product and geography dimensions. As model 1 and model 2 shown, one term effect for both product and geography dimensions are significant and positive, while quadratic term are proved to be significant and negative, indicating the inversely U-shaped relationship between niche width and their performance in both product and geography dimensions. This conclusion can also be visually supported by Figure 5. The multiplier (M) here is a measurement as proportional effect of the given niche width on the performance of international contractor, which can be defined as (Carroll et al. 1993):

\[ M(Multiplier) = \frac{\exp(C + \alpha_1 NW_i + \alpha_2 NW_i^* NW_i)}{\exp(C + \alpha_1 NW_{min} + \alpha_2 NW_{min}^* NW_{min})} \]  

(8)

As can be seen from Figure 5, the expansion of niche width in both product and geography dimension can benefit international contractors’ performance. However, this effect turns to be in opposite direction when the extreme value is overturned. Based on function 8 and coefficients in model 1 & 2, the turning point of M is mainly determined by “c+\alpha_1 NW_i+\alpha_2 NW_i^* NW_i”. The function can be specified as “c+0.608 NW_i -0.629..."
NW_i “ by using the results in model 1, the NW_i value at the turning point of product
dimension is then calculated as NWe=0.608/(0.629*2)=0.483. The extreme value of NW_i at
the geography dimension can be estimated in the similar way with the results in model 2,
which turn out to be 0.531. These niche width (0.483 in product dimension and 0.531 in
geography dimension) are the turning points of the inversed U-shaped curve in Figure 5. It
suggests that for most international contractors, when their niche width are smaller than the
extreme value, increasing NW_p and NW_g will probably improve their performances.
However, when the extreme value is surpassed, further expansion of NW_p and NW_g are
presumably deleterious to their performance.

As reported in Table 2 (model 3 & 4), location has shown a significant effect on
performance of organization, though the result in geography dimension is opposite to
product dimension. Coefficient of L_p (models 3) is positive and significant as expected,
indicating the distance away from the center of the market will relieve competition pressure
of an organization and improve its performance. However, the coefficient of L_g has shown
significant but negative results, demonstrating the location away from the market center in
geography dimension may reduce the performance of international contractors.

At the same time, it is worth noting that the interactive coefficients are significant but
opposite for product and geography dimensions as shown in model 5 & 6, suggesting the
proper competitive position or strategies for an international contractor is quiet different in
product market and geography market. Multipliers (M) of the NW and L on the
contractor’s performance have been calculated as:

\[
M(\text{Multiplier}) = \frac{\exp(C + \alpha_1 NW_i + \alpha_2 L_i + \alpha_3 NW_i \times L_i)}{\exp(C + \alpha_1 NW_{\min} + \alpha_2 L_{\min} + \alpha_3 NW_{\min} \times L_{\min})}
\]  

(9)

Based on function 9 and coefficients from model 5 and 6, the interactive effect in product dimension and geography dimension has been shown as Figure 6 and Figure 7 respectively. It can be concluded that the results for product and geography dimensions are opposite.

Concerning the specialists in the product dimension, the expansion of distance away from the product center will improve their performance as Figure 6 implied. However, this effect is moderated by the niche width. According to the function 9 and results of model 5, when \(NW_p > 0.557\) (the turning point of \(M\) is mainly determined by “\(c+\alpha_1 NW_i+\alpha_2 L_i+\alpha_3 NW_i \times L_i\)”.

By using the results in model 5, the function can be written as “\(C+2.629 NW_i +0.157 L_i -0.282 NW_i \times L_i\)”, which can be further transformed to “\(C+2.629 NW_i +(0.157-0.282 NW_i) \times L_i\)”. When the \(NW_i\) exceed the value of 0.157/0.282=0.557, the expansion of \(L_i\) will transfer from a positive effect to a negative effect on organizational performance. The calculation of the geography dimension is in the same way, the expansion of \(L_p\) will change from a positive effect to a negative effect on organizational performance. It supports the hypothesis of resource partitioning theory that generalists should locate in the center of the market, while specialists residing in the peripheral area are more likely to achieve good performance. Nevertheless, the results in the geography dimension have shown a contrary trend. As can be seen from Figure 7, the distance away from the geography center is accompanied with decline of performance for specialists, which is opposite to hypothesis.
2a. NW again is a pivotal variable to reshape the relationship between L and organizational performance. As demonstrated in Figure 7, the negative effect of L on performance will transfer to positive effect when the NW achieves at 0.557. This conclusion in the geography dimension is contradict to the judgment of Yang and Lu (2013), which proved that the most appropriate niche for international contractors at both product and geography dimensions is a broad niche width and locate near to the market center. Nevertheless, the ideal conditions may not always happen. As “growth model” is adopted in this study, increment of international revenue is emphasized in this study. The results in this study indicate that the cause of increment of international revenue is different in product and geography dimensions. In the geography dimension, the specialists locate close to the market center and generalists stay away from the market center are more likely to predict a growth in their international revenue, while the condition in the product dimension is opposite.

Because of the data limitation, concentration ratio in geography dimension cannot be calculated in this study. Thus, only resource partitioning process in product dimension has been tested. Based on Table 2 (model 7), coefficients for both NW and interactive variables are not significant, indicating the resource partitioning process is not effective in multinational construction industry. Furthermore, it is worth noting that the coefficient for C is significant and negative, suggesting the enhancing of concentration may bring down the performance of international contractors.
With caution about the control variables, it can be concluded that both GDP of the world and the experience of an organization show a significant and positive effect on contractors’ performance, which prove that both the prosperous economy environment on macro level and rich experience of micro level can promote the performance of international contractors.

**Discussion**

According to the results in this study, a number of key findings warrant further discussion. Firstly, it is manifested from Figure 5 that there is an extreme value for the expansion of niche width for international contractors. Contractors with a niche width around this extreme value tend to gain better performances, which is accord with Kale and Arditi (2002)’s conclusion that contractors with a neutral approach to scope of competition are superior in their performances. The contractors with a too broad niche width may also harmful for their performances. However, have the international contractors achieved this extreme value? Based on data of TIC 225, \( NW_p \) and \( NW_g \) for main contractors in 2009 have been calculated.

**Insert Table 3 here: Average niche width for top 225 international contractors in 2009**

It can be concluded from Table 3 that most contractors in the international construction market still have a lot of opportunities to enhance their niche width in both product and geography dimensions, as most average value for international contractors are smaller than
the extreme value. Han et al. (2010) have proved that by increasing the proportion of overseas revenues and enhancing the diversity of products, contractors are more likely to sustain their growth in the international construction market.

Dunning (2000) has specified the ownership advantages of international companies as special capabilities that mainly gain from the resources and capabilities of their home countries. With these advantages, companies are more likely to achieve superior performance in the international market. This phenomenon has also been detected in the construction industry. It can be seen from Table 3 that most contractors from developed countries have wider niche width in both product and geography dimensions. With better technology, management capacity, and financial skills, contractors from developed countries are more competitive to take advantage of the global development (Ngowi et al. 2005). Besides, with long history of internationalization, they are believed to accumulate more experiences. Their costs to straddle different resource fragments may be smaller, while the scale advantages are more likely to be magnified. Compared with their experienced competitors, contractors from developing countries, for example China and Turkey, show relatively narrow average niche width in both dimensions as Table 3 represented, suggesting their limited abilities that can only control and straddle few resources in the international construction market.

Secondly, as mentioned above, center of the market is a double-edges sword, which is characterized by prolific resources and fierce competition at the same time. Concerning
product dimension, competition threat prevail the resource attraction in the product center, as distance away from the market center is proved to be positive for organizations as a whole. Meanwhile, generalists possess more advantages than specialists in the center of product dimension because of their wide distribution of products can offset the competition threat to some extent. Thus, they are more likely to locate in the center of the market to utilize profuse resources and gain scale advantages just as indicated in Figure 6.

In the geography dimension, it is supposed that the center of the market mainly show glamour, since the distance close to the market center will enhance the performance of organizations. In contrast to product dimension, specialists seem to do better in geography center than their general competitors. It considered that resources in geography dimension are quiet dissimilar because of different environments, economics, politics and cultures among countries, where generalists have to pay much to straddle different resource fragments and are hard to gain scale advantages. However, specialists may conquer these disadvantages with their professional focus. Furthermore, it can be concluded from Figure 4 that the market center of geography is mainly composed by developing regions, such as Africa, Asia and Middle East, where have large requirement of construction activities. Specialists, usually come from developing regions (Low and Jiang 2004) are more convenient to carry work in these regions with similar culture, language background and low transportation costs. Thus, specialists concentrate to geography center while generalists locate away from the center of the market are predicted to gain good performances.

Overall, it can be concluded that specialists are more likely to achieve a better performance
by residing in a location which is close to the market center in geography dimension and
far from the market center of product dimension, while generalists tend to achieve good
performances in a location which is near to the market center in product dimension and is
far away from the market center in geography dimension. Thus, the proper niche for the
special international contractors can be summarized as market centers such as Europe, Asia
and Africa in geography dimension, and manufacturing, power, water/sewer waste etc. in
the peripheral area of product market; while the proper niche for the general international
contractor is opposite to those of the specialists.

Conclusion

With a new perspective from organizational ecology theory, the proper competitive
positioning of international contractors has been investigated. Niche width and performance
of international contractors show inversely U-shaped relationship in both product and
geography dimensions. The location of contractors has significant effect on the performance
of contractors, in spite of a diverse observation in product dimension and geography
dimension. Contractors locating in the peripheral area of product dimension (manufacturing,
power, water/sewer waste, hazardous waste and tele-communication) and scattering in the
center of geography dimension (Europe, Asia and Africa) are more likely to gain high
performance. In addition, the interactive effect of niche width and location also shows
significant but opposite results in product and geography dimensions, indicating that the
proper competitive positioning for the special contractors are areas close to the market center
of geography dimension and far away from the market center of product dimension, while the
proper competitive positioning for the generalists are opposite to those of the specialists.

With a nature selective perspective, this study provides a new understanding of organizational niche, competitive positioning and performance of international contractors. By examining contractors’ abilities to occupy various resources, taking account of their location to the market center, and observing their match with the resource environment, this study has critically analyzed the proper competitive positioning for international construction companies. Compared with the traditional analytical methods, niche theory in organizational ecology framework succinctly puts international construction companies into their macro and nonobjective resource environment. Although this study only focuses on the construction industry, similar research method could be replicated for other industries, thus contributing to the understanding of the relationship between organizations and their survival environment.

References


Research in Organizational Behavior, 24, 1-40.


Table 1 Descriptive statistics

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<tr>
<th>Variables</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Number of observation</th>
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Table 2 Fixed-effect model for top 225 international contractors

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<th>H2b (L_P)</th>
<th>H3 (L_C)</th>
<th>Model 5 (NW_P*L_P)</th>
<th>Model 6 (NW_G*L_G)</th>
<th>Model 7 (NW_P*C4)</th>
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a. Standard errors are in parentheses
b. *p<0.05 , b*p<0.01 , c*p<0.001
c. Independent variables are lagged one period
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<th>UK</th>
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<td>0.111</td>
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Figure 2: Revenue in billions of dollars from 1992 to 2009, broken down by region:
- North America
- Europe
- Latin America
- Asia
- Middle East
- Africa

Click here to download Figure: Figure 2.pdf
Figure

Click here to download Figure: Figure 3.pdf
Figure 1. Revenue of each product market (1992-2009)

Figure 2. Revenue of each geography market (1992-2009)

Figure 3. Market center of product dimension (2004 - 2009)

Figure 4. Market center of geography dimension (2004 - 2009)

Figure 5. Effect of NW on performance of international contractors

Figure 6. Interactive effect of niche width and location on the performance of international contractors (product dimension)

Figure 7. Interactive effect of niche width and location on the performance of international contractors (geography dimension)