

2 The Future of Logistics in Emerging Markets – Fuzzy Clustering Scenarios Grounded in Institutional and Factor-Market Rivalry Theory

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Abstract

Transport and logistics are increasingly relevant to the rapid economic growth of emerging economies. Decision makers in the transport and logistics industry require a comprehensive understanding of the institutional business environment and factor markets in emerging economy countries to formulate accurate supply chain strategies for the future. Although extensive studies on prospective scenarios in emerging economies are available, research has largely neglected the future evolution of transport and logistics. This study addresses this gap by applying a multiple method research approach and relying on institutional theory and factor-market rivalry theory to create scenarios of the development of transport and logistics in emerging economy countries by 2030. We do so by collecting qualitative and quantitative data through a Delphi survey and applying fuzzy clustering to group the results into meaningful and interpretable scenarios. Our results suggest that emerging economies will take advantage of free trade zones to consolidate their position in the international market and encourage investment. Consequently, logistics will experience rapid growth and value-added services will expand, propelling new players from developing economies onto the international stage. Our findings also suggest that the logistics service industry in emerging economy countries will undergo a significant consolidation process, leading to the possibility of factor-market rivalry among shippers. This

suggests that shippers' social networks and personal contacts will increase in importance in the future.

Keywords: Transportation, Distribution and Logistics; Emerging Economies; Institutional Theory; Factor-market Rivalry Theory; Panel Study; Fuzzy Logic; Cluster Analysis.

2.1 Introduction

Numerous research and popular science articles propose that emerging economy countries, such as Brazil, Russia, India and China, represent the new arena for future economic growth (e.g., Wu & Pangarkar, 2006; Gnatzy & Moser, 2011). Their gross domestic product (GDP) has experienced double-digit growth rates and is expected to prevail in the future. Not surprisingly, large multinational corporations (MNCs) are already venturing into these promising markets (Trunick, 2008; Magnusson, Westjohn, & Boggs, 2009), offering their products and services in order to improve sales and consolidate sourcing markets (Kusaba, Moser, & Rodrigues, 2011). However, to operate successfully in these fast-growth markets, efficient transportation and logistics systems have to be in place (Czinkota & Ronkainen, 2005). This also means that emerging economy countries need to improve their logistics capabilities and connectivity to benefit from globalization and increasing international trade volumes (Memedovic et al., 2008; Lin & Ou, 2011). Efficient logistics systems and new free trade zones further stimulate trade across national boundaries and attract foreign investors. Increased demand, however, could constrain logistics capacities and infrastructure (Lorentz, Wong, & Hilmola, 2007; Hausman et al., 2010; WTO, 2013).

It is important to be familiar with the business environment and its intrinsic attributes in these rapidly evolving industries (Pang, 2010). Foresight allows firms to assess potential impacts from many perspectives and to determine the most suitable strategies and implementation procedures (Haegeman et al., 2013). As institutions and factor markets strongly contribute to countries' economic development and firms' market success (e.g., Hitt et al., 2000; Hoskisson et al., 2000), we grounded our research in institutional theory (e.g., DiMaggio & Powell, 1983; Scott, 1995) and factor-market rivalry (FMR) theory (e.g., Markman, Gianiodis, & Buchholtz, 2009; Ellram, Tate, & Feitzinger, 2013).

Researchers have suggested various participatory methods to evaluate impending environmental issues in rapidly evolving industries (Rohrbeck & Schwarz, 2013), including Delphi studies. We conducted a global Delphi survey and obtained the input transportation and logistics experts in evaluating 16 future projections. In performing fuzzy clustering, we were able to draw future scenari-

os concerning how the logistics industry in emerging markets may evolve. We selected the year 2030, since it is far enough into the future to allow thinking outside the box on radical new approaches, especially in the context of the development of emerging markets. Our chosen horizon is also in line with numerous other foresight studies in the logistics context (e.g. Banister et al., 2000; Shiftan, Kaplan, & Hakkert, 2003; Stead & Banister, 2003; Piecyk & McKinnon, 2010; Schuckmann et al., 2012). Such a long-term outlook provides thought-provoking input for strategic planners, governmental organizations and other relevant stakeholders interested in how the future may look for this specific industry in emerging economy countries and offers support for their decision-making.

Consequently, our paper aims to close three existing gaps in the literature. First, our research allows us to integrate institutional theory and FMR theory to develop rich insights that complement our qualitative investigation. Second, we examine how transportation and logistics in emerging economy countries might evolve by 2030, via a Delphi study. And third, we add the fuzzy clustering approach to well-established methods for scenario development, to provide more granular insights to our Delphi study results.

The remainder of the paper is organized as follows. We start by discussing the relevant literature on institutional theory, FMR and foresight in emerging markets and on the transportation and logistics industry in particular. We then describe our multi-method approach including the Delphi study design, the development of future projections, the participation analysis, and the scenario development through fuzzy clustering. Next, we present and discuss the Delphi findings and the results from fuzzy clustering and link our results to the underlying theories. We conclude with implications for research and practice and outline potential limitations as well as future research directions.

2.2 Literature Review and Conceptual Framework

2.2.1 The Importance of Logistics for Emerging Markets

Wu and Pangarkar (2006) emphasize the role of logistics networks within the large emerging markets. Providing companies with efficient access to product and factor markets is critical for emerging economy countries to take part in international business (Wu & Pangarkar, 2006; Hausman et al., 2010; Schwab, 2013). Devlin and Yee (2005) argue that the provision of a functioning logistics infrastructure in emerging economy countries requires the common efforts of firms, institutions and governments to efficiently reach regional and global product and factor markets. This means that an efficient logistics system should not

only increase trade volumes but also attract export-oriented foreign direct investment (FDI), which may further facilitate export capacities and international business (Cavusgil, Kiyak, & Yeniyurt, 2004; Hoskisson et al., 2013). In contrast, limitations in logistics capacities and corresponding inefficiencies can significantly impact lead times and the cost of logistics services. Furthermore, the lack of adequate required transportation infrastructure (e.g., ports) and other logistical barriers such as insufficient customs procedures intensify firms' vulnerability to logistics-related uncertainties (Hausman, Lee, & Subramanian, 2006) and capacity shortcomings. The resulting factor-market rivalries can significantly disrupt supply chain operations (Ellram, Tate, & Feitzinger, 2013). As emerging economy countries represent important links in global supply and distribution networks, improving their transportation and logistics systems will have essential impacts on the global value chains in which they participate (Sawhney & Sumukadas, 2005). Therefore, the foresight of structural and institutional changes and logistics capacity constraints becomes a basic requirement to prepare for FMRs and to succeed in international supply chain operations (Lorentz & Ghauri, 2010).

2.2.2 *Theoretical Lenses*

We further strengthen the often discussed relevance of both institutions and factors of production for the economic development of and firms' business success in emerging markets, as their theoretical integration has become a promising research avenue (Wan & Hoskisson, 2003; Wan, 2005; Wright et al., 2005; Peng, Wang, & Yi, 2008; Kim, Kim, & Hoskisson, 2010; Ellram, Tate, & Feitzinger, 2013; Hoskisson et al., 2013; Wong, 2013). Institutional theory proposes that organizations' behaviors and decisions are shaped by their institutional environments rather than by efficiency purposes alone (Meyer & Rowan, 1977; DiMaggio & Powell, 1983; Scott, 1987, 1995; Oliver, 1997). Thus, formal (e.g., laws, rules) and informal (e.g., values, norms) institutions are "the rules of the game" (North, 1990, p. 3) based on three inherent mechanisms (DiMaggio & Powell, 1983): 1) coercive isomorphism, which results from political (e.g., laws, sanctions), competitor or customer influence or even from governmental incentive mechanisms (e.g., subsidies, tax benefits) to reward specific behaviors (Grewal & Dharwadkar, 2002); 2) mimetic isomorphism, which occurs when companies imitate organizations or adopt practices they perceive as successful, and which represents a standard reaction to uncertainty; and 3) normative isomorphism, which is related to values, norms and standards, often fostered by professional associations or social networks like Guanxi in China (Tate, Dooley, & Ellram, 2011). These institutional pressures induce firms to (un)consciously adopt certain practices to conform to the expectations of their surroundings (Scott, 1987;

Oliver, 1997). Although these pressures may lead to similar behavior among firms in common institutional contexts (DiMaggio & Powell, 1983), the related uncertainty affects their resource decisions differently (Hitt et al., 2000).

To directly address the “why, where, how, and when players compete for [nonstrategic] resources” (Markman, Gianiodis, & Buchholtz, 2009, p. 439) in common markets, we further apply factor-market rivalry theory as a second theoretical perspective. Factor-market rivalry theory details resource multifunctionality, mobility, and discontinuity to explain competition in factor markets. FMR suggests that the higher the multifunctionality and mobility of resources, the more industry-spanning demand and thus competition for these resources. Resource discontinuities describe the case where a few rivals capture the key resources for effective factor-market participation and thus limit the market access of others (Peteraf, 1993; Chen, 1996; Eisenhardt & Martin, 2000; Markman, Gianiodis, & Buchholtz, 2009; Ellram, Tate, & Feitzinger, 2013). Factor-market rivalry research has mainly focused on product-market overlaps. Unexpected rivalry, however, can also arise for resources that are limited to factor markets, for example logistics personnel or transportation capacities (Chen, 1996; Markman, Gianiodis, & Buchholtz, 2009). The difficult foreseeability and partial negligence of these rivalry situations have often led to competitive blind spots (Zajac & Bazerman, 1991). Focusing on supply chain and logistics capacities, Ellram, Tate, and Feitzinger (2013, p. 38) therefore argue that a “[b]etter scanning of [factor] market issues can allow firms to plan alternative logistical solutions” to potential FMRs that can even be a source of competitive advantage.

We further elaborate on and integrate institutional theory and FMR theory to frame our research design and the projections that emerge from our Delphi study (Vaughan, 1992; Lee, 1999; Lee, Mitchell, & Sablinski, 1999; Tate et al., 2009).

2.2.3 *The Foresight Perspective in Emerging Markets*

Uncertainties from growing competition, new technologies or changes in regulations and laws force business practices to undergo major and rapid transformations (Carter et al., 2000). The forecasting of such conditions is crucial to identify significant changes and enables decision makers to prepare for them (Czinkota & Ronkainen, 2005). Decision making and managerial planning are therefore assisted by a certain level of forecasting accuracy (Wisner & Stanley, 1994; Lindsey & Pavur, 2005; Larrain, 2007). Continuously determining probable future challenges is thus not only an obligatory (Schuckmann et al., 2012) and never-ending process (Carter et al., 2000), but also improves firm value through grounded decisions (Tihanyi & Thomas, 2005). The analysis of relevant current and future-oriented data on business environments in emerging markets

is more complex. Emerging markets are rapid-growth but low-income countries focusing on economic liberalization. These characteristics combined with the unique institutional and factor-market environments make effective decision making challenging and require a long-term orientation in order to prepare for future changes (Nielsen & Thangadurai, 2007). Several foresight studies exist on macro-economic activities in emerging markets (e.g. Czinkota & Ronkainen, 1997; Chakravarti et al., 1998; Blanning & Reinig, 2005; Gnatzy & Moser, 2011). However, to the best of our knowledge, research concerning how the logistics industry in emerging markets might evolve over time is scarce, and the results from existing studies are not focused on cohesive themes that might more meaningfully guide future decision making.

2.3 Methodology and Research Design

2.3.1 *Delphi Study Design*

For our foresight study on emerging market logistics, we chose a web-based, real-time Delphi format. Previous research has shown that such a Delphi variant delivers results comparable to the traditional format, but increases the process efficiency (Gnatzy et al., 2011). In general, the Delphi method relies on the assumption that, unlike individual forecasts, group-based forecasts provide greater accuracy. It facilitates a written group communication process on future projections among a designated expert panel (Dalkey & Helmer, 1963; Landeta, 2006). Table 4 in the appendix summarizes key characteristics of the technique (Rowe & Wright, 2001; Gnatzy et al., 2011) and the individual specifications of our Delphi survey on emerging markets' logistics.

Panelists were instructed to rate the projections' expected probability of occurrence (EP), their impact on the transportation and logistics industry (I) and the desirability of occurrence (D). While probabilities had to be assessed on a scale ranging from 0 to 100 percent, impact and desirability had to be evaluated on a five-point Likert scale, where 1 represented a very low and 5 a very high assessment. In addition, panelists were requested to provide rationales for their assessments in the corresponding text fields for EP, I and D. After a first completion of the survey, each Delphi panel member could log into the system via a "consensus portal" anytime and as often as he or she liked for discussion progress tracking and potential revisions (see Table 4) in the appendix and Gnatzy et al. (2011) for a more detailed description of a consensus portal in real-time Delphi studies as applied in this study).

2.3.2 *Development of Future Projections*

Delphi surveys require a systematic development of projections (Loveridge, 2002; Warth, von der Gracht, & Darkow, 2013). We applied an environmental scanning approach that encompassed database research and a creative workshop session. The purpose of this initial creative workshop was to refine the study scope and reflect on own assumptions of key factors and drivers based on the participants' expertise. The workshop participants included three senior managers and three senior researchers in the field of transportation and logistics. Next, we conducted three Delphi projection workshops among the same group of six experts to cross-validate the original group of factors and to formulate projections. The workshop process was iterative and included a frequent reformulation of statements, changes in projection order, discussion of expected Delphi panel estimates and argumentations, clustering and structuring of a projection framework, and reflection on theoretical foundations. For the development of projections, we followed methodological rules that included a clear definition of scientific or technological concepts, avoidance of ambiguity, elimination of conditional statements (Johnson, 1976; Rowe & Wright, 2001; Loveridge, 2002), an equivalence of conciseness and length of Delphi projections (Salancik, Wenger, & Helfer, 1971; Linstone & Turoff, 1975), and an efficient processing time, as indicated by the survey length (Parenté & Anderson-Parenté, 1987; Mitchell, 1996). Participants from the sample population underwent cognitive interviews to ensure that the statements were clear and unambiguous (Bradburn, Sudman, & Wansink, 2004; Dillman, 2007).

2.3.3 *Selection of Panelists*

Strong emphasis should be placed on the adequate selection of Delphi survey panelists to make research results more reliable (Welty, 1972). The panel was carefully selected on the basis of easily noticeable surface-level criteria and deep-level diversity dimensions (Spickermann, Zimmermann, & von der Gracht, 2014). The selection criteria included company type, present work position and status, level of education or academic title, published works, speeches, and peer recommendations. As a result, we identified 846 potential panelists. In total, 87 experts participated in our survey. Unlike conventional surveys, the Delphi technique does not aim for results representing a wide population, but rather a high degree of knowledge and expertise. An extensive literature review on Delphi panel sizes revealed that scholars aim for a panel of 30 participants, plus or minus a few (Turoff, 1970; Delbecq, Van de Ven, & Gustafson, 1986; Skulmoski, Hartman, & Krahn, 2007). Given the global focus of the study, we strove to enhance the panel size and, for the research at hand, found the response rate

sufficient and reasonable. The expert panel comprised top-level representatives from industry¹ (62%), politics and business associations (12%), and academia (26%). Moreover, participating experts represented 28 countries from around the globe.² Overall, 47 percent of participants represented emerging economy countries, while 53 percent represented developed countries. In order to verify a possible nonresponse bias and deflect the problems associated with it, early and late respondents were divided into different groups (Armstrong & Overton, 1977; De Rada, 2005). We issued three reminders and generated a comparison between the first and last assessments of four groups, from early respondents to those who responded following each of the three reminders. The results of a Mann-Whitney test did not reveal any statistically important discrepancies between the answers of early respondents and those of late respondents.

2.3.4 *Scenario Development and Qualitative Analysis*

The development of probable future scenarios enables managers to better prepare for the most likely high impact potential. To complement the results our Delphi study and fuzzy clustering, we conducted an in-depth qualitative analysis of the arguments submitted by the panelists during the Delphi process to create scenarios based on a wide diversity of contextual and argumentative data. Overall, the panel discussions resulted in 840 written text arguments. In most cases, an expert comment included one to three sentences to justify his or her estimate. Two researchers conducted a coding exercise following the established procedure of Strauss and Corbin (1990) to analyze these arguments. The coding procedure was conducted for each separate projection. Any divergence was discussed and rearranged until the two coders reached agreement. Consequently, the researchers counted the appearance of each developed category from similar codes. The findings of this analysis were then incorporated in the subsequent scenario descriptions.

¹ More specifically, industry group can be differentiated into five classes: Logistics including motor carriage (50%), Water and Ocean (24%), Aviation (13%), Rail (9%), and Other (4%).

² Represented countries: Algeria, Australia, Austria, Belgium, Brazil, Canada, China, Cyprus, Denmark, France, Germany, India, Italy, Jordan, Malaysia, Mexico, Netherlands, New Zealand, Panama, Russia, Singapore, South Africa, South Korea, Spain, Taiwan, Turkey, United States of America and Uruguay.

2.4 Research Results and Discussion

2.4.1 Descriptive Delphi Results

Within the scope of the Delphi survey and the expert communication process, an opinion convergence for all 16 projections was achieved, which is expressed in a decrease in standard deviation (SD). The projection on low-tech logistics solutions (Projection 14) shows the strongest convergence, as its SD decreased by 26.6 percent. In contrast, the decrease in SD of the projection on the establishment of free trade zones (Projection 2) by only 1.7 percent indicates a confident response behavior of the panelists. On average, we observed a convergence rate of 12 percent. Consequently, we could observe an agreement process over time during the ongoing discussion process and an approximation towards consensus. Experts revised their first round answers 280 times, of which 144 estimations (51.4 percent) were adjusted upwards and 136 downwards (48.6 percent). For 12 out of 16 projections we achieved consensus, which is reflected by the interquartile range (IQR); based on earlier research, we defined a threshold value of less than or equal to 20 (Scheibe, Skutsch, & Schofer, 1975; De Vet et al., 2005). We also observed that experts increased their EP estimates for 10 projections and decreased them for the remaining 6 projections. Table 2 summarizes the quantitative findings of our Delphi survey.³

Table 2: Delphi Survey Results

<i>Projection</i>	<i>EP Final (First)</i>	<i>EP adj.</i>	<i>I</i>	<i>D</i>	<i>IQR</i>	<i>SD Final (First)</i>	<i>CV in %</i>
1 <i>Logistics companies in emerging markets will continue to suffer from inadequately designed mechanisms for law enforcement.</i>	55.4 (57.5)		3.6	1.6	20	21.4 (24.2)	-11.8
2 <i>The establishment of free trade zones will have fostered strong economic growth in emerging markets.</i>	65.5 (64.8)	58.2	3.9	3.8	20	18.2 (19.7)	-8.0
3 <i>Social networks and personal contacts (e.g., Blat in Russia, Guanxi in China) will have become key determinants of the supply chain structures in emerging markets.</i>	55.9 (55.7)	61.2	3.4	2.5	20	18.4 (21.6)	-15.0

³ Italicized font indicates projections for which consensus on EP among the panel was achieved. P1=Projection 1, etc.

<i>Projection</i>	<i>EP Final (First)</i>	<i>EP adj.</i>	<i>I</i>	<i>D</i>	<i>IQR</i>	<i>SD Final (First)</i>	<i>CV in %</i>
4 <i>Privatization of state-owned transport organizations will have reduced the role of government from major play-er to 'watchdog' in emerging markets.</i>	56.7 (56.0)		3.9	3.8	20	18,4 (19.9)	-7.7
5 <i>The transport and logistics industry will have become a focus area for (foreign direct) investment in emerging markets.</i>	64.5 (64.2)		4.0	4.0	12.5	15,8 (18.1)	-12.9
6 <i>Major infrastructure projects between emerging markets and least developed countries will be primarily realized via barter trade.</i>	43.8 (46.7)	46.7	3.2	2.8	30	18,0 (20.4)	-11.5
7 <i>Global trade flows will have shifted such that new transportation corridors between emerging countries and least developed countries have been established.</i>	68.7 (67.3)	60.4	4.0	3.9	20	15,8 (17.8)	-11.0
8 <i>Logistics service providers in emerging countries will have strongly increased their depth of added value.</i>	72.9 (71.4)	64.7	4.0	4.0	10	13,2 (15.6)	-15.4
9 <i>Multinational logistics service providers will have entered the domestic logistics markets in emerging countries.</i>	75.3 (74.0)	69.3	3.9	3.7	10	14,0 (16.4)	-14.6
10 <i>Logistics service providers from emerging countries will have gained significant market share in developed countries.</i>	37.6 (45.0)	36.1	3.4	3.2	20	16,1 (20.3)	-20.9
11 <i>The logistics service industry in emerging countries will have undergone a strong process of consolidation.</i>	66.6 (64.1)	60.7	3.8	3.7	20	14,1 (16.4)	-14.0
12 <i>Promising career perspectives in emerging countries will have attracted large numbers of skilled logistics professionals from developed countries.</i>	59.1 (61.0)	56.1	3.6	3.4	20	17,5 (190.0)	-8.0
13 <i>The CEP market (Courier, Express, Parcel) in emerging countries will have experienced the highest growth rate in the logistics industry.</i>	62.9 (63.0)	60.0	3.6	3.3	25	16,7 (18.1)	-7.6
14 <i>Low-tech logistics solutions from emerging countries will have flooded the markets in developed countries.</i>	36.1 (38.9)	44.8	3.4	2.2	27.5	15,9 (20.1)	- 20.8%

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