An Investigation on E-Commerce and Logistics in China and the Classification for Their Problems

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Abstract: Investigated actual situation on Chinese e-commerce and logistics, conducted a lot of surveys on nine questions about challenges in e-commerce and logistics fields in China by interviews with merchants, officials, and scholars in Qingdao. Based on the scope of question and the scale of resolution, the concerns can be divided into basic, manageable, and intractable solutions, and reached to a conclusion on challenges probably found in Chinese e-commerce and logistics for the time being and the future.

Keywords: e-commerce; logistics; basic; manageable; intractable

INTRODUCTION

It would be difficult to over-exaggerate China's economic power and potential. *The Economist* [1] recently forecasted that within 20 years, China would become the second largest economy in the world. With a population of over 1.3 billion people, China's share of world trade is already in the top ten nations, and has an annual economic growth rate of almost 10% the past decade. This importance has attracted a growing amount of academic interest, as evidenced by an entire issue of an eminent scholarly journal devoted to "Doing Business in China" [2].

Of perhaps even more importance, particularly to the present special issue of Industrial Marketing Management, is China's present and future potential as a manufacturing base. China will remain a power in low-cost labor-intensive industries, owing to its nearly inexhaustible labor supply and vast economy of scale. Yet at the same time, China is moving up the ladder to more sophisticated goods (e.g., semiconductors and information technology hardware, where it is the third largest producer [1]). Thus China has demonstrated the ability to be the manufacturing base of choice for a wide range of goods.

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Having said this, China is clearly still a developing nation, full of potential, yet catching up rapidly. But in many ways, it is the growth itself that is the problem. China's logistics infrastructure is straining under the weight of its new economic growth: insufficient highways, ancient port facilities, and limited runways and airports [3]. The overwhelming of Chinese infrastructure by economic growth has led to relatively expensive and poor quality transport [4]. On top of this, the rise of e-commerce has opened an entirely new front in which the Chinese economy must catch up. The Internet has become an important tool in supply chain management, with everything from vendor catalogs to shipment and order tracking to scheduling handled electronically [5].

Is China ready for the quickly evolving present and not-so-distant future of e-commerce and logistics? Given the size, strength, and potential of the Chinese economy, combined with the changing economic, legal, and technological environment, it is crucial for distribution and logistics personnel to be continually updated on the state of logistics in China. Therefore, the purpose of our investigation was to examine the range and extent of logistics and e-commerce problems in China. First, a search was conducted of research into the state of affairs in China today. In combination with a review of modern logistics practices, a list of the crucial dimensions in international logistics was created. This list of potential issues was presented to a panel of Chinese business, academic, and government officials for their views. After discussing the results of the interviews, conclusions were then drawn about the present and future of e-logistics in China.

1. E-COMMERCE AND LOGISTICS CHALLENGES

Daskin [6] defined logistics as "the design and operation of physical, managerial, and informational systems needed to overcome time and space". Following this definition, we endeavored to discover information about China in these three critical areas. Unfortunately, information about China and its readiness for participation in the "new" logistics is limited. In a recent review of major journal management and organizational research on "Greater China", Peng, Lu, Shenkar, and Wang report no comprehensive studies of logistics or e-commerce – and their definition of Greater China includes not only the People's Republic of China and its provinces, but also the overseas Chinese in Southeast Asia and elsewhere [7]. The research in these journals considered the manifestations of culture that are of importance to the managerial aspects of logistics. These include, for example, individualism and risk-taking [8], adaptation and teamwork [9], the relative importance of social vs. economic relationships [10], managerial expertise and financial resources of Chinese firms [11] and shifts in work

values [12]. But Peng *et al.* point out that this cultural perspective misses out on the dynamics of the rapidly changing Chinese political, economic, and technological environment.

This limited success in only the managerial concerns led us to engage in a very comprehensive search of the literature. This effort revealed only a small handful of additional studies that touch on Chinese logistics issues. Three papers focused on the transport issues [4, 13, 14] and two papers considered industrial buying selection criteria of purchasing managers [15, 16]. In the end, only one paper was found which touched comprehensively on logistics issues in China [17]. The Carter, Pearson, and Peng study developed taxonomy of logistics barriers in China: purchasing (local suppliers), transportation services, documentation/order processing, warehousing services, inventory control, and logistics services. Their taxonomy also contains 4-10 very useful detailed issues within each general taxonomic category. This information fleshed out the physical and managerial concerns of our three-part taxonomy.

Unfortunately, the Carter, Pearson, and Peng study does not substantively touch on the hardware, software, or managerial issues surrounding the use of modern information technology and the Internet in logistics. To look for more detail in this critical area, we delved into the rest of the international purchasing, sourcing, and logistics research stream. We discovered three other different taxonomies that examined concerns ranging from physical infrastructure to management practices to the cultural, political, and economic system [18, 19, 20]. While these added to our list of potential issues, none had any significant development of information technology issues.

Electronic data interchange (EDI) has been investigated as far back as the late 1980's [21]. One study of interest in the logistics area considered the barriers to EDI implementation. In this research, Murphy and Daley investigated the major barriers to EDI implementation as well as key information system issues [22]. We found two more very useful studies on the use of the Internet and information technology on B2B marketing [23] and logistics [24]. Together, these three studies enabled us to formalize the information technology issues in our three-part logistics taxonomy (**Table 1**).

2. SCALING THE E-COMMERCE/LOGISTICS ISSUES

Next, we needed to develop a framework for considering the acuteness of these concerns. In the past, most researchers have asked their subjects to assess how extreme the particular concern was as a barrier to effective logistics practice [17, 19, 25]. Clearly, high barriers to good logistics practices will clearly require greater efforts than low barriers, whether they be capital resources, technology and

education, management energy, or labor time and effort (money, management, and manpower). Thus we conceptualize this dimension as the "scale" of the solution.

However, Roy, Walters, and Luk point out a recurring theme in China-based research: tremendous intra-country variation across cultural, physical, economic, and technological dimensions [26]. That is, to what degree does the particular issue in question occur all over China, to many different firms, in many different industries, and has a long history of occurring and is projected to remain a issue for some time in the future (everywhere, everybody, every time)? We characterize this dimension of the concerns as their "scope".

Thus, we propose a two-dimensional framework for studying the intensity of the concerns, namely scale *vs.* scope. Since we divide the scale and scope dimensions into "high" and "low" groupings, our taxonomy has four categories (**Figure 1**)[1]. The simplest problems are low in both scale and scope, which we name *"basic"* concerns. At the other end of the spectrum are the most difficult concerns: these are both high in scale and scope, and are labeled here *"intractable"*. The intermediate category of concerns is low in one dimension, but high in the other; these are labeled *"manageable"* concerns.

The idea behind the taxonomy is to divide the concerns into four groups, based on the ability and effort of managers required to deal with the underlying issues. For example, concerns high in scope (occur everywhere) and high in scale (require large resource inputs to deal with) are very intense and are thus *"intractable"*: firms are not particularly able to "solve" these concerns, but must work around them. At the other end of the scale are the *"basic"* problems. Due to their localized nature and relatively easy solution, these are routine tactical issues and can be safely ignored at a strategic level. In the middle, "manageable" problems are large and difficult, yet with appropriate investment and managerial attention, these have been and can be dealt with in some ways. We further divide these into *"focused"* concerns, which require high amount of resources poured into relatively narrow functional areas. Conversely, *"diffuse"* concerns are more easily resolved issues but owing to their endemic nature require continuing attention as well.

[1] Past studies have used a three-point scale of average, high, or extreme severity [17], a five-point scale from strongly disagree to strongly agree [19], a seven-point scale from extremely unimportant to extremely important [25], even a ten-point scale from very unimportant to very important [22]. Given the qualitative nature of our data and to avoid unneeded complexity in the taxonomy, it seemed appropriate to break each dimension into a high/low dichotomy.

3. METHODOLOGY

Armed with these areas of e-business concern and the two-dimensional description format, we undertook to build a case study of a single Chinese city, based on interviews with government officials, business executives, plus academicians. Qingdao is a major trading city on the northeastern coast of China, with over seven million residents in the greater metropolitan area. It has a unique heritage owing to the colonial influence of Germany, somewhat similar to that of Portugal in Macao or the British in Hong Kong. Today, Qingdao is known internationally, not only for world-famous Tsingtao beer, but also as the headquarters of Haier, a multi-billion dollar manufacturer of home appliances, as well as host to other major multinational corporations, including AT&T, Mitsubishi, and Nestle [27]. It is also home to Qingdao University, a major state university with over 20,000 students.

In a panel of fifteen people, representatives of the Qingdao municipal government, logistics and marketing personnel from major local businesses, and their local technology and logistics support suppliers were asked questions related to our areas of concern. Separately, discussions were held with Qingdao University academicians to gain their input on the e-logistics concerns. Based on the responses of the panelists and academicians, the co-authors determined the placement of the issues in the three concern areas into the scale and scope framework (**Figure 1**). Disagreements after initial placement were resolved by consultation, followed by an informal set of meetings and telephone interviews with selected informants from the panel.

Our method follows many established trends in China-based business research, including sampling, interviewing process, and data interpretation. According to the very recent review by Roy, Walters, and Luk, a Western researcher interviewing Chinese respondents can be problematic, due to differences in cultural background, verbal styles, and non-verbal communications [26]. While the Western co-author has had numerous academic and practitioner experiences with Asian cultures, most of the question/answer period was handled by the Chinese co-author; having a local Chinese interviewer helped overcome these limitations.

Interviewers must avoid over-explanation of the research topic in China, as to accidentally leading the respondents to particular answers [26]. In our interviews, we used the three-concern format but purposely avoided making reference to our scale and scope descriptive framework. This avoidance of any potentially pejorative labels helped us avoid "topic sensitivity". Roy, Walters, and Luk suggest that many Chinese

managers fear outside knowledge and interference in their firms, causing limited cooperation with the research project. They also go on to discuss the possibility of social acquiescence due to the desire to avoid "losing face" [26]. In our case, if we had utilized the scale/scope framework explicitly, the listing of a particular concern area as large in scale or scope could easily have led to others panel members' losing face. Thus we could only develop our placements *ex post facto*, away from the panel discussion.

Roy, Walters, and Luk also explore the issue of government controls and influences on research processes and outcomes [26]. They state the lack of clear guidelines as to what topic areas are permissible, and highlight the possibility of too much self-censorship on the part of both foreign and local researchers. Their suggestion is the inclusion of local officials, which our panel included. We appreciate the input and support of the Qingdao government; the municipal officials were very helpful and supportive at every step of the process.

As for sampling, nearly all past China researchers have focused on "local" samples that are not particularly representative of the country as a whole [26]. While the present sample is very narrow in that it contains only a single city, the city is representative of China's major trading cities: because of history it's cosmopolitan, because of extensive export trade and foreign direct investment it's open to outside influence, and because of a major university it's equipped for technological change. On the other hand, our sample is somewhat unique. Roy, Walters, and Luk point that essentially all major journal China research has been based in the very largest cities of China – Beijing, Chongqing, Hong Kong, Shanghai, etc.

In addition, our methodological approach is somewhat different than that of previous logistics researchers, who have historically taken two alternative directions in examining China. The first approach has been that of a country-level review, using secondary data and commenting on the relative state of Chinese logistical readiness and effectiveness [13, 14, 28, 29]. The second approach has been to examine China from the perspective of foreign firms that do business in China [4, 17, 20]. By asking Chinese businesses and government officials directly, the present work provides first-person assessments of the Chinese e-commerce and logistics environment, answering a call for research from the perspective of Chinese partners [30].

4. RESULTS

Based on our investigation of the literature, we broke each concern area (physical, information, and managerial systems) into three sub-areas. These sub-areas had a number of issues

that served as the basis for our discussions with the panel members. **Table 1** summarizes the results of the panel discussions.

4.1 Physical Systems

The physical systems issues focus on the tangible side of logistics: making, shipping, and distributing the actual goods. The panelists were uniformly happy with the quality and function of the goods they received from local suppliers. Of course, all sourcing agents would like lower price, the panelists felt these were very usual and normal issues within the supply chain. There was some concern about the over-all dependability of supply in terms of availability and responsiveness. The main complaint focused on suppliers stocking too little finished inventory ("disrupting the JIT system"[2]) or stocking too much ("producing for inventory"), causing inflated prices. However, the over-all characterization was that these were minor, everyday issues, limited to only a few suppliers, and thus part of the daily routine (and therefore a Basic concern in **Figure 1**).

In contrast, the transportation and logistics issues were seen as much more serious matters. Transportation, while good in the general Qingdao area and along waterways, is a wide spread difficulty throughout the country. Dated and inadequate infrastructure and equipment leads to significant problems in timeliness and dependability, creating real problems in both supply and distribution. Furthermore, there is a lack of good logistics service in terms of locations, facilities, and dependability ("plenty of transport companies; no real 3rd party providers"). To make JIT and physical distribution work in China, managerial energy has to go into planning facilities around transport problems. Ultimately, many large firms do their own logistics and warehousing in order to achieve satisfactory outcomes. While logistics and transport are widespread problems, with little immediate hope of resolution, these were seen by the panelists as relatively minor. They required only some foresight and organizational effort to resolve (and therefore were Diffuse concerns in **Figure 1**).

4.2 Information Systems

The information systems concern focuses on the less tangible side of logistics: the information systems and data streams that are intrinsically important to effective distribution and supply chain management. One of the most fundamental issues in information systems (IS) is the availability of IS professionals. Our panelists were united in their agreement that appropriately trained and educated IS personnel were

[2] Quotations are taken directly from the discussions and communications with the panelists.

commonly found in nearly all locations throughout China and that it never presented itself as a significant issue (and thus is a Basic concern in **Figure 1**). In fact, rather than doing this work themselves, large firms commonly outsourced the IS function, or at least significant portions of IS activities, especially programming and computer maintenance.

In contrast, both the telecommunications infrastructure and over-all data quality were seen as much more major issues by the panelists. Relying on the general communications systems for critical logistics systems was just not considered an option – major firms develop and maintain their own communications infrastructure ("often with third party assistance"). Similarly, the reliability and accuracy of available data is often poor. Significant managerial time and effort must be brought to bear ("particularly on the lower reaches of the channel/supply chain") about the importance of reliable, accurate, and accessible data. Larger, more forward thinking firms are again placed in the position of creating their own logistics data processing systems throughout the supply chain – a very significant undertaking, but limited to a particular aspect of the business process (thus making infrastructure and data quality issues Focused concerns in **Figure 1**).

4.3 Managerial Systems

The managerial systems concern focuses on the over-all managerial issues found in logistics and supply chain management. This includes what we termed the fundamental logistics "skill set" (order taking, paperwork for arranging transportation, bureaucratic issues around inventory control and transfers, etc.). Basic knowledge of routine tasks in these areas — was considered quite well distributed around most firms and parts of the country (thus making logistics knowledge a Basic problem in **Figure 1**).

But the panelists saw more sophisticated supply chain management and other global best practices as lacking across nearly all organizations in all parts of the country ("a new and underdeveloped area"). Supply chain management used to be "plan driven", that is, a centrally developed plan put into motion a production-inventory-transport operation, little influenced by market forces. Chinese firms recognize and desire a move toward a more system driven by orders ("order-initiating dynamic"). This shift requires both market sensitivity and systems adaptability not exhibited to any significant extent by Chinese firms. Similarly, many global "best practices" have not been well implemented – or even accepted by most Chinese firms. Very few personnel exist in any part of the country with the requisite training and knowledge to implement ERP, JIT, TQM, or other sophisticated logistics systems (thus making Global practices and Supply

chain[3] require Intractable solutions in **Figure 1**).

5. DISCUSSION

5.1 The Present: Capabilities Beyond Expectations

How do these results compare with past studies of Chinese logistics capabilities? **Table 1** summarizes some past research on each issue. Clearly, many areas have improved in the short time since publication of these previous studies (mid-1990's). For example, under physical systems, the over-all rating of local suppliers' quality, dependability, and responsiveness was poor [17, 28]. Today the rating of local suppliers has improved dramatically – to the point that it is no longer an issue of importance to our panelists. Similarly, basic logistics knowledge has progressed from fairly severe shortages [17] to a very widespread knowledge of important routine tasks and skills. And perhaps surprisingly (when compared to other developing countries such as Bangladesh [19] or Bulgaria [31]), there is no real shortage of qualified IS personnel. In summary, it appears there is now a broad range of issues (Basic concerns in our framework) that should no longer concern potential foreign partners.

The rest of the good news is that while there remain less than satisfactory issues, many of these concerns can be handled with diligent investment of resources, management energy, and labor. For example, previous reports indicate that transportation infrastructures problems were very bad – and that the barriers to satisfactory operation were so high that even establishing one's own transportation fleet was unlikely [17]. Today, while our panelists report that third party logistics is still unavailable, transport conditions have improved to the point that large firms are able to provide their own national transportation and total logistics services, if necessary. Often such drastic measures are unnecessary, as reorganizing production locations and transportation schedules are adequate to solve most problems.

Similarly, the potential for handling the infrastructure and data quality information systems issues have also improved dramatically. Previous reports indicate that these problems were unlikely to be resolved due to severe telecommunications infrastructure problems [17]. Today, though issue is still significant, our panelists have demonstrated how large firms can solve IS problems by focusing resources on them. We believe this improvement is probably due to the development of satellite and other wireless technologies, combined with the education and training of a new generation of hardware and software IS specialists in China.

[3] This was the only major difficulty in terms of placing issues within the taxonomy. Due to the movement toward direct management by supply chain leaders, this might be characterized as a manageable, but focused issue (a limited number of firms in the supply/distribution chain).

This new generation of managers also operates in a system that has a greater respect for and understanding of the importance good data. Under the old centrally planned economic system, managers had many incentives to distort their data: to receive more raw materials, to hoard inventory to barter for other inputs, or to satisfy obscure or difficult planning targets [28]. Our panelists report that market forces now require supply chains to share more accurate and timely data in order to meet competitive pressures. In particular, positioning management, consumption monitoring, and continued replenishment systems generate much more accurate data than previously available. Together, these market forces and top management have brought about substantial improvements in the accuracy, reliability, and timeliness of logistics data.

The area that still creates the most concern for potential partners is the broad topic of managerial systems. While very basic knowledge is widespread, the skills required to engage in more sophisticated logistics practices is much more limited – though there is very clear improvement from before. Previous reports indicate that such global "best practices" and any form of supply chain management were "unheard of" in China [28] and that the overwhelming majority of Chinese firms were basically unable to respond to market changes [29]. Today, while still quite rare, these skills do exist in special places. Very recently, a select few major firms (including Haier in Qingdao) have gone so far as to implement a centrally controlled ERP and JIT system for all its business processes throughout the supply chain – even down to tier-two suppliers. This type of very drastic measure appears to be having success, as measured by Haier's decreased purchasing costs, order cycles, delivery times, and order processing costs.

5.2 The Future: New Skills Under Development

What of the future? The trends that have improved Chinese logistics should be expected to continue: massive investment should improve both physical and telecommunications infrastructure, systematic influences should continue to improve data quality, and now that world-class logistics practices are established in a few Chinese firms and supply chains, one would expect the knowledge to filter through to lower-tier suppliers and around the entire country.

Yet the Internet and its requisite data sharing may be only the first step in e-logistics. Many supply chains are moving toward the concept of virtual logistics, where the physical and informational parts of logistics are handled separately. The benefit is that within the virtual organization of the supply chain, resources can be

"traded", thereby catering to demand fluctuations with far less investment. This virtual supply chain requires a very sophisticated and flexible understanding of how raw materials, production capacity, and finished stock contribute toward the meeting of final demand [32]. More concretely, Lancioni, Smith, and Oliva discuss three key abilities needed to take advantage of the Internet in supply chain management: creating fast accurate information, adjusting inventory, production, and transport systems, and reacting quickly to market changes.

Each of these three items requires one thing: a different attitude and ability to deal with change. A recent study indicates that there is truly a "New Generation" of Chinese managers [12]. This "New Generation" grew up during the era of Social Reform (1977-present), which required a much less rigid conformity than previous generations' eras of the Cultural Revolution (1966-1976) or the Communist Consolidation (1949-1965). This work indicates that younger Chinese managers have increased individualistic tendencies and are more likely to act independently and take risks – in fact they may be becoming more like Western managers very, very quickly. This "New Generation" may avoid the resistance to reform found in managers whose norms were formed in pre-reform days [7]. As such, it will be interesting to watch the next group, the "One-Child Generation". This group's formative period has been even more open to outside influences and change – will they pattern themselves even more closely to Western values and attitudes?

In addition, the Chinese economic system continues to evolve at a prodigious rate. Modern communism has transformed China from a closed and stagnant Soviet-style centrally planned economy to a much more open, economic giant [7]. Central government has loosened controls over business and local government acts like a participant in economic development. Furthermore, state-owned enterprises and collectives are more entrepreneurial because they can no longer afford to be passive.

Another aspect of supply chain management that may develop quite quickly in China is the area of inter-organizational relationships. A recent editorial work by Bowersox, Closs, and Stank [33] suggests ten important trends in supply chain management. Four of the ten – and the two most critical – are related to relationships: customer relationship management, collaborative supplier relationships, virtual integration, and information sharing. Chinese business systems, and the culture from which they spring, has a long history of business networks and alliances based on *"guanxi"* [7]. *Guanxi* is the connections built by managers, based on their interpersonal relationships, stemming from college days, memberships in social clubs or professional

organizations, and often the most important – family ties. Some have suggested that these relationships are the essence of "relational contracting, so popular in the inter-organizational management literature [10]. As Western business practices take on a relational approach more akin to those in China, it is entirely conceivable that the highly refined ability of the Chinese to manage and promote relationships will become very important.

And the role of foreign partners in the future? Clearly the continuation of past efforts at training and education will be key [17]. The present work has shown the readiness for Chinese businesses to "move to the next level" in logistics system design. The presence of basic managerial, logistics and information technology skills and infrastructure means that the installation of increasingly complex information systems and other Internet-based applications is now possible – where it may not have been as little as 5-7 years ago. Similarly, the initiation of sophisticated virtual logistics managerial systems may now become conceivable in Chinese as soon as the mid to late part of this first decade of the 21st century.

6. CONCLUSION

Our work confirms what many logisticians already may have suspected: with its low cost structure and growing information and managerial systems skills, China has almost limitless potential to succeed as a global sourcing location. Thus, our primary conclusion is clearly that: 1) many hurdles of the recent past should be seen now as only minor "basic" problems to sourcing in China; 2) many of the remaining issues in Chinese logistics are "manageable" and can be overcome with significant (but not overwhelming) investment of resources, management, and labor, and; 3) even in the most "intractable" issue areas, there is positive movement toward satisfactory levels of logistics systems knowledge and application. Ultimately, foreign (and domestic) companies will find China an increasingly hospitable place to conduct very modern-style operations.

The primary limitation of the present research is that it includes companies, officials, and academics from only a single city in China. However, the sample includes major manufacturers and supply chain leaders with logistics and marketing channels connections across China and the world. Thus, their knowledge spans not only the situation in their own local area and China, but also the state of logistics in the rest of the world. In addition, our work in many ways builds on and confirms previous studies of Chinese and developing country logistics capabilities.

Our experience in developing the research methodology and data collection confirms previous commentary on the difficulties of conducting market research in China. While our panelists were most gracious and receptive to our questions, there was a clear desire to avoid comments that could be construed as "blaming" any other institution, therefore causing them to lose face. We thought that the inclusion of government officials was a definite advantage in the process, gaining addition credibility for the project and adding a valuable perspective on the issues at hand.

Therefore, future research in this area must include more quantitative studies of the logistics issues under examination – particularly the information systems concerns that have had very little study to date. The anonymity of a written survey might let respondents feel freer to voice their opinions without the other people they relate to losing face. In addition, the tremendous geographic variability of physical, information, and managerial systems in China could be studied in some detail. This would allow both Chinese and foreign businesses a much greater and more detailed understanding of the differences in capabilities and knowledge across regions.

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Table 1: Summary of Logistics Taxonomy and Interview Panel Results

Area of Concern	Issues	Panel Commentary	Past Research
Physical Systems			
Local Suppliers	Availability, quality, dependability, pricing, responsiveness	Very acceptable quality and function of physical products; minor difficulties with other issues	Availability and price acceptable; quality, dependability, and responsiveness poor [17, 28]
Transportation	Infrastructure, equipment, timeliness, dependability, cost, availability	Good facilities/outcomes in Qingdao area and along waterways, less so in much of the country; facility planning used to make distribution and JIT work	Infrastructure and service poor; equipment OK; dependability issue very poor [17]
Logistics-warehousing	Location, facilities, service quality	Lack of satisfactory third party suppliers; large firms increasingly do these activities themselves	Warehousing services acceptable; logistics service shortages [17]
Information Systems			
Human resources	Availability, education, training, awareness	Commonly available in both large and small companies; often brought in from third parties	No report in China literature; other reports suggest unavailable [19, 31]
Infrastructure	Availability, quality, dependability, pricing, responsiveness	Poor general quality throughout country; but can be bought through development of own or local systems	Telecommunications infrastructure has severe problems and limitations [17]
Data quality	Reliability, accuracy, timeliness, accessibility	Often poor; however, a focus on information quality can bring substantial improvement	Quality compromised by systematic incentives to distort data [28]
Managerial Systems			
Logistics knowledge	Purchasing, inventory, and transportation management, order processing	Broadly distributed basic knowledge of routine tasks	Adequate logistics skills found in very few Chinese firms [17]
Supply chain	Forecasting reliability, market sensitivity, systems adaptability	Missing in many organizations; beginning to see direct management by supply chain leaders	Lack of adaptability and sensitivity make Chinese firms unable to respond to market changes [28, 29]
Global best practice	Sophistication, education, training, acceptance	Wide-spread lack of important management and marketing skills; too much doing things "the old way"	Global/foreign best practices "unheard of" in China [28]

Figure 1: Areas of Concern for Chinese e-Commerce and Logistics

	Narrow Scope of Concern (Concentrated by location, industry/sector, and time)	**Wide Scope of Concern** ***(Dispersed over location, industry/sector, and time)***
Large Scale Solution Required to Solve Concern *(High resource inputs, management energy, labor time/effort)*	**Focused** Information: Infrastructure Information: Data quality	**Intractable** Managerial: Supply chain Managerial: Global best practice
Small Scale Solution Required to Solve Concern *(Low resource inputs, management energy, labor time/effort)*	**Basic** Physical: Local suppliers Information: Human resources Managerial: Logistics knowledge	**Diffuse** Physical: Transportation Physical: Logistics-warehousing