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The Impact of Gender on Humanitarian Logistics

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Logistics performance in the humanitarian context has been linked to gender issues in several ways. From the perspective of the beneficiary, gender-based disaster vulnerabilities and gender disparities in accessing aid have been highlighted. However, the gender of humanitarian staff in contact with beneficiaries, making purchasing decisions, and responsible for last-mile deliveries, i.e., humanitarian logisticians, also impacts on the way in which the needs of female and male beneficiaries are met. This conceptual article focuses, therefore, on the links between gender, logistics performance, and logistics skills—discussing the implications of these three areas in the humanitarian context. From this, an agenda for further research is proposed.

Keywords: Logistics skills, logistics performance, gender, humanitarian logistics

Introduction

In many ways, the 2004 South East Asian tsunami can be seen as a turning point for humanitarian logistics. A combination of several factors—including the time of year, the scale and scope of the disaster, the demographics and origin of the people affected, and the ensuing media interest—have all helped to focus attention on the difficulties of responding quickly and efficiently to major rapid onset disasters. Subsequent significant disasters including the flooding of New Orleans and the major Pakistan earthquake in 2005, and Cyclone Nargis in Burma and the Sichuan earthquake in 2008 have served to reinforce the need to understand how best to deliver humanitarian aid in the aftermath of such major events. Indeed, given that the number, magnitude and impact of natural

disasters are all showing an upward trend (EM-DAT 2008), increased attention by academics and practitioners in researching the issues surrounding disaster relief in response to large-scale emergencies is to be welcomed.

In parallel, there has been a recognition that many humanitarian organisations (including UN agencies, non-governmental organisations (NGOs) and the Red Cross/Crescent movement) expend a very large proportion of their income on logistics, with some estimates suggesting that this is as high as 80% (van Wassenhove 2006). Yet such a statistic is hardly surprising once the definition and scope of humanitarian logistics are considered. Thus, two key commentators in the field argue that humanitarian logistics encompasses “the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials as well as related information, from the point of origin to the point of consumption for the purpose of meeting the end beneficiary’s requirements” (Thomas and Mizushima 2005, p.60).

Within this definition, particular attention is drawn to its final clause—that of meeting the end beneficiaries’ requirements. This underscores the crucial differentiation between business and humanitarian logistics as the end beneficiaries in the latter case (i.e., people affected by a disaster) are frequently devoid of any purchasing power, are unable to use alternative sources of supply, and may not even be able to articulate their needs and wants (Pettit and Beresford 2009). This latter challenge may be for a number of reasons and, indeed, may differ (positively or negatively) according to factors such as gender, race, or age. Thus, while humanitarian logistics in general has become a focus of academic interest (Kovács and Spens 2009)—with an increase from a near zero baseline in 2005 to around 10 journal special issues dedicated to the topic that have or will be published in the 2008-10 timeframe—very little (academic) attention has been paid to its gender dimension. This is true notwithstanding the academic and practitioner focus on gender mainstreaming that has gained impetus since its introduction as one of the UN Millennium Development Goals. In short, the link between humanitarian logistics and gender remains little understood, even though responding to gender-specific needs of beneficiaries seems crucial to humanitarian logistics performance and, ultimately, aid effectiveness.

Although clearly of major significance, gender mainstreaming as it relates to beneficiaries (and the associated logistics performance) is but one of the dimensions linking logistics to gender. An alternative perspective can be derived from consideration of the issue in the context of business logistics where a number of gender issues have been taken up in Council of Supply Chain Management Professionals’ annual *Ohio State Women in Logistics Survey*, which considers the representation of women in logistics, their career patterns, and their leadership skills. In other words, another way of linking logistics to gender is to look at the impact of the gender of the logistician her/himself on logistics skills as well as on logistics performance.

Against this background, and in the absence of prior research that considers this issue, the aim of this paper is to develop a conceptual model that can be used to evaluate the links between gender, logistics skills, and logistics performance. To achieve this, the paper is structured as follows: it will first review gender issues from the perspective of the beneficiary, as any successful logistics system must begin with understanding these differentiated needs. Then, the topical literature review will turn to the consideration of the gendered nature of logistics as a profession, looking at humanitarian logistics in particular. The paper will next review existing research into the skills that are perceived to be required of logisticians in the for-profit sector. This will emphasise an apparent gap in the research to date, which has yet to evaluate how the suggested skill set for logisticians actually affects logistics performance. Again, this discussion will consider this aspect of the problem through the lens of gender. The final summary section will outline a research agenda that aims to assist humanitarian organisations in understanding how best to meet the needs of their beneficiaries from the logistics perspective.

It is emphasised that this paper is conceptual in nature and it represents the first element of a wider study designed to answer the question: “Why are there so few female humanitarian logisticians?” This question reflects the concern felt by some NGOs that, although their overall gender balance is broadly neutral or even tilted in favour of females, the area of logistics remains firmly the province of males. In this first phase, therefore, we aim to expose the existing research into the reasons why the gender of a humanitarian logistician should make any difference when deployed in the aftermath of a disaster. We also seek to understand the implication of any previous research that links the skills and attributes considered to be of value to a logistician to logistics performance. Finally in this phase, we seek to understand if any earlier work has revealed an association between the gender of the logistician and logistics performance. From this baseline we have developed a model that considers the relationship among logistics skill, logistics performance, and gender. From this, we lay out an agenda for primary research.

Meeting the Needs of Beneficiaries

Meeting end beneficiary requirements is stipulated in the definition of humanitarian logistics as its very aim. Yet for decades, disaster relief has commenced with a push philosophy where humanitarian organisations—or rather, their donors—shipped whatever they deemed necessary for survival to a disaster-stricken area (cf. Long and Wood 1995; Kovács and Spens 2007). A move from push to pull is only possible after the needs of beneficiaries have actually been assessed. However, to be able to respond to these identified needs, it is important to recognise that the logistics pipeline can easily be jammed with previously pushed supplies or, indeed, with unsolicited goods that may have been donated by those who wish to respond to the disaster but lack a suitable appreciation

of the real requirements. Therefore humanitarian logisticians not only want proper data from the needs assessment process, but it also makes sense for them to participate in this activity.

Developing the needs assessment data is equivalent to achieving knowledge of demand—which is, indeed, one of the most significant challenges of humanitarian logistics. Arminas (2005 p. 14) pinpoints the problem of demand in the humanitarian setting when saying that “purchasing and logistics for major disaster relief is like having the client from hell—you never know beforehand what they want, where they want it, how much they want and even where they want it sent”. In other words, the nature, quantity, and location of demand are all unknown at the beginning of a disaster relief effort. Furthermore, pushing “one size fits all” supplies is not only highly inefficient from a cost perspective, it also runs the risk of filling the supply pipeline with unwanted goods whilst also, potentially, failing to take into account the gendered nature of the effect of such disasters (Enarson 2002).

Indeed, not only do the needs of different groups of beneficiaries reflect the gender of the recipient, but disasters also affect these groups in a differentiated way—an effect that has triggered a number of studies researching differences in gender advantages resulting from disasters (e.g. ILO 2002; WHO 2005; Childs 2006), or, as Enarson (2002) puts it, gender differences in disaster vulnerabilities. These include differential disaster exposure (e.g. Bradshaw 2007 accounting for men’s risky behaviour in Hurricane Mitch in Nicaragua exposing them more to the storm), and differential disaster coping strategies (Delica 2002), as well as impacts on the life expectancy of beneficiaries. As for the latter, the economists Neumayer and Plümper (2007) conclude that natural disasters have a stronger negative effect on the life expectancy of women than of men—which is increased by disaster magnitude and a (potentially lower) socioeconomic status of women. Overall, therefore, there is good evidence of a gendered nature of the impact of disasters.

Much of the gender differentiation in disaster vulnerabilities can be attributed to the sex segregation of various activities in a geographical area (Weekes-Vagliani 1994; Delica 2002), i.e., to the cultural specificity of gender socialisation. Such cultural specificities, however, not only help in accounting for differences in the exposure to disasters, but also for differences in the access to aid. This access starts with the possibilities of voicing one’s needs. This is particularly important where women are inhibited from speaking to men outside their own families (WHO 2005) or where men cannot articulate the needs of their female family members. The very needs of female and male beneficiaries do differ, and these differences are particularly highlighted in questions of safety (for example: in camps, whilst trading, whilst collecting firewood, or enroute to or from school), water and sanitation (especially hygiene items) and medicine.

Although such differences have been at the core of gender studies in the humanitarian arena, the needs assessment process itself has been largely overlooked. For example it has been suggested that some female-headed households (i.e., those in which the male “head” had died, or in the case of single mothers) were excluded from needs assessment in the aftermath of the 2005 Pakistan earthquake. Such circumstances emphasise the need for women (as well as men) to be members of needs assessment teams, as the former are more likely to be able to gain the necessary access to females affected by the disaster and thereby understand individuals’ needs.

Unfortunately, in the same way as in the for-profit sector of business logistics, there are relatively few female humanitarian logisticians and, surprisingly, this is the case even in organisations where the overall representation of females is as high as 80-90% (e.g. Médecins Sans Frontières). Given the paucity of female humanitarian logisticians, it is almost inevitable that there are reports of gender-insensitive purchasing where logisticians have misjudged the needs of beneficiaries of the opposite sex. Infamous examples here include not just gender and culturally insensitive distribution of clothing (CATAW 2005), but more strikingly, relief items being purchased that endanger women beneficiaries from a safety or a health perspective (ALNAP 2005; Burki 2006). In addition, there is the ever-present challenge of managing unsolicited donations such as those reported in the wake of the 2004 SE Asia tsunami which included Viagra, ski jackets, Father Christmas costumes, expired medicines, tinned pork (sent to the strictly Muslim area of Banda Aceh in Indonesia), heavy sweaters and other woollen goods, and inappropriate female swimming costumes and underwear (TEC 2006; Tomasini and van Wassenhove 2009).

Beyond needs assessment and gender-insensitive purchasing, female and male beneficiaries also differ in their ability to access aid itself. Access to aid consists of the physical accessibility of aid (e.g. travel distances and the ability to afford the necessary transportation—Dayal 2008; de Vos et al. 2008) as well as the organisation of aid distribution (to male heads of households only through the convenience of the times at which aid is distributed—Enarson 2002; Lutz and Gady 2004).

In summary, the role of the humanitarian logistician has a substantial affect an aid organisation’s ability to meet end beneficiaries’ requirements in the light of gender. This role starts with assessing the needs of both female and male beneficiaries, ensuring the delivery of supplies to meet these needs, and ensuring the accessibility of these supplies by all beneficiaries. The gender of the humanitarian logistician affects all of the above, and it is suggested that the presence of a larger number of female logisticians would have a considerable positive impact on the logistics performance of humanitarian organisations—and hence enable them to meet the needs of beneficiaries more efficiently and effectively.

Women in Logistics

The main focus of gender studies in logistics such as the Ohio State study (CSCMP 2006 and CSCMP 2007), or Chartered Institute of Logistics and Transport UK's (CILT 2002) vs. the Canadian Logistics Institute's studies (TLI 2008) is on the (under-)representation of women in the logistics field. Yet, to some extent, they have been criticised for a sampling problem when capturing the representation of women in the field. For example, it has been suggested that women are less likely than men to join such professional organisations which are, typically, the target of questionnaires (Trunick 2007).

Another problem of surveying logisticians stems from the definition of logistics and the subsequent sample population. This manifests itself in areas such as journal ranking exercises, where warehousing journals are overrepresented if the survey had been sent out to a warehousing association etc. (Carter 2002). However, the basic issue here is that there is an, as yet, unsettled debate over the definition of logistics and its relationship with Supply Chain (or Network) Management (SCM or SNM). This has been summarised by Larson and Halldórsson (2004) and Larson, Poist and Halldórsson (2007) in which four perspectives are offered:

- *Traditionalist*. In which SCM is seen as a sub-set of logistics.
- *Unionist*. In which logistics is seen as a sub-set of SCM.
- *Re-labelling*. In which what had previously been described as logistics is now called SCM.
- *Intersectionist*. In which both Logistics and SCM are of equal standing and are complementary in nature.

Whilst the work of Larson and his colleagues has indicated a preference for the re-labelling perspective amongst the academics that were surveyed in 2004, the SCM professionals surveyed in 2007 gave a mixed response, but tended towards the unionist and intersectionist perspectives. The Thomas and Mizushima (2005, p.60) definition of humanitarian logistics is based on the Council of Supply Chain Management's (CSCMP's) definition of logistics that sees it as a subset of SCM, and hence adopts a unionist perspective. That said, Aquino and Draper (2008), in a study of 198 companies, found no less than 122 variations of the scope of activities encompassed by SCM. The problem is, therefore, wider than finding a representative sample of women in logistics, it extends to the entire discipline of what logistics entails, and which activities it represents.

In any event, the under-representation of females in the business arena would seem to be confirmed across any related and sub-disciplines of logistics. That said, logistics is often perceived as an engineering-related field (Sohal and D'Netto 2004; EP 2007), in

which male domination is rather the rule than the exception (Broadbridge and Hearn 2008). Generally, a male image (more precisely, a truck-driver image) and the difficulty of balancing career and family have been quoted as the main reasons for the underrepresentation of females in logistics. For example, 48% of respondents to the CSCMP 2007 survey list work-family conflicts as a barrier to the females working in the field and this is due to issues such as work-related travel in global supply chains (Trunick 2007). In addition, female students are underrepresented in logistics education—which is reflected in humanitarian logistics education as well. For example, only 20% of students who had enrolled in the Fritz Institute's training courses for the Certification for Humanitarian Logisticians and Certificate for Humanitarian Supply Chain Management by mid-2008 were female (Macdonald 2008). Therefore organisations such as WISE (the Women's Institute for Supply-Chain Excellence in International Humanitarian Logistics) have it set as their aim to increase the number of female humanitarian logisticians by 80% by the year 2010 (WISE 2006).

However, gender studies in logistics have not only highlighted the paucity of female logisticians (which are arguably the more needed in disaster relief), but also the differences in skills between a female and male workforce. Women are attributed better negotiation skills (important for purchasing, Min, LaTour and Jones 1995), and the latest CSCMP survey has even suggested that there are differences in logistics leadership between women and men.

In short, there is clear evidence that there is a paucity of female logisticians, although the reasons for this are less clear. There would appear to be something about the image of the profession that puts females off from joining it—although it may be that migrating the title of the employment area away from logistics to that of SCM or SNM might assist in making it more attractive. To a large extent this has happened within the business arena, but the humanitarian field remains wedded to the logistics title even though a recent analysis of job advertisements conducted by CILT (UK) showed that humanitarian logisticians were responsible for a broad range of activities including security, communications and administration in addition to the traditional role encompassed by the Thomas and Mizushima (2005) definition (CILT 2008). Clearly we would not wish to advocate positive discrimination in favour of females—not least as this would be illegal in many countries. Rather, if it is perceived that there would be benefit in the presence of a greater proportion of female humanitarian logisticians, then the community as a whole needs to consider what barriers to recruitment and retention it may have inadvertently erected.

Logistics Skills—A Closer Look

It is clear from the discussion in the previous section that the topic of logistics skills, and gender differences in these, is important to understanding why there are disproportionately few female humanitarian logisticians. The topic is relatively new in the literature and, although it has been examined through a gender lens, there would appear to be only two such studies to date. Min, LaTour and Jones (1995) investigated the negotiation skills of purchasing professionals based on their gender. According to their study, situations involving mixed-gender negotiation partners can “soften” the negotiation, even though this only occurred in the moment of initial contact. Separately, the 2006 CSCMP women in logistics survey focussed on leadership as the year’s special topic. This survey of 915 female members of that organisation reported under the heading of “key aspects of leadership”, 92% viewed themselves as good planners, 94% as good at multi-tasking, and 66% as good at setting and keeping to goals (CSCMP 2006).

Other such logistics skills studies address the topic from different angles. One of the most prominent being the educational one, and this has seen the assembling of lists of logistics skills that should be addressed in educational programmes (Dinwoodie 2001; Mangan, Gregory, and Lalwani 2001; Tracey and Smith-Doerflein 2001; Chapman 2007). Not surprisingly, many of these studies led to the establishment of new logistics certificates, masters programmes, or continuing education programmes.

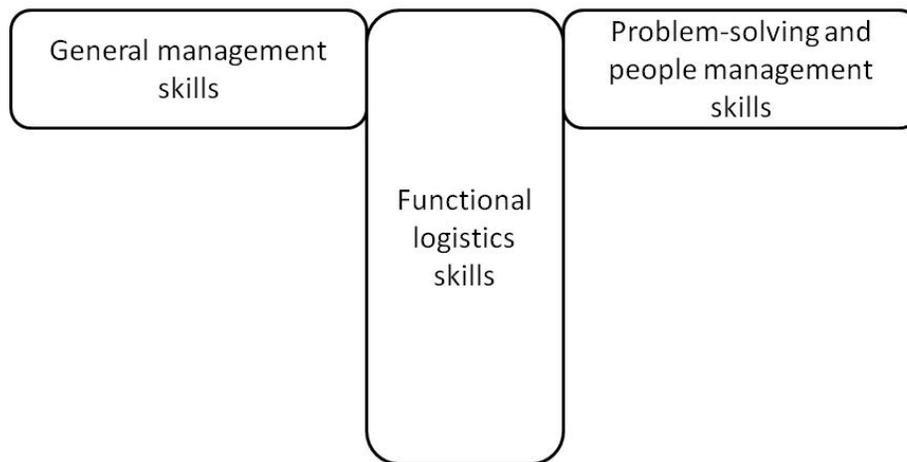
Skills for different levels of the profession have also been investigated, e.g. the skills needed to advance to senior positions in logistics (Murphy and Poist 2007; Carter et al. 2006), or the differences in skills needed between logistics and supply chain management (Gammelgaard and Larson 2001; Dischinger et al. 2006). Here, however, what appears to be a crucial difference in skills actually boils down to the balance between the “technical” skills of the logistician and the “personal skills” and “relationship management skills” that SCM emphasises (van Hoek, Chatham and Wilding 2002; Mangan and Christopher 2005)—or, as Murphy and Poist (2007) put it, SCM requires “business skills” other than mere logistics competence.

The general emphasis on training and education in the business-related logistics skills literature is also found in that relating to humanitarian logistics—albeit much of the latter is devoted to a criticism of the lack of training, education and overall professionalism (Thomas and Mizushima 2005). But perceptions of the scope of logistics and the role of a logistician colour the analysis of the required skills and knowledge. Indeed, not only is the logistics skills literature biased towards individual authors’ definition of logistics, but also future students, managers of logisticians, and the hiring organisations’ definitions affect the combination of skills required from logisticians (Sohal and D’Netto 2004; Trunick 2007).

Nevertheless, Mangan and Christopher (2005, p. 180) suggest that supply chain managers regard themselves as “managers first and logisticians second . . . with requisite skills and competencies sets that comprise both general managerial skills and competencies and specific logistics/supply chain skills and competencies”—which, indeed, seems to be a consensus view in the literature. Thus, van Hoek et al. (2002) argue that there is a need for logisticians to possess not only a core of logistics knowledge, but also a set of personal skills, arguing that textbook logistics knowledge and logistics expertise are only qualifiers that need to be rounded up with a wide range of personal and interpersonal skills. This perspective is in line with Mason-Jones, Naylor and Towill’s (2000) differentiation between market qualifiers and market winners.

Such different sets of skills have been represented in a T-shaped model that is also prominent in a number of other engineering-related disciplines. For example, Iansiti (1993) used it in his discussion of successful approaches to research and development within the computer industry, and Weiss (2005) used a similar model to describe the engineer of the future. However, Mangan and Christopher (2005) have, in the business logistics and supply chain management context, codified this more clearly suggesting that the required skills fall into three areas (see Figure 1).

Figure 1: The T-shaped Model of Logistics Skills



Source: Adapted from Mangan and Christopher 2005, p.60.

Figure 1 follows Mangan and Christopher’s (2005) nomenclature. However, Murphy and Poist (2007) also talk about three areas, in this case naming them business skills, logistics skills, and management skills. Interestingly, “business skills” in the Murphy and Poist (2007) BLM framework are equivalent to Mangan and Christopher’s (2005) general management area, in that they both list the same skills under these headings (e.g. finance, IT, etc.). On the other hand, Murphy and Poist’s (2007) “management skills” refer to

interpersonal and problem-solving skills as well as what van Hoek et al. (2002) call “social skills and self management”. “Logistics skills”, on the other hand, refer to what Dischinger et al. (2006) specify under “functional skills”, i.e., the “fact base” (Carter et al. 2006) of logistics.

Using the Mangan and Christopher (2005) model (i.e., Figure 1) as the baseline, Table 1 summarises the skills perceived by researchers to be important for each of these areas. It is recognised that the individual skill sets could be grouped under a variety of headings. For example, it might be argued that a category of “people management” could usefully be introduced with areas such as leadership and communications as subordinate elements. However, the Mangan and Christopher (2005) classification has been adopted not least because it aligns well with the major business transformation processes identified by Christopher (2004) (such as the transformation from inventory to information and from “trucks and sheds” to end-to-end pipeline management). He argues that these business transformations will have significant implications for SCM and, hence, this classification of the skill areas has been selected.

Table 1: Skills in the T-shaped Model

General Management Skills	Functional Logistics Skills	Problem Solving Skills	Interpersonal Skills
Finance and Accounting	Legal	Problem Identification	Listening
Information Technology	Customs, Import and Export	Information Gathering	Oral Communication
Change Management	Transportation Management	Problem Analysis	Written Communication
Marketing	Inventory Management	Information Sharing	People Management
Project Management	Warehousing	Problem Solving	Meeting Facilitation
Strategic Management	Purchasing and Procurement		Negotiation
<i>Customer Relationship Management</i>	Forecasting		<i>Stress Management</i>
<i>Supplier Relationship Management</i>	<i>Reverse Logistics</i>		<i>Human Resource Management</i>
<i>Risk Management</i>	<i>Port/Airport Management</i>		<i>Leadership</i>
	<i>Logistics Information Systems</i>		

This list of skills was tested in a pilot survey at the 2008 Logistics Research Network conference in Liverpool (UK), with 75 researchers answering the survey. The respondents ranked the skills not only in terms of their importance in delivering logistics performance, but also answering the questions of adding/deleting skills from each of the

lists. This led to several modifications in the table, with some additional skills (shown in italics in Table 1), and some re-labelling.

It is important to note that in spite of a number of articles having been published on logistics skills, few present any empirical data. That said, there is some indication that there is a trend towards the increased importance of general management skills and interpersonal skills that would appear to reflect the shift in focus from operational and technical aspects of logistics towards the more strategic concept of supply chain management (Mangan and Christopher 2005). Murphy and Poist (2007) arrive at similar conclusions based on a comparison of 1991 to 2007 survey data (in which supply chain management was added as a skill *per se* in the latter data set). Similarly, van Hoek et al. (2002) argue for the increasing importance of emotional intelligence over functional logistics skills even in the logistics discipline. Nonetheless, while the literature would indicate that problem-solving skills, interpersonal skills and broader general management knowledge are increasingly important in logistics, the T-shaped model has yet to be tested. What is more, one could reasonably argue that the importance of any particular skill should be related to logistic, and hence organisational, performance—be this in the for-profit or not-for-profit context.

Outside the logistics domain, differences in skills have been attributed to gender. For example, Goldstein et al. (2001) studied the volume of different parts of male and female brains, attesting that (relative to overall cerebrum size) female brain volumes were larger in the frontal and medial paralimbic cortices which are generally associated with decision-making and problem-solving (Hoag 2008), implying that females may be physiologically more suited to perform such tasks. Separately, research in the area of leadership indicates that women are more likely to use a transformational (rather than transactional) leadership style (Bass and Avolio 1994; Sarros, Gray and Densten 2001), which in turn has been found more effective than a transactional one (Lowe and Kroeck 1996).

The relevance of this debate is clear—if there is a set of skills and attributes that are deemed to be of particular relevance and importance to logisticians, then these must also be viewed through the lens of gender. Put simply, are females better at, say, listening (which is one of the allegedly key skills) than males? If so, then the absence of females as logisticians must adversely affect an organisation, and that organisation needs to take appropriate steps to rectify the situation. Again, it is stressed that the authors are not advocating any form of positive discrimination. Rather we would suggest that, if there is clear merit in a greater proportion of the logistics workforce being female, then it is for the sector as a whole (as well as for individual organisations) to reflect on how this can be achieved—in other words, how can the profession be made more attractive to females?

With this question in mind, one further issue needs to be resolved. Is there any linkage between the particular skills and attributes of logisticians that is advocated within

the literature and improved logistic performance? This will be discussed in the next section.

Logistics Performance

There is a vast body of literature on different aspects of logistics performance, though much of the focus is on particular metrics for each of these aspects, the definition of these metrics, and how to actually measure them. Generally, the focus of logistics performance is on effectiveness and efficiency. Breaking down these two, the debate centres on the measurement of product and process quality, on-time deliveries, flexibility, time and cost efficiencies, and customer service levels (Daugherty, Ellinger and Gustin 1994; Beamon 1999; Morgan 2004). Here, time efficiencies relate to turnover measures (of e.g. inventory turnover) as well as financial measures (e.g. cash-to-cash cycle times) and on-time deliveries and lead times (cf. Beamon 1999; Morgan 2004).

From a supply chain perspective, Stewart (1997) also includes the question of time to market from a product development perspective. Cost efficiencies are related to operational productivity (Caplice and Sheffi 1994; Morgan 2004), as well as to capital reduction, and resource utilisation (again referring to inventory turnovers—Caplice and Sheffi 1994). Customer service is another attribute that includes drivers from on-time deliveries to, interestingly, correct paperwork (Morgan 2007). In essence, we need to relate the attributes of logistics performance to material flows as well as to information (cf. Moberg et al. 2004), and even financial flows (cf. Töyli et al. 2008). The latter is particularly important in the not-for-profit sector, given its need to ensure its financial stability (Beamon and Balcik 2008).

Whilst much of the performance management literature focuses on particular performance metrics, logistics performance can also be related to consideration of the optimal processes to achieve the desired outcome. Thus, a much quoted process-oriented model is the supply chain operations reference model (SCOR) that originates from a benchmarking study (Stewart 1997). The SCOR model identifies 19 strategic measures including asset turns, cash-to-cash cycle times, perfect order fulfilment, return on fixed assets etc., but can be criticised for the ambiguity of its measures, which span managerial-operational or strategic levels (Morgan 2007).

Nevertheless the most important attributes in the SCOR model can be summarised as (Theeranuphattana and Tang 2008, p. 127):

- *Supply chain reliability.* The performance of the SC in delivering the correct product, to the correct place, at the correct time, in the correct condition and packaging, in the correct quality, with the correct documentation, to the correct customer.

- *Supply chain responsiveness.* The speed at which the SC provides products to the customer.
- *Supply chain flexibility.* The agility of the SC in responding to market place changes to gain or maintain competitive advantage.
- *Supply chain costs.* The costs associated with operating the SC.

The differentiation between SCM- and logistics-related models is also evident in terms of external vs. internal measures of performance. Similarly, such a differentiation exists within logistics performance literature, where it has been discussed in terms of output-oriented and input-oriented measures. Thus, Beamon (1999) talks of input-related measures (“resources”), output-related measures, and the performance attribute of “flexibility”. In essence, resources refer back to operational efficiency, whilst output refers to the effectiveness of an operation—or, in humanitarian logistics, the effectiveness of a mission (Beamon and Balcik 2008). Flexibility has different subsets, referring to volumes, delivery times, and the mix of items (Beamon and Balcik 2008). Another view on “external” metrics is to differentiate among organisational-internal, customer, and shareholder metrics (Caplice and Sheffi 1995). In the humanitarian sector, this would include donor metrics, which is why additional attributes of logistics performance here include transparency and accountability of operations (de Brito, van der Laan and Vergunst 2007; Beamon and Balcik 2008).

Generally, however, the logistics performance literature has focused on measuring input and output metrics, but it has not related either of these to different logistics skills. This is all the more surprising as, for example, customer service is listed both as an attribute of performance (Morgan 2007) as well as a logistics skill (Murphy and Poist 2007). Studying a logistics department, Wouters and Wilderom (2008) have indeed indicated that different sets of (in particular leadership) skills can be linked to the logistical performance of an organisation. A broader testing of all skill sets in the T-shaped model has, however, yet to be carried out.

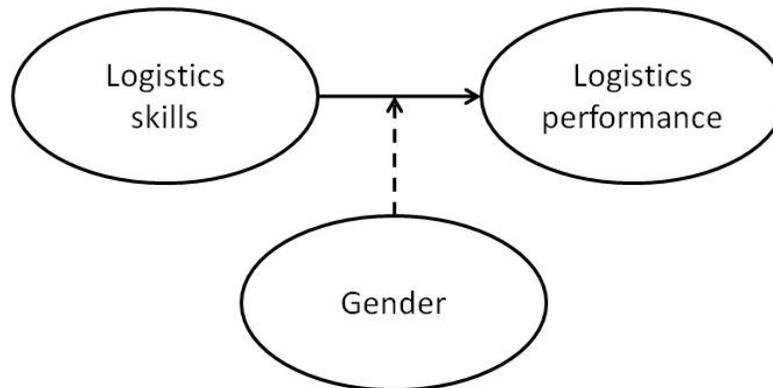
In summary, whilst logistics performance has been investigated in some depth in both the for-profit and not-for-profit sectors, research into which skills lead to improved logistics performance has, to date, not been undertaken. Therefore, in the following section we will relate the two bodies of literature to each other, and the resultant research agenda.

A Model of Logistics Performance in the Light of Gender

As explained in the previous sections, a theoretical model of the skills and attributes required of a logistician has been developed (i.e., the T-shaped model of Figure 1). However, although it would be reasonable to assume that the skill sets that senior

logisticians perceive to be important (e.g. in Dischinger et al. 2006; Murphy and Poist 2007) lead to improved logistics performance, this has not been empirically tested. Furthermore, gender differentiations in skills have only been indicated, and their affect logistics performance has not been studied. Based on the literature review, we thus propose the following model linking the three areas to each other (see Figure 2).

Figure 2: Logistics Performance in the Light of Gender



In this figure, logistics skills encompass all of the skill sets in the T-shaped model. Thus the model is designed to test not only the relationships between the three constructs of logistics skills, logistics performance, and the potential effect of gender attributes, but also the relative weight of different sets of skills that are relevant to logisticians. Whilst literature suggests that gender affects a logistician's skills, it remains to be tested how gender affects logistics skills, and ultimately, logistics performance.

The potential linkage of gender-related attributes to logistics skills and, ultimately, to logistics performance has significant implications for logisticians. For example, organisations will wish to hire logisticians with a skill set that has been attested as significant for logistics performance; so if "female" negotiation skills (Min et al. 1995) are deemed highly significant for logisticians, a lack of female logisticians may have a negative affect logistics performance and it is incumbent of organisations to consider how this situation might be overcome.

In the humanitarian context, the gender of the logistician has been linked to questions of needs assessment (in particular in relation to the issues of communication with beneficiaries as well as forecasting), but also to functional skills such as purchasing. Thus it is to be expected that gender-related attributes are deemed significant in these areas of logistics skills, and may indeed affect logistics performance.

Setting the Agenda for Further Research

Having developed the model in Figure 2, it is clear that further research is needed in order to test it, and this is planned to be the next stage of the research. As indicated earlier, a pilot study was undertaken at the LRN conference in 2008, but the aim of the next phase of the research is to seek the views of a number of communities by means of an online questionnaire.

Importantly, as has been explained earlier, there are clear differences between the aim of logistics in the for-profit and not-for-profit communities, and indeed between the former and academics (as evidenced by the differences in the perspectives of the Larson and Halldórsson, 2004, model that these communities prefer). It is reasonable to suppose, therefore, that there may equally be differences in the skills and attributes deemed to be important by each of these groups. In reality, there is a further important grouping that can usefully be considered, namely that of military logisticians who are of interest because they differ from humanitarian organisations in terms of culture etc; whilst at the same time they are often found operating in a similar environment (e.g. in peacekeeping and in the provision of support such as helicopters, medical personnel, and engineers for disaster relief).

The aim is, therefore, to use the authors' broad network of contacts within the commercial, humanitarian, military and academic logistics fields to invite a multi-national and multi-organisational group of respondents to indicate the importance that they would assign to each of the skill sets in Table 1. The questions within the research instrument will be focussed at the skill level (e.g. project management or negotiation skills) rather than at the group (e.g. problem solving skills) level. In this way, it is anticipated that the question of which group a particular skill belongs to will become of lesser importance.

Apart from the baseline information (including gender, occupation, educational qualifications, country in which working, duration of employment in a particular line of work, etc.) the questionnaire will, therefore, first seek the view of the relative importance of the skill sets to logistics performance (as indicated above) before asking a second series of questions that will invite the respondents to indicate whether they perceive males or females to possess this skill to a greater or lesser extent. Whilst it is fully appreciated that such views are entirely subjective, they will throw some light on the particular areas that may well prove to be important to probe further in the final phase of the research that will be conducted in the field.

It is also intended that the research instrument will allow respondents to comment on the skills and attributes they deem to be important for logisticians, as well as to provide examples where a logistician's gender has proved to be important. Finally, in view of the

original research question, we intend to ask our respondents why *they* believe there are so few humanitarian logisticians.

Concluding Remarks

As indicated in the introduction, this article reflects the desk-based research as the first phase of a project designed to understand the reasons behind the paucity of female humanitarian logisticians. We felt it important to understand why it might be advantageous for there any differentiation in the gender of the logistician and, as explained in the first part of this paper, there is clear evidence within the literature of logistics failings that may have been ameliorated by the presence of female logisticians.

In addition, however, we were keen to try to understand the implications of any previous research that links the skills and attributes considered to be of value to a logistician with logistics performance. In this regard, we were most surprised to discover that, as far as we could ascertain, this has not been previously studied—notwithstanding the existence of a number of papers that suggest the skill sets required of logisticians. Such research has not made the link (if any) between these skill sets and logistics performance. Finally in this phase, we sought to understand if any earlier work has revealed an association between the gender of the logistician and logistics performance. Again, we could find no evidence of such research.

As a result, we have proposed a model (Figure 2) which links all of these three issues and, in the final section of this paper, we propose a high level questionnaire-based methodology for researching these issues in greater depth. Clearly, this aspect of the research will require further consideration and validation before the actual survey is undertaken. Nevertheless, even in its early stages it is believed that the results will be of assistance in designing the third phase of this project. In this, we anticipate undertaking field-based research in two settings—that in which the beneficiaries are in a camp setting and those in which they are dispersed, as it would appear that the logistician may perform a different role in each of these environments. The aim in both settings would, however, be to interview logisticians, managers of logisticians, and those affected by the impact of a disaster in order to understand their perspective on the question of the importance of the gender of the logistician.

Through the combination of the output of the three phases of this project, we hope to be able to understand more clearly the impact of the paucity of female logisticians, the causes of this situation and, hence, recommend a number of actions that those charged with recruiting and retaining staff within UN agencies and NGOs should be undertaking.

Apart from the links between gender, logistics skills, and logistics performance, some factors may even inhibit females from entering the logistics profession. Such inhibiting factors listed in literature refer to work-family conflict and the image of the profession

(CSCMP 2007; Trunick 2007). In humanitarian logistics, the latter extends beyond the question of a truck-driver image to matters of security. Work-family conflicts are also exacerbated due to long periods of time away from home. They affect the career choices of women in logistics, with a negative effect on females selecting logistics as a major during studies, to female logisticians choosing to work for a humanitarian organisation. Further research is, therefore, also needed to evaluate the factors inhibiting females from entering the logistics profession.

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