Competing Constraints: The Operational Mismatch Between Business Logistics And Humanitarian Effectiveness

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***Abstract*— Decades of research have been committed to developing effective business logistics systems. In contrast, the important design principles for effective humanitarian logistics systems remains poorly understood. Current research focuses largely on applying business models to humanitarian logistics, however, there remains a fundamental mismatch between business logistics models, and humanitarian logistics ways of operating. Specifically, business logistics systems are utility focused; designed to prioritize cost minimization and profit maximization, to sustain a long-term market demand for their service and to limit the opportunity for uncertainty within their supply chain. Alternatively, humanitarians and their logistics systems aim to prioritize a shared moral code over economic outcomes, reduce beneficiary dependence upon their service, and specifically operate in a contingent environment characterized by high uncertainty and context flux. Thus, we argue that business logistics models and tools designed for precision outcomes and control cannot merely be re-engineered for a humanitarian context that calls for approximation and parallel option flexibility. Instead of adapting economic-based logistics systems designed for maximizing business effectiveness, we believe academics could better contribute to the science of humanitarian logistics by pursuing new designs supporting the goals and constraints driven by humanitarian values.**

Keywords-humanitarian response; humanitarian systems; humanitarian logistics; humanitarian effectiveness; supply and demand; supply and need

I. INTRODUCTION

Academic interest in humanitarian logistics has been growing in the last decade, with increasing numbers of universities dedicating programs to the topic (e.g. Northwestern University, Harvard, MIT, Georgia Tech), and even the development of a stand-alone journal (Journal of Humanitarian Logistics and Supply Chain, 2010 [1]). One factor contributing to this increased academic interest is the heightened interest from corporate logistics agencies due to the economic growth of disaster response [2,3,4]. Yet, while many organizations have sought to apply business logistics models to humanitarian work, these models have had little impact in increasing the effectiveness of humanitarian logistics.

There is no standard definition for logistics. However, logisticians across multiple contexts predominantly agree on the quip that logistics is "getting the right things to the right place at the right time"[5,6]. Today's common understanding of the important principles for designing an effective logistics system emerges from the ubiquitous presence and study of business-centered logistics theories, where effective logistics is centered in achieving cost optimization, reducing uncertainty, predicting demand, and creating long-term presence. However, while humanitarian logistics may share the same general definition for logistics—right things to the right place at the right time—and share similar tools—trains, planes and automobiles; they do not have the same central aims and values, and hence, constraints. Humanitarian organizations operate within a highly unpredictable and rapidly changing environment (versus highly controlled networks and predictable demand); [7]; value the means of the work as much or more than the ends; and seek to save lives rather than maximize revenue or profits. These goals and constraints drive a need for an altogether different kind of design. Hence, the design of business logistics systems, while quite advanced and impressive, are not built to support the operational construct of humanitarian work, and, in fact, hold unnecessary constraints that may lead to ineffective and even destructive decisions for humanitarian objectives.

Research that continues to promote adapting existing business logistics theories for application in humanitarian work misses the mark by trapping us into accepting *general* assumptions (i.e. constraints) about logistics designed for a *specific* purpose. Bruno Latour, in his book, Science in Action, describes how our understanding of much of what we accept as

established truths within science, actually started as discoveries that had to be socially negotiated [8]. He calls the beginning state 'science-in-the-making' and the resulting state 'ready-made-science.' Discoveries that have become "ready-made" are no longer revisited as to how they came be, and are accepted for building upon for all future discoveries—e.g. the DNA helix structure, the computer chip.[1] Another example exists within the ready-made science of logistics, where decades of academic work fueled by economic success has established a highly developed and advanced science for moving goods and measuring their "effectiveness." However, in this case, systems designed to support commerce have unknowingly evolved to a socially and academically accepted model upon which to build all other logistics systems. This has created a 'ready-science' myth of what makes good logistics overall. Encoded inside this science are business *specific* meanings for terms such as 'effective,' 'demand,' and 'sustainable,' which are incompatible for wider contexts. This paper endeavors to reveal underlying constraints embedded into the foundation of business logistics system designs that are incompatible for humanitarian logistics systems.

II. MISMATCH #1: EFFECTIVENESS

"Effectiveness" has been studied extensively in the business context, resulting in a sophisticated collection of theories, assessments, and performance measures. Conversely, while research related to effective humanitarian operations is a growing body of work, overall, it is minimally accessed and understood [7, 9].

A. Utility-Centered System Designs

Effectiveness in business is ultimately centered around the primary constraint of maximizing profit and minimizing costs. Leading philosopher Alasdair MacIntyre observes that 'effectiveness' within the culture of economics, where it is measured by quantitative standards, is based in utilitarianism – achieving the ends without a measure for the means [10]. These systems are task-based and necessarily constrained to a specific outcome-- for "getting the job done" and "the bottom-line" (ends)-- or else their effort would not have "utility" [11]. Economists would agree that in economic terms, success is primarily measured according to the bottom-line. [12].

Effectiveness within a quantitative, utility-centered construct, is specifically absent of intrinsic measures for assessing a system as a *morally* 'good' or 'bad' system. MacIntyre argues that a utility-centered system creates a "culture of effectiveness [that] situates society as a collection of self-interested individuals who bargain for mutual benefit."[11]. Because moral or immoral conviction cannot be quantified, these systems are distinctly neutral from *normative* claims of society; leaving the good or bad of the system as "personal preferences subject to a bargaining process between *individuals*'" [11]. In other words, if I can persuade you to my view and you agree, then we have determined the common 'good' (regardless of what others may think about our arrangement.) This framework of effectiveness, devoid of the ability to gage a system against social norms, is also not easily constrained by them. While this may be possible for economic systems, it is not the case for humanitarian systems.

B. Means-Centered System Designs

Means-centered systems, unlike utility-centered systems, value the "how" of work is conducted over the ends. The international humanitarian context maintains this and other critical differences from these market-oriented ways of operating. [13, 14]

Humanitarian operations *are* grounded in, morally accommodating means-centered views of success and rooted in a code that values lowest level empowerment vs. top-down control [15]. The more challenging part of humanitarian work is not the lack of resources as is often assumed, but rather in specifically applying available resources in a highly dynamic, unstructured and unpredictable environments, while maintaining respect for the rights of beneficiaries. In this context, "effectiveness" has very different qualities than seen under traditional business models. It is intertwined with practical implications around organizational structures, operational processes, motivations, communications and decision-making.

A starting point for understanding "effectiveness" within the humanitarian context is the code of conduct developed by

Principles of Conduct for the International Red Cross and Red Crescent Movement and NGOs in Disaster Response Programmes

1. The humanitarian imperative comes first.
2. Aid is given regardless of the race, creed or nationality of the recipients and without adverse distinction of any kind. Aid priorities are calculated on the basis of need alone.
3. Aid will not be used to further a particular political or religious standpoint.
4. We shall endeavour not to act as instruments of government foreign policy.
5. We shall respect culture and custom.
6. We shall attempt to build disaster response on local capacities.
7. Ways shall be found to involve programme beneficiaries in the management of relief aid.
8. Relief aid must strive to reduce future vulnerabilities to disaster as well as meeting basic needs.
9. We hold ourselves accountable to both those we seek to assist and those from whom we accept resources.
10. In our information, publicity and advertizing activities, we shall recognize disaster victims as dignified human beings, not hopeless objects.

Figure 1. The Code of Conduct for The International Red Cross and Red Crescent Movement and NGOs in Disaster Relief [16]

[1]Latour describes the resulting blind and concretizing of assumptions into continuing science a black-box. A term he borrows from Cyberneticians who, whenever a piece of machinery or set of commands is too complex, and only needed to the input and output, they would instead draw a box. [8]

the non-governmental organizations (NGOs), international organizations (IOs) and agencies that have defined, molded and led humanitarian work. This self-policed community (Figure 1) first put in writing their code of values, the Code of Conduct for The International Red Cross and Red Crescent Movement (ICRC) and NGOs in Disaster Relief in 1992 [16]. This code lists the agreed upon, stated values of their work. Although signing the ICRC code of conduct is voluntary, non-signatories struggle to attain legitimacy within the humanitarian community [17]. The code defines expected accountability for the motivations and ways in which aid is offered. Tomasini and Van Wassenhove put it this way "Unlike commercial supply chains, humanitarian operations are not judged by their speed or costs, but rather by their impact. This means adhering to the humanitarian principles at all cost, which at times can prove to be very expensive, or controversial" [18]. Hence, we see business models are designed around very different constraints than by those humanitarians are subject to. Humanitarian systems are constrained by the imperative[2] to meet needs (humanitarian constraint) regardless of what it may mean in monetary cost or loss to the bottom-line (business constraint). How an agency does something (means) has impacts on the quality of life that cannot be easily measured. As such, there are principles that need to be met regardless of quantifiable or bottom-line impact.

III. Mismatch #2: Market Demand vs Need

Business logistics models are designed around the market concepts of supply and demand (Fig. 2). This principle, for example, explains that the quantity of a good supplied together with the level of market demand will determine an equilibrium price and quantity at which the market will clear. However, the two key assumptions underlying this model are perfect information and perfect competition.

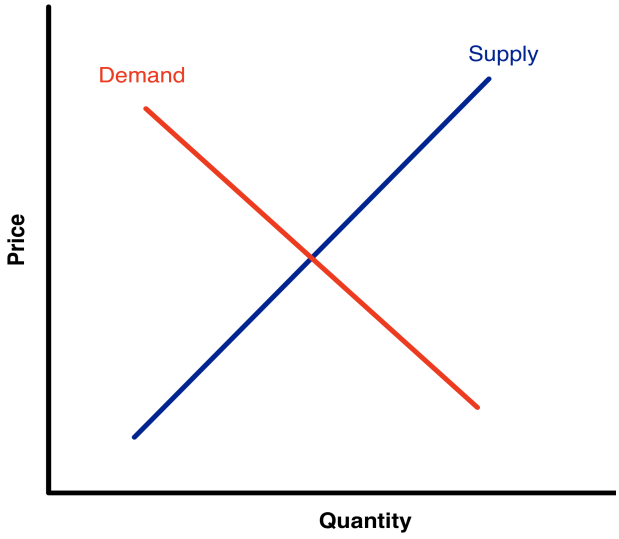

Figure 2. Supply and Demand

Perfect information refers to the idea that decision-makers (producers and consumers) have full information on product prince, characteristics and substitutes. While no market fully lives up to these expectations, disaster situations by nature are much worse, plagued with incomplete, rapidly changing, conflicting and missing information. [19, 20]

Perfect competition implies that markets consist of large numbers of buyers and sellers such that no player can affect the price of a product. In disaster situations, suppliers may be very few in number, and 'consumers' may have few choices in terms of providers since substitutes are few.

Moreover, the beneficiaries of disaster assistance are not analogous to consumers, who (in theory) can exercise choice and choose an alternative supplier if the price and quality of a particular product are not appealing. Many goods provided by humanitarian relief agencies are not discretionary. Where necessity removes choice from the supply and demand equation, people must pay whatever is asked.

An extreme example of this occurred during the 2004 crisis in Darfur Sudan villagers were being driven by force from their homes by rebel forces and gathering in large camps near urban areas. While humanitarian agencies were doing the best they could to deliver provisions of food aid, families collected firewood wherever it could be found to prepare the rations for eating. Jingaweed soldiers who roamed the area would shoot and kill any men and rape any women they encountered. Because men were killed, women were forced to take the risk of rape in order to feed their families. [21,22] In such situations of life threatening need, even when the cost was as unappealing and incomprehensible as rape, it had to be paid in order to survive.

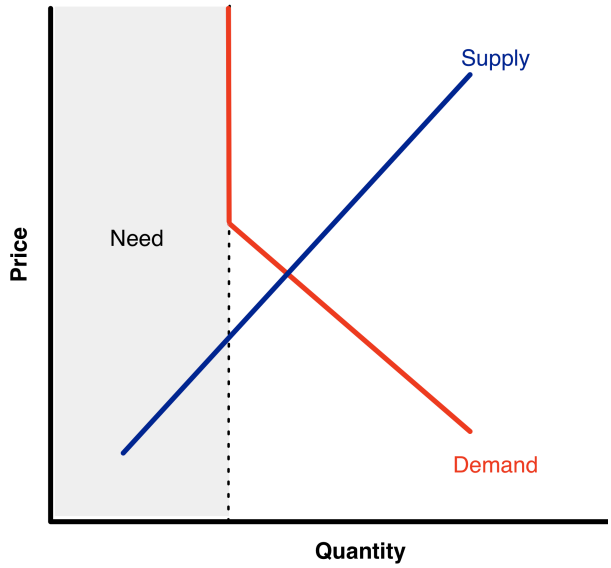

Figure 3. There is a minimum threshhold (or "need") that humanitarian agencies are constrained to meet.

Goods required to live beyond destitution, such as food, water, and shelter have a minimum requirement that is greater

[1] [2] Specifically, the first principle in the ICRC code of conduct (Fig 1) is that the humanitarian imperative comes first, which is to provide humanitarian relief wherever it is needed.

than zero (Fig. 3). Any amount below this minimum requirement threatens people's ability to sustain life.. Thus, in humanitarian logistics work there is no true market and no real discretionary demand--instead, there is unequivocal necessity (need).

In a competitive market, price is determined by available supply and demand and the market clearing price maximizes consumer and producer utility. (Market equilibrium price is the point where the supply and demand curves cross – Fig. 2). But where supply is limited and consumers have no ability to pay, market clearance is unlikely to take place in a way that honors social welfare. Competition to drive down prices is unavailable, making it unlikely that need (or "demand") could be justly accommodated through a market mechanism.. Humanitarians aim to deliver goods and services to those in need in the most appropriate way and as quickly as possible—cost is not the primary driver. The market cannot function in the constraints of this environment, where supply is almost always limited. Goods need to meet standards agreed to by the agencies, and for some of these goods the number of producers is very limited, with limited capacity." [18] Here, the cost-minimizing motivation behind supply-and-demand models doesn't stand.

Consequently, humanitarian agencies are constrained to meet a minimum threshold, and hence forced to pay whatever the cost is in order to meet the need. The perspective of humanitarian logistics that puts the humanitarian imperative first, requires a morally conscience means-centered model of supply-and-*need* to be considered for humanitarian disaster relief.

IV. Mismatch #3: Sustainability

The long-standing goal of a business, and a key metric of its success, is its ability to sustain its operations and serve a market in the long run. This can be accomplished by beating out competitors, adapting and keeping pace with the changing demand of the market, or by generating new demand and creating markets which had not previously existed. Thus, business aims to create and maintain a market for their product or service. In this way, business success is defined in terms of business survival. [23,24].

Alternatively, humanitarian success is not to sustain their own service or existence, but for their beneficiaries to become able to sustain themselves again. The success of humanitarian operations is weighed in their ability to help move a community out of crisis mode and back to normalcy as quickly as possible [14]. Thus, unlike economic systems, humanitarians seek to create and maintain independence separate from their product or service [15].

Humanitarian logisticians operate with a strategic obsolescence to their service—building on local capacity to aid in long-term sustainability for the community, but otherwise constantly appearing and disappearing wherever most helpful for meeting the constantly changing needs and operational context.. While focused on long–term impacts, services are relatively short-term. Hence, humanitarian supply chains are intended to be temporal.

These differing views translate to vastly different supply chain models. In the business case, where we desire a long-standing, reliable supply chain focused on outcomes, sustainable logistics are centered on cost minimization and predictability of outcome where *"resource productivity reduces costs through process efficiency, including supply chain optimization."* [25] These models include overarching control of the supply chain as an essential and basic element of their design. [26] However, owning and controlling the supply chain is contrary to the humanitarian goals of returning communities to self-sustainment and brings additional limits and constraints not optimal for humanitarian effectiveness

A good example of the fleeting value of controlling the supply chain for humanitarian work is the 2002 humanitarian food aid deliveries made to famine areas in Zambia:

> *"Logistically, everything seemed to be in place. The ports, trains, and roads were assessed and reinforced; agreements with suppliers were negotiated and signed; transportation and warehousing were all coordinated, and the amounts of aid per region were allocated. However, the crisis took a significant turn as the aid began to arrive. The maize was found to be genetically modified, and in the eyes of Zambian authorities this was unacceptable. Zambian President Levy Mwanawasa voiced his opinion to the international community saying, "Just because our people are hungry it doesn't mean we will feed them poison." All distribution of maize was temporarily suspended and WFP had to find an alternative solution to conduct their lifesaving mandate. The rejected maize had to be collected, and in some cases milled for redistribution. New sources of maize had to be identified and coordinated, sometimes at a premium price. "[18]*

In this example, where there was complete control of the supply chain, it did not offer a greater guarantee of efficiency. Hence, controlling the supply chain is not only incredibly expensive for humanitarians – but to do so does not provide the security of meeting an end goal that it gives to the utility-centered systems. In short, the underlying drivers and constraints of business sustainability create a supply chain that is not sustainable for humanitarian operations.

V. Mismatch #4: Optimization

Optimization occurs under a business model that includes the above assumption of long-term control as part of sustainability. Specifically, business logistics optimize around costs. The goal of a commercial organization is: "Make money now and in the future." Those measurements are given by throughput accounting as: throughput, investment, and operating expenses [25]. This does not mean that business models do not value wider elements such as speed, meeting the customers need, or flexibility; however, it does mean business models optimize around those factors to the extent that they better serve their bottomline. For example, time or distance may be a key measure because the longer it takes something to get from manufacturing to delivery equates to increased costs in transportation, inventory or a customer's willingness to pay more or less. [24] In this case, multiple ways of moving the goods is more costly and least optimal. The system aims to

narrow all options to find the most efficient—or the one that meets the demand at the least cost possible.

While companies do not have direct control of demand, they put a great deal of time and effort into assessing and predicting demand of their product. This is true, because uncertainty is expensive. For businesses uncertainty can be avoided, and must do so to meet utility-centered constraints of the bottom-line. A highly controlled supply chain in a long-term, top-down, organization yields greater flexibility at the lowest cost by reducing the company's operational dependencies. [24] Therefore, when designing supply chains in the business context (whether by vertical integration or by contract) optimization favors highly controlled supply chain models. In other words, controlling the supply chain = controlling uncertainty = controlling costs.

Where business models seek to eliminate uncertainty, humanitarians seek to master operating within it. A single controlled solution is not optimal in unpredictable environments. For humanitarians, where uncertainty cannot be avoided, logisticians require a greater range of flexibility for *how* they achieve delivery. In order to meet and respond to unpredictable changes, the system must be built to accommodate maximum ranges of uncertainty.. Humanitarians are more effective to meet the ever-changing situations of their environments when they have more options versus a single solution. Walton, et al observe that neither cost nor speed alone is central to decision making in disasters insomuch as they allow the logistician to meet needs "as fast as possible" and as appropriate as possible [7]. Walton's research observes that options are a key tool used by humanitarian logisticians to meet needs most efficiently. Further, Smith and Dowell in their disaster response case study observed teams actively pursue a number of options in parallel. They call this approach the "progression of multiple options" and identified it as the team's optimized way of operating. [27]. Rather than be limited to a single cost-optimized route, humanitarian logisticians simultaneously pursue multiple options to meet as yet unknown needs, not foreclosing on any option unless absolutely necessary. .In stark contrast to business models, what makes for an effective humanitarian logistics system is the ability to manage uncertainty, optimizing for options and flexibility in the way items are delivered.

VI. Conclusion

In this paper, we have explored several underlying differences between business logistics and humanitarian logistics. What makes for an effective utility-centered system is largely dissimilar and, at times, contrary to what makes for an effective means-centered system. Where effective business logistics are utility-centered, constrained by cost minimization and profit maximization outcomes, the pursuit of market creation under conditions of consumer choice, and reducing uncertainty, effective humanitarian logistics are means-centered; operating according to a shared moral code, in pursuit of strategic obsolescence, and within maximum uncertainty. Further, where business logistics operations models are driven to a single, controlled supply chain, specific outcomes, and long-term presence, humanitarian models are driven to operate temporally and optimize flexibility and options in order to meet needs approximately and appropriately.

The current research that suggests business systems can merely be adjusted to solve the humanitarian dilemma misses the mark and runs a risk of locking in constraints around cost and risk that would make humanitarian work less effective or worse, take it off course from their stated mission and values. Millions of humanitarian dollars have been spent to try to adapt business logistics systems to humanitarian work, and to date there is little evidence of any successful impact. This may be because business model adaptations are constrained in ways that prevent it from successfully accommodating humanitarian work.

As yet, there is an overall lack of study and understanding of the differing underlying assumptions and constraints that these opposing systems require. Our research suggests that applying business logistics systems designs wholesale to humanitarian work is centrally misaligned and researchers must return to "logistics in the making" to develop truly 'effective' solutions and improvements for humanitarian logistics systems. Instead of starting with logistics systems designed for maximizing business effectiveness we believe academics could better contribute to the science of humanitarian logistics by starting with deeper understanding humanitarian work and pursuing new designs from the 'ground up' that can support goals and constraints driven by humanitarian values.

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References

[1] Emerald. *Journal of Humanitarian Logistics and Supply Chain Management.*2010. http://www.emeraldinsight.com/products/journals/journals.htm?id=jhlscm (accessed Jun 5, 2012).

[2] Russell, Tim. "The humanitarian relief supply chain, analysis of the 2004 south east Asia earthquake and tsunami, unpublished master's thesis, , Cambridge, MA. Retrieved from." *unpublished Master's Thesis.* Cambridge, MA: Massachusetts Institute of Technology, 2005.

[3] Whiting, M, and B Ayala-Ostrom. "Advocacy to promote logistics in humanitarian aid." *Management Research News* 31, no. 11 (2009): 1081-1089.

[4] Carroll, Alan, and Jens Neu. "Volatility, unpredictability, and asymmetry: An organising framework for humanitarian logistics operations?" *Management Research News* 32, no. 11 (2009): 1024-1037.

[5] World Logistics. *What is Logistics?* http://www.logisticsworld.com/logistics.htm (accessed Jun 5, 2012).

[6] Defense Logistics Agency. *The Defense Logistics Agency—Who We Are and What We Do.* http://www.dtc.dla.mil/dsbusiness/Course.htm (accessed Jun 5 2012).

[7] Walton, Rebecca, Robin Mays, and Mark Haselkorn. "Defining fast: factors affecting the experience of speed in humanitarian logistics." *Proceedings of the 2011 international conference on international systems in crisis response and management (ISCRAM)*, May 2011.

[8] Latour, Bruno. *Science in Aciton.* Cambridge, MA: Harvard University Press, 1987.

[9] Oloruntoba, Richard, and Richard Gray. "Humanitarian aid, an agile supply chain?" *Supply Chain Management, An International Journal,* 11, no. 2 (2006): 115-120.

[10] MacIntyre, Alasdair. *After Virtue.* Notre Dame: Notre Dame Press, 1984.

[11] Horvath, Charles. "Excellence vs Effectiveness: MacIntyre's critique of business." *Business Ethics Quarterly* 5, no. 3 (1995): 500-525.

[12] Wikipedia. *Profit_motive.* http://en.wikipedia.org/wiki/Profit_motive (accessed Jun 5, 2012).

[13] Long, D, and D Wood. "The logistics of famine relief." *The Journal of Business Logistics* 16, no. 1 (1995): 213-229.

[14] Lindenberg, Mark, and Coralie Bryant. *Going global: transforming relief and development NGOs.* bloomfield, CT: Kumarian Press, 2001.

[15] Chambers, Robert. *Who's Reality Counts? Putting the First Last.* London: Intermediate Technology Publications, 1997.

[16] ICRC. *The ICRC code of conduct; humantiarian principles in practice.* Sep 20, 2004. http://www.icrc.org/eng/resources/documents/misc/64zahh.htm (accessed June 20, 2011).

[17] Walker, Peter. "Cracking the dode: the genesis, use, and future of the code of conduct." *Disasters* 29, no. 4 (Dec 2005): 323-336.

[18] Tomasini, R., & Wassenhove, L. van. *Humanitarian Logistics* . Edited by INSEAD Business Press. Palgrave Macmillan, 2009.

[19] Maiers, C, M. Reynolds, and M. Haselkorn. "Challenges to effective information and communication systems in humanitarian relief organizations." *Conference proceedings of the 2005 IEEE Professional Communication Society.* Limerick, Ireland, 2005.

[20] Walle, Bartel, and Murray Turoff. "Decision Support for Emergency Situations." In *Handbook and Decision Support Systems 2*, by Frada Burstein and Clyde W. (Eds.) Holsapple, 39-63. Berlin Heidelberg: Springer , 2008.

[21] Fritz, Mark. *In Darfur wood-gathering women walk through a minefield of rape.* Aug 19, 2004. http://www.rescue.org/news/darfur-wood-gathering-women-walk-through-minefield-rape-3986 (accessed Jun 1, 2012).

[22] Mercy Corps (Cassandra Nelson). *Sudan: Five women from Godaba village tell their tragic story.* Nov 4, 2004. http://reliefweb.int/report/sudan/sudan-five-women-godaba-village-tell-their-tragic-story (accessed Jun 1, 2012).

[23] Praag, C.V. "Business survival and success of young small business owners." *Small Business Economics* 21, no. 1 (aug 2003): 1-17.

[24] Heikkilä, Jussi. "From supply to demand chain management: efficiency and customer satisfaction." *Journal of Operations Management*, no. 20 (2002): 747-767.

[25] Frechette, Henry. "Defining Sustainability ." *Citizen Polity*, July 2010: retreived from URL: http://citizenpolity.com/2010/07/26/defining-sustainability/.

[26] Gunasekarana, A., C. Patelb, and Ronald E. McGaughey. "A framework for supply chain performance measurement." *International Journal of Production Economics*, no. 87 (2004): 333-347.

[27] Wally Smith & John Dowell (2000): A case study of co- ordinative decision-making in disaster management, Ergonomics, 43:8, 1153-1166