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Donor Country versus Recipient Country Approaches

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ABSTRACT

This paper conceptually and empirically examines sourcing emergency food aid, comparing the approaches promoted by the U.S. with those of the United Nations and the European Union. In the recipient country (RC) approach promoted by the United Nations and the European Union, Transaction Cost Economics (TCE) suggests that RC provides faster aid at less cost. In the donor country (DC) approach practiced by the U.S., the Resource-Based View (RBV) suggests that the superior resources of a donor country assure higher quality, safer, and a plentiful food supply. Using actual data provided by the United States Agency for International Development (USAID) we provide evidence that improved sourcing and transportation options provided through operations research methods can offer significant benefits over existing practice. However, contrary to the United Nation’s and European Union’s recommendation to source close to the disaster zone (RC approach), we find that RC and DC as practiced in reality are both sub-optimal. We propose an approach that reduces landed costs of food aid that can be justified by Resource Dependency Theory (RDT). Our findings contribute to the decision-making and policy discussion about the efficiency of governmental food aid programs.

Keywords: Humanitarian Logistics; Supply Chain Management; Resource-Based View; Resource-Dependency Theory; Transaction Cost Economics

1.0 INTRODUCTION

In 2011, hunger affected roughly one in seven people (WFP, 2012), or close to a billion worldwide. This trend has been increasing over the past three decades where about
15 food emergencies were reported in the 1980’s with the number doubling by the early 2000s (WFP, 2006). When a disaster strikes, relief organizations are expected to immediately provide resources such as food, water, shelter and medicine to the affected communities (Day, Melnyk, Larson, Davis, & Whybark, 2012). The United States Agency for International Development (USAID) program, through its Food-For-Peace initiative (FFP) provides immediate emergency relief in situations such as famines, earthquakes or hurricanes. In cooperation with its partners (Long et al., 1995), FFP’s emergency support program aims to provide short term relief after catastrophes. The partner organizations are responsible for the physical distribution of the goods, while USAID sources food traditionally from the US agricultural markets only (USAID, 2012). An increase in disasters strains governmental resources that attempt to provide relief, especially in the European Union (EU) and the United States (US), the world’s two largest food aid providers. The problem is that the direct aid approach used by USAID and the indirect aid approach promoted by the EU and United Nations (UN) are both suboptimal from an operations research perspective. This creates inefficiencies in delivery time and cost that harms relief efforts. The purpose of this study is to apply decision-making tools used in the Operations literature to suggest an improved approach to food aid deployment that improves governmental response. We compare the procurement and logistics costs of the USAID approach, where food is procured in the donor country (DC) and shipped to the recipient country (RC); with that recommended by the EU where food is mostly purchased in the RC and shipped within the RC. Then, we compare the results to an approach to see where efficiencies can be gained. We refer
to the USAID approach as the “DC approach” and the EU recommended approach as the “RC approach”.

The DC can be partially explained by the Resource-Based View (RBV) of the organization (Conner and Prahalad, 1996) where the DC organization, in this case a government, views itself as having a resource advantage over other countries that is not easily duplicated. In the context of government, Wemerfelt (1984) argues that firms should consider government contacts as resources, and says that first-movers in this area can create competitive advantage for their businesses. In the case of food relief it is not a direct competitive environment; however a purely competitive reason given by DCs for providing food aid is to create a future market for their home-grown resources in agricultural goods (Long et al., 1995). The RBV is a revenue-focused theory whereby higher rents can be earned on a premium resource, i.e. the availability and quality of DC food. The proposition that RBV explains the actions of USAID (the DC) is further supported by the fact that, while having only 4% of the world’s population, the US supplies over US$ 2 Billion annually - half of the global food relief during emergencies (USAID/USDA, 2010).

On the other hand, the actions by governments that promote the RC (EU and UN) can be explained by Transaction Cost Economics (TCE) (Coase, 1988), where organizational behavior is driven by a desire to minimize costs; in this case the cost of providing food relief and the cost of disaster recovery for the RC. The application of TCE to explain the behavior of governmental organizations is in the extant literature (Williamson, O.E., 1998; Shelenski and Klein, 1995; Crocker and Matsen, 1996), although empirical examinations have been limited. This proposition is supported
because the UN proposes that the total cost of food aid is minimized by sourcing in the RC because, despite possibly higher food prices, transportation and procurement costs should be much cheaper because of on-site or near-site sourcing, thus preventing the costs of long overseas, long overland trucking or rail, or air transportation. Sourcing and transporting solely in a RC country can be related to a vertical-integration approach for businesses where all activity is controlled by the RC country. Unlike RBV, TCE is a cost-based approach that does not expressly consider behavior driven by future revenue from resources.

The research questions are:

RQ1: Is there a theory that explains the behavior of the EU/UN and USAID in promoting the RC or DC approaches?
RQ 2: Is the DC or the RC the better relief response option?
RQ3: Is there an improved solution available that is more cost-efficient than the DC or RC?
RQ4: Is there a theory that explains why governmental relief organizations should use a more efficient approach?

This study contributes to the literature by using Operations Research techniques and theories to explain and demonstrate that neither the pure DC nor the pure RC approaches universally provide the best available solution to food relief aid. Instead we show that they are efficient only contextually and that a case-by-case analysis is needed to estimate which is more applicable given a specific relief scenario. This study contributes to governmental decision-making by providing a model where the USAID approach and the EU/UN approach can be evaluated in any emergency aid situation.
The paper is organized as follows: first we summarize the relevant arguments of both academics and practitioners in the disaster response field. Next we model and compare the costs of the DC to the RC approach to estimate their relative efficacy on food delivery. Then, we empirically test which sourcing option is more cost efficient considering multiple transportation cost scenarios using actual data provided by USAID, US Bureau of Transportation Statistics (International Trade Report), and the Food and Agriculture Organization (FAO).

2.0 LITERATURE REVIEW

USAID is a US governmental organization tasked with providing, food relief to areas affected by disasters. This aid can take the form of fast, emergency food relief meant to prevent immediate loss of life or health, and longer-term food relief over a number of years to aid developing countries. USAID’s motivation for providing food aid is twofold: a) for altruistic reasons to areas in need, and b) to generate demand for U.S. agricultural product (USAID, 2011). As a prominent member of the food relief supply chain (see Figure 1), USAID is the single largest food donor, providing over half of global food aid, (Atwood, McPherson, & Natsios, 2008; Shapouri & Rosen, 2004) and delivers the aid shipments through the United Nations World Food Program (WFP). The two major direct costs involved in providing food relief are procurement costs and transportation costs. According to Falasca and Zobel (2011, p 152), “procurement activities account for 65% of the expenditures”. According to the U.S. Bureau of Transportation Statistics (International Trade Report), international transportation costs
can range from 9% to over 20% of landed costs. Seeking the optimal balance of these costs will result in more food being made available to deal with the ever-increasing number of catastrophes.

Although a number of studies have addressed the issue of goods and personnel allocation, and inventory management in the context of relief aid, there is a paucity of research that considers the procurement decision (Falasca & Zobel, 2011) in conjunction with transportation. As highlighted in Figure 1, our study focuses on the upstream aspects of the relief effort, specifically sourcing food aid commodities during the steady state of an emergency disaster lifecycle, because agencies in this stage of relief can focus on cost efficiencies (Day et al., 2012). However, because the costs of emergency food aid can involve both immediate/fast response versus long-term (Day et al., 2012), transportation rates for faster response can be much higher relative to the variance in procurement costs. This fast-response scenario is considered in our model as a higher transportation rate. Because this study focuses on the governmental decision-making process it examines the procurement, and transportation cost decisions from the food source to the first Non-Governmental Organization (NGO) which is typically responsible for final distribution to the affected regions.

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Insert Figure 1 Here
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2.1 Relief Efforts

A growing amount of scientific research in the field of organizations that specialize in disaster relief has emerged in the past two decades (Kunz & Reiner, 2012).
Long and Wood (1995) provide a summary of the logistics issues in disaster relief and find a paucity of research. In describing the complexity of a relief supply network, Kovács and Spens (2007) provide a graphic depiction of how a real network might look, emphasizing the interaction among its members driven by multiple transactions. Oloruntoba and Gray (2006) use a more sequential model as depicted in Figure 1. Some studies that focus only on the final leg in the distribution of aid to recipients (Balcik, Beamon, Krejci, Muramatsu, & Raminez, 2010), while others emphasize the big picture and focus on the supply chain network as a whole (Balcik et al., 2010; Beamon & Balcik, 2008). While there are several models and conceptual discussions on the topic, empirical research on quantitatively evaluating the DC and RC approaches is lacking.

2.2 Donor (DC) versus Recipient Country (RC) Approaches

In the field of relief aid, a controversial debate has sprung up discussing the advantages and disadvantages of DC versus RC approaches. For example, the RC increases transportation cost efficiency (Brause, 2009: Rienstra, 2004). The EU and UN have historically promoted the RC; however, their representative governments often do not follow this approach. For example, in a 2003 60% of all UN relief aid went to Africa, but only 10% was sourced from there (Rienstra, 2004). This creates an imbalance that slows economic recovery for the RC that some studies suggest inhibits independence from relief aid (WFP, 2006; Hoffman, Gardner, Just, & Hueth, 1994). Responding to this imbalance, the UN General Assembly passed a resolution that encourages RC, including sourcing from developing countries and countries with economies in transition (United
Nations, 2009). The resolution has had marginal success, improving RC sourcing from about 45% in 2004 to 54% in 2008 (United Nations, 2009). In describing food aid, Trent & Monczka (2003) argues that all food relief procurement is generic and therefore requires limited product expertise in the purchasing process, thus enabling RC in foreign markets with minimal supply chain expertise. Theoretically, the RC approach can be partially explained by Transaction Cost Economics (TCE) (Coase, 1988) where the transaction costs of food aid are minimized when a single government agency in the RC controls, sources, and transports aid to affected areas. The RC approach is related to the TCE’s promotion of the vertical integration of an organization where one entity controls the supply of goods to market. One study shows how transportation and logistics costs are minimized in an RC approach (WFP, 2006). TCE has been applied to explain several governmental activities and policies (i.e. Williamson, O.E., 1998; Shelenski and Klein, 1995; Crocker and Matsen, 1996), but suffers from a lack of empirical examination in a governmental aid context. This evidence supports the examination of RQ:1 and RQ:2. Practically, RC approach considers important cultural sensitivities such as tastes and preferences that may differ from the DC (GAO, 2009). For example, during the Bosnian war in the 90s, Muslims did not eat the airdropped food aid because it contained pork. During the Afghan war food relief packets containing peanut butter and jelly were sold in the black market because recipients in the RC were not familiar with their use (Filipov & Neuffer, 2001). This literature supports the proposition that RC may be a more efficient food relief approach.

There are also a number of resource issues with RC, thus making DC more practical. RC sourcing close to the site of a disaster already requiring external support can
be difficult. First, the local market might not have the resources to fill the large demand for food (Beresford & Pettit, 2012; Care, 2006). Second, the physical resources, such as transportation infrastructure, in the RC might be damaged (Beresford & Pettit, 2012), and large bulk purchases by relief agencies and food shortages can drive local prices higher than those at the DC, thus harming local purchasing power (Carney, 2012). Third, relief organizations face the obstacle of developing the resources to supply a network on the fly in the wake of a catastrophe as the geographic location of the next disaster is difficult to predict (Van Wassenhove, 2006). Fourth, RC sourcing from an unknown market and unreliable sources may create opportunistic behaviour through exorbitant prices or poor quality. Unlike a business that can use historical data to judge and qualify a supplier, RC requires trust in the relationship (Kotabe, Martin, & Domoto, 2003) because procurements in food relief are one-time, or short-term purchases. They provide little incentive for the supplier to build a long-term relationship. Finally, to procure large quantities in RC, key personnel are needed on-site. These factors may sometimes make sourcing in the RC a challenging strategy.

The DC has a number of advantages because DC governments have intimate knowledge of its market, suppliers, and transportation capabilities as well as the quality and prices of the commodities (Rienstra, 2004). Since DCs are mostly located in the industrialized world the resources they control have a higher level of predictability and stability that is not necessarily present in developing countries (Trautmann, Turkulainen, Hartmann, & Bals, 2009) – especially those affected by disasters. Using a DC like the one employed by USAID allows governments to exercise more control in the procurement process capturing economies of scale and scope thereby making the whole
process less costly (Arnold, 1999). This approach is partially explained by the Resource-Based View (RBV) of the organization (Conner and Prahalad, 1996) where USAID views food production in the US has a competitive advantage over global sources. This is supported by the fact that the US has only 4% of the world’s population, yet provides over 50% of world food aid at US $2 Billion annually (USAID/USDA, 2010; Atwood, McPherson, & Natsios, 2008; Shapouri & Rosen, 2004). While countries do not directly compete for providing emergency aid, as would be suggested in a business application of the RBV, one stated objective of USAID is to promote a market for US agricultural goods, directly competing with global suppliers. Next, government organizations like USAID are run by politicians who are sensitive to lobbying efforts from the DC. Finally, introducing additional supplies into the RC can help avoid inflation and stabilize prices (GAO, 2009). This literature supports the proposition that, in context, the DC may be a more efficient approach to food relief efforts. While Wemerfelt (1984) discusses government relations in the context of RBV, to our knowledge this is the first empirical examination of the RBV in a governmental relief aid context.

2.3 Earmarking of Funds

In addition to location related factors, the earmarking of funds may also influence the selection among DC vs. RC. Earmarking is a budgeting tool frequently used by politicians where certain money is reserved for specific projects to improve their public image or create political goodwill. Many of these funds are earmarked to promote the DC agriculture as being the “best”, thus suggesting superior resources. Because this is a
competitive maneuver that can garner increased revenue, the RBV partially explains earmarking behavior; however, in this case the RBV explains only the perceived superiority of food resources, not the reality, which may be different. However, economists have often criticized it for encouraging the misallocation of resources (McCleary, 1991; Minear & Weiss, 1992). In the context of food relief, earmarked funds have to be used for the specific activities/projects based on donors' (or taxpayers) wishes (Barman, 2008), resulting in 30% to 50% higher expenses for DC (Care, 2006). Besiou, Pedraza-Martinez and Van Wassenhove (2012) suggest that earmarking of funds has negative consequences on procurement lead times and also prevents reallocation of vehicles in response to new disasters, thus increasing DC costs. In addition, Wakolbinger and Toyasakis (2011) emphasized its effect on increased prices and wasted resources. For example, as a federal agency, USAID must purchase goods from US agricultural markets, in accordance with PL-480 (public law) (Long et al., 1995). Lead-times are long due to (1) complex bureaucratic ordering cycles and (2) the requirement to purchase products from US farmers. The food commodities and the associated transportation services are sequentially purchased from the US market through a competitive bid process (Bagchi, Paul, & Maloni, 2011; Trestrail, Paul, & Maloni, 2009). Therefore, by current law USAID can’t fully practice RC, although 20% of its 2011 food shipments were sourced outside the U.S. An overview of USAID’s procurement process for food products is depicted in Figure 2.

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Insert Figure 2 Here

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The literature conceptually supports both the RC and DC but does not provide empirical examination of a better available solution. This supports RQ: 3 where we propose that there is a better solution to minimizing the costs of food relief.

3. METHODOLOGY

3.1 The Model

To increase the relevance of our comparison of DC versus RC we use the actual procurement costs of governmental food aid shipments to various locations around the world plus transportation costs to the NGO. To estimate the cost of sourcing DC, we first aggregated data for six perishable food commodities that dominate the food aid relief effort (lentils, beans, wheat, green peas, corn, and rice) and calculated the actual purchase costs of USAID's food aid shipments to five recipient countries (Rwanda, Ethiopia, El Salvador, Nicaragua and Bosnia Herzegovina). Then, we calculated the possible purchase costs if the same type and quantities of food commodities had been procured in the RC. Finally, we compared the results aggregated at both a commodity level and country level to figure out which sourcing method is most efficient. Then we conduct a sensitivity analysis on the validity of the solution by generating three unique scenarios varying transportation costs per metric ton of shipment (MT). This was done to simulate the effect of the volatility in fuel costs worldwide. Figure 3 provides an overview of our study.
The dataset used in this study is USAID commodity shipments from its Lake Charles warehouse, listed by date of shipment (October 1993 to July 2005). Information was available for 52 different stock-keeping units (SKU) by nation (69 countries). The shipment data were measured both in weight (MT) and value (US Dollar). In order to compare different procurement locations, we supplemented the USAID data with information published by the Food and Agriculture Organization (FAO) (FAOSTAT, 2009) and the U.S. Bureau of Transportation Statistics (BTS) (International Trade Report, 2012). FAO provides average yearly information about historical crop producer prices in various countries in US Dollar/MT. We gathered the procurement prices for the period from 1995 to 2004 for the six commodities, and compared them to prices paid by USAID for a set of countries on three continents and regions: Bosnia-Herzegovina (Europe), Rwanda (Africa), Ethiopia (Africa), El Salvador (Central America) and Nicaragua (Central America). In Table 1, average USAID costs of commodities are listed next to the RCs’ prices.

In the majority of emergencies, USAID’s food aid needs to be shipped long-distance from the Lake Charles warehouse. As transportation costs constitute a significant portion of total landed costs, we also investigate the impact of different levels of
transportation charges on USAID’s cost efficiency in US versus RC sourcing. Walker (2004)’s Ocean Transportation Rates (FR) for heavy grain and the U.S. BTS provide some guidelines for long-distance transportation cost but also show that there were significant fluctuations from about $10 to $80 MT. The fluctuations in transportation rates are caused by several factors including fuel surcharges, peak versus off-peak demand periods, and speed of response. Faster response to immediate aid needs results in higher rates than longer-term aid because they garner a premium and can displace planned transportation capacity. Thus, we employ three different transportation rate scenarios (see Table 2): US$15, US$30 and US$75 MT to increase the relevance of our study. US$30 per metric ton is an approximation of the average transportation rate between 1998 and 2004 (Walker, 2004). US$15 MT is used as a low transportation cost scenario reflective of the relatively low cost at the end of 1998 and mid 2002. While rates waned during the 2008 recession, since 2010 there has been a sharp increase in global transportation costs, especially during peak demand, represented by the third scenario’s US$75 MT. Applying these transportation rates to the commodities in our dataset, we generate a total of four scenarios and compare the total costs (combination of purchase and transportation cost). Scenario 0, the base case, reflects the procurement cost in both the RC and the DC, i.e. the USA. Scenario 1 provides insights into total cost with relatively low shipping cost of US$15 per metric ton. Scenario 2 reflects average shipping costs and Scenario 3 higher transportation cost of US $75 per metric ton.

3.2 Interviews with Practitioners
After completion of analysis and development of an improved scenario, we showed the results to a panel of eleven practitioners selected from government, US farming industry, aid volunteers, and NGOs. Two were employed by USAID, one from the American Farm Bureau Federation, two Peace Corps directors, one operations manager from the American Red Cross, one former congressional candidate. Eleven academics were also selected, including five academics from Europe, one academic from South Africa, three academics from China, and two American academics. First, the eleven academics were asked to evaluate the applicability and appropriateness of RBV, TCE, and RDT theories to the DC, RC, and improved solution scenarios we modeled in this study. They were given a copy of this study and asked to rate each theory against each scenario on a scale of “1” – “7”, with “1” representing no applicability of the theory to explain the scenario, and “7” representing a full explanation of the scenario by the theory. We also welcomed open comments that we will report in section 4.5. Then, academics and practitioners were asked to evaluate the practicality of our improved scenario to real governmental food relief efforts. A score of “1” represents that the improved scenario has no practical application and would unlikely to be used by a governmental agency to provide food relief efforts. A score of “7” represents that the improved solution could be applied in virtually all governmental food relief efforts worldwide.

4. RESULTS

4.1 Overall Analysis
Results are provided in Table 2. Picking up Ethiopia as an example, USAID procured over US$24 million worth of lentils to this country between 1994 and 2004 (column B). Had the lentils been purchased in the RC (Ethiopia), these costs would have been reduced to US$16.9 million (column A). Similarly, the wheat shipped to Rwanda was purchased for about US$1.3 million, significantly less than the estimated US$4.5 million if procured in the RC (Rwandan) market. In columns C, D and E of Table 2, as per the transportation rate scenarios discussed in Section 3, the transportation charges ($15, $30 and $75 per MT respectively) are added to the USAID’s purchase costs in Column B. For example, the lentils, including low shipping cost of US $15 per MT led to total cost of US $25.4 million to Ethiopia. In Scenario 2 and 3, the costs are US $26.7 million and US $30.7 million respectively.

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Insert Table 2 Here
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Next, in the right half of Table 2, we calculate the total cost ratios of procuring in the DC versus procuring in the RC across four scenarios. Looking at Scenario 0 (column B/A), the base case, we find that based on procurement costs alone, sourcing from the DC is cheaper in the majority of country-commodity pairs, i.e. cost of beans sourced in the DC are about 44% of the cost if sourced in Bosnia-Herzegovina. Total Cost Ratios above 1.0 indicate that it is cheaper to source the product from the RC, while ratios below 1.0 show that DC is more cost efficient. For example, corn (Total Cost Ratios – El Salvador: 0.53, Nicaragua: 0.85, Rwanda: 0.56) and wheat (Bosnia: 0.87, Ethiopia: 0.99, Rwanda: 0.29)
are procured cheaper in the DC than in the RC. Beans are generally less costly in the DC (Bosnia: 0.44, El Salvador 0.71, Nicaragua: 0.63, Rwanda: 1.07). Rice (El Salvador 1.59 and Nicaragua: 1.65) and lentils (Ethiopia: 1.45) are more expensive in the DC whereas green peas (Ethiopia: 1.06) are slightly less expensive in RC.

Scenario 1, using a transportation charge of US $15 MT, gave similar results to the base scenario. The main difference is that wheat, which was slightly cheaper to buy in the DC than in Ethiopia (RC) (Scenario 0), is now 8% more expensive when procured from the DC. In Scenario 2, with an increase to US$30 per metric ton in transportation charges, we find that the total cost of wheat for Bosnia-Herzegovina and corn for Nicaragua turn to be slightly cheaper (3% and 6% respectively) when procured in the RCs. Scenario 3, shows that most commodities can be purchased cheaper in the RCs, when transportation costs are high at US$75 per metric ton. For example, cost of rice shipped from the US market to both Nicaragua and El Salvador is about twice the cost of that in the RC’s markets (Total Cost Ratios of 2.01 and 1.93 respectively). Overall, we observe across the different scenarios that both country characteristics and commodity type impact the Total Cost Ratio between US and RC procurement. Next, we investigate these effects in more details.

4.2 Country Level Analysis

In Table 3, the data is aggregated across commodities to observe country level cost (dis)advantages of sourcing in the RC’s national market over sourcing from the US agricultural market. Again, we employ different transportation cost scenarios. With Total Cost Ratios below one, we find that in the base scenario (no transportation cost), sourcing
food aid commodities from Bosnia-Herzegovina (0.66), El Salvador (0.81) and Rwanda (0.69) are more expensive than sourcing from the DC; while sourcing from Ethiopia (1.01) and Nicaragua (1.20) would result in some savings. These results are consistent in Scenario 1 (low transportation rates) and Scenario 2 (average transportation rates). Only in Scenario 3 (high transportation rates) do we observe a change in this pattern. In this setting, sourcing from El Salvador is 8% more efficient than sourcing in the DC. Contrary to expectations, the results display no clear cost advantage for the UN approach sourcing in RCs countries over the DC. Rather, the improved solution is contextual in that for certain countries, sourcing from the US is more cost efficient across the different transportation cost scenarios, while in others RC sourcing is cheaper. It is important to note that the tables are not designed for comparisons across countries, i.e. you can’t directly compare the results for Bosnia with those from Ethiopia, because the transportation rates differ for each location. The tables are designed to compare the different scenarios at the given rates of $15, $30, and $75 despite the reasons for the differences. As discussed previously, rates can differ based on a number of variables such as distance from the DC to the RC, peak demand periods, fuel surcharges, etc.

Insert Table 3 Here

4.3 Commodity Level Analysis

Next, we test for cost efficiencies at the commodity level (see Table 4). Aggregating shipments across countries, the results suggest that the US market has a
distinct cost advantage for procuring corn (Total Cost Ratios ranging from 0.57 to 0.92) and beans (0.86 to 0.98) across all transportation cost scenarios. Lentils (1.42 to 1.82), rice (1.65 to 2.00) and green peas (1.06 to 1.25), on the other hand, can be sourced more cost efficiently in the RCs. The findings are not as clear for wheat (0.97 to 1.42), which accounts for the largest volume of all food aid shipments. In the base scenario, we find that sourcing wheat in the DC is slightly cheaper (2.7%). However, in Scenarios 1 to 3, the additional transportation charges significantly increase the cost of wheat (Total Cost Ratios: 1.06, 1.15, and 1.42 respectively) resulting in relatively cheaper costs in the RC markets.

Insert Table 4 Here

4.4 Savings from Improved Sourcing Decisions

Table 5 provides an overview of potential savings relief organizations could realize when using improved sourcing rather than a pure RC or DC sourcing strategy. Column A reports USAID's total procurement costs of all six commodities to the five RCs at different transportation rate scenarios. For example, excluding transportation charges, USAID spent over $360 million between 1995 and 2004 to procure these six commodities sent as relief aid to the five recipient countries. These procurement costs increase to over $514 million at the high transportation rate of $75 per metric ton (last row of column A). Column B shows that if all commodities were procured in the RCs,
the total cost would sum up to over $374 million. Comparing columns A and B, we find that sourcing only from RCs provides some savings compared to sourcing from the US in all but the base scenario. In column C, for each shipment, we minimized procurement cost through the use of an improved procurement strategy: specifically, using DC or RC depending on which option is less costly, we derive at an improved procurement cost setting. Naturally, this alternative results in additional cost savings. For example, if all commodities were procured in the lower-cost location (RC or DC), the total procurement cost of the base scenario would be $349 million, lower than either DC ($360 million) or RC sourcing ($374 million). We find that with improved sourcing USAID could realize savings of 3.2% (column A/C). These savings increase with higher transportation rates. In the final scenario with transportation cost of US$75 per metric ton, USAID could realize cost efficiencies of 29.1%. Similarly, we find that this improved sourcing strategy still generates cost savings when compared to the strategy of sourcing only in the RCs. As reported in column B/C, in Scenario 0, the savings from improved sourcing would amount to 7.3%, while in Scenario 3 (high transportation rates), accounts for 2.6%.

Insert Table 5 Here

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4.5 Interview Results

Table 6 reports the results of the ratings given by the twenty-two-person panel. Only the eleven academics were asked to review the theoretical section of the study, while all twenty-two raters were asked to rate the practicality of the improved solution.
The theoretical evaluation from all eleven academics supports the proposition that RBV explains a substantial portion of the behavior of the DC in this study, reporting a mean of 5.28/7.00. Comments from the raters indicated that the US is arguably the most efficient food producer in the world while maintaining a high standard of quality and safe supply. This makes food a resource that gives the US agricultural industry power domestically and internationally when it comes to food aid with economic benefits. However, as the DC countries change to those of the EU nations, China, Korea, or Japan the RBV may predict less of their behavior. These nations rely on substantial food imports therefore while a major driver of food aid from these nations may be to encourage exports or political good will, their behavior may require other theoretical contributions in addition to RBV.

The academics had similar strong support for the TCE explaining RC, with their scores also averaging 5.27/7.00. The weakest support came from South Africa because she indicated that for the TCE to be considered as a strong theoretical contribution, the solution of vertical integration, where a government responsible for controlling a RC approach in their home country behaves in a similar manner as a vertically-integrated company, must also apply. While TCE has been previously applied to governmental activities, the studies were conducted only on stable governments. She argues that in the case of a country with an unstable government, where aid is likely to be needed, TCE may not apply due to insufficient control of the food supply. Under stable governments in RCs, TCE is more applicable.
5. DISCUSSION

In this study we use historical emergency food shipment data from USAID to assess cost efficiency of USAID's emergency relief supply chain in terms of DC versus RC sourcing. Hence, we contrasted the costs of procuring and transporting from the DC to a select number of RC markets and found that despite the recent trend in food aid neither are the most efficient solutions. The type of commodity, local market prices and transportation rates are all key determinants in efficient sourcing decisions. The DC has a cost advantage for some commodities such as corn and beans, while RC has an advantage in rice and lentils. Therefore, despite the USAID approach of DC and the RC as promoted by the UN-EU, the improved solution is a combination of both approaches based contextually on availability of a commodity in a potentially resource-constrained environment and country location. In cases where the DC is more efficient or where there are no significant cost differences, sourcing from a known market with known, stable prices can provide additional benefits such as reduced search cost, and higher quality of food. This is especially true for food aid over the long-term as found in Africa. However, when costs are significantly cheaper in the RCs, sourcing from markets close to the affected area may reduce response time and economic recovery for the RC.

Proximity of the RC to the DC is an important factor influencing transportation rates. Our analysis shows that transportation rate volatility could significantly change the results. With lower transportation cost, the use of RC sourcing can provide significant cost efficiencies for emergency relief organizations. RC sourcing is appropriate for certain
product-country pairs, especially those in geographically distant recipient countries, and result in reduced lead time.

The practitioners indicate that disasters in small countries can affect the whole/majority of the RC food markets and render any RC solution impractical, no matter how optimal. Even in larger countries higher prices in RC, driven by greater demand, will reflect scarcity (i.e. higher wheat prices in Rwanda), unless the DC overstocks the market and drives prices down. Thus, in situations of scarce food supplies, DCs and relief organizations need to consider the price impact of their bulk sourcing in the RC.

Finally, our findings also support arguments about inefficiencies created by earmarking of donor funds. Many DCs are funded by public resources and are subject to constraints in their procurement and logistics policies similar to USAID. Our findings show that USAID's mandate to source the majority of its food relief aid domestically can result in significant supply chain cost inefficiencies. At high transportation rates, representative of today’s rates, this earmark results in 29.1% higher costs based on relief shipments (see Table 5). Actually, a Government Accountability Office report (GAO, 2007) evaluating US food aid found that while the funding was relatively constant between 2002 and 2007, the delivered tonnage of US food aid dropped by 52% due the amount of funds spent on increased transportation costs. With rising fuel prices, the magnitude of these inefficiencies is likely to further increase.

5.1 Theoretical Support for the Improved Solution
The adoption of an improved approach by any governmental agency requires a conceptual explanation of how and why it should be used over a pure RC or DC approach. In addressing RQ:4, does it require a new theoretical lens or does an existing theory of the organization explain how a similar application to government policy may be affected?

In our review of the literature, we find that the Resource Dependency Theory (RDT) (Pfeffer and Salancik, 1978) partially explains why an organization may use the improved approach. RDT has been previously applied to governmental activities (Sparrow, 1996). The argument for RDT is that all organizations depend on resources that originate from their own environment, whether internal or external to the organization. In today’s environment, all organizations depend on external resources to a certain extent, most considerably so. These external resources are controlled by other organizations allowing them to exert some control over each other. This overlaps with the RBV in that both theories propose that resources are the basis of organizational power, including the power of government. As RDT links power and resource dependence, the more critical or rare a resource, the more power derived from it. This requires legally independent organizations to therefore depend on each other to obtain the best results. This means that resources can be used to build relationships, which may be strategic or tactical (i.e. situational) and provide mutual benefits. In the context of food relief agencies, the RDT explains that a DC government can provide food more efficiently by examining each emergency situationally and choosing the improved solution contextually, whether DC, RC or a combination. Because the affected RC government is operating in an emergency, it is heavily dependent on either financial or food resources
from the DC, giving the DC considerable power to enforce an improved decision. The RDT suggests that our improved solution is likely to require a DC to trust its partners, i.e. NGOs, RC governments to deliver the resource aid. The benefit to the DC is that it can deliver more aid (output) for the same level of resource (input) thus improving the marginal benefits derived from a DC government, which translates to greater voter/constituent satisfaction in developed countries. This creates mutual benefits and suggests that RDT partially explains how benefits are derived for both parties in our improved solution, and the motivation for government agencies to implement it.

In applying the Resource Dependency Theory (RDT) to explain the adoption of the improved solution, there is strong support (see Table 6). The South African rater gave the lowest score because of concerns over the theory being applied to explain the behavior of weaker governments, like those found in mid-Africa or rural India, since they are heavily resource dependent and have little or no resources relative to a DC country like the US. She argues that the RDT assumes that each organization has some internal resources to contribute, along with required external resources. This is necessary for our improved solution to work, sourcing both locally and internationally to achieve the lowest cost food aid. If a RC government has little or no resources, the RDT may not explain their behavior.

6.0 CONCLUSION

This study has significant implications for governmental relief agencies, in general, and for USAID, in particular. First of all, we show that for those governmental...
relief agencies sourcing only in the DCs, there could be untapped potential in their supply chains to reduce procurement and logistics costs through RC sourcing. While constraining sourcing location to the DCs results in higher costs, considering both RCs and DC markets in the sourcing strategy could significantly increase the supply chain cost efficiencies. Second, our study is one of the first to empirically assess the cost structure of a relief organization's procurement policy in place. As concluded by Kovács and Spens (2011), lack of empirical research in relief aid due to unavailability of field data is a striking shortcoming in developing improved and practical solutions. Thus, we believe that, by using actual shipment data of USAID and matching it with the archival data of WFP, this paper makes a significant contribution to the literature. Kovács and Spens (2011) furthermore stress the inter-disciplinary nature of logistics and its effect on governmental public policy, politics, culture and sociology.

Another contribution is to the ongoing governmental debate about the Food for Peace Act (PL-480), which mandates USAID to increase global food security through US-grown food. Recently, the interpretation of the Food for Peace Act of 2008 released some of the tight US-sourcing requirements and allowed USAID to provide grants to non-profit, international and private voluntary organizations for some very specific purposes, such as the preparation and distribution of the aid food. This is an express recognition that the DC model is sub-optimal in delivering food aid. The US Congress has at times appropriated funding for USAID through other acts, which then can be used to source food products globally, recognizing the potential benefits of RC. Our study empirically supports the research of Van Wassenhove (2006), that while earmarking has been instrumental in continuation of governmental support, it also results in both misallocation of resources
and inefficient aid delivery. Using a hybrid approach of sourcing both from the DCs as well as RCs provides the improved solution. In addition to being cost efficient, it allows DCs to provide timely help while balancing the interests of the RC as well. Practically, governments should allow more flexibility in its emergency food relief agency policies to obtain more efficient results. Otherwise, inefficiencies in these programs eventually translate into fewer beneficiaries fed. Sourcing only in the DCs' commodity market or buying only in the RCs are both suboptimal solutions and have huge cost implications. The type of commodity, transportation charges to the RCs, and the condition of the food market in the RCs affect costs and prices in local markets.

Lastly, this study provides theoretical support for both the DC and RC approaches using concepts derived from the RBV and TCE theories, as well as an improved approach that is partially explained by the RDT concept. While not mutually exclusive theories, they do explain unique characteristics of all food relief options we explored in our study. To our knowledge, this is the first study to apply common empirical and optimization techniques, and theories used in the Operations literature to improve governmental relief efforts based on real sourcing and transportation data from actual relief efforts.

7.0 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

While our scenario approach provides lower and upper boundaries of total costs, this study could further be enhanced by using actual transportation charges in calculating costs. Additional data could also be helpful in extending this study to other countries. Although providing a comparison for critical, perpetual-aid countries such as Iraq and
Afghanistan is desirable, these countries were war-torn and no reliable national data is available. As discussed earlier, it is also doubtful that the RC market has sufficient supply to provide the needs for the regions. Furthermore, assuming the market has sufficient supply to provide the required goods the DCs also face the additional challenge of funding (short-term) warehousing for the good before they can be shipped to the NGO. These warehousing costs (and the potential cost of securing the goods) are currently not accounted for in our model and, hence, might significantly influence the final outcome of the scenarios.

While we focus on cost efficiency in this study, effectiveness is often seen as a more important performance measure than efficiency for emergency relief supply chains. We think that both are important in the delivery of aid. Lack of effectiveness will result in sub-optimal aid for a region, while a lack of efficiency results in fewer goods send to affected areas. Looking at potential trade-offs between effectiveness and efficiency is, hence, an area of future research.

This study addresses the issue of governmental operations from a sourcing organization’s perspective. We compare RC to DC using USA as the example and provide suggestions for the redesign of sourcing policies in relief supply chains without addressing issues in the final distribution of the aid through NGOs. Given that the majority of recipient countries have limited or nonexistent infrastructure, the final leg is often challenging and expensive. Therefore, additional research is needed to address the redesign of the down-stream relief supply chain from a distributor’s perspective. Lastly, while we applied common TCE, RBV, and RDT theories to explain organizational behavior in governmental organizations, we recognize that other theories
may also apply. While TCE and RDT have been applied to government activities and policies, there is a paucity of literature applying RBV. Further theoretical work is necessary to discover how existing theories can be applied to food relief agencies to explain and predict their behavior during emergency events.

REFERENCES


USAID (2012). Fact Sheet: Emergency Food Security Program. In USAID (Ed.): USAID.


<table>
<thead>
<tr>
<th>Year</th>
<th>Rwanda RC/USAID Purchase Cost (US$/MT)</th>
<th>Ethiopia RC/USAID Purchase Cost (US$/MT)</th>
<th>El Salvador RC/USAID Purchase Cost (US$/MT)</th>
<th>Nicaragua RC/USAID Purchase Cost (US$/MT)</th>
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<td></td>
<td>Beans</td>
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<td>Wheat</td>
<td>Wheat</td>
</tr>
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<td>462/460</td>
<td>195/106</td>
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<tr>
<td>1996</td>
<td>323/600</td>
<td>147/122</td>
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<td>214/200</td>
</tr>
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<td>1997</td>
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<td>N/A</td>
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</tr>
<tr>
<td>1998</td>
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<td>347/133</td>
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<td>1999</td>
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Table 2: Comparison of RC versus DC (USAID) total costs – 3 transportation cost scenarios

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<thead>
<tr>
<th>Country</th>
<th>Commodity</th>
<th>RC Purchase Cost</th>
<th>USAID Purchase Cost</th>
<th>B + $15 FR/MT</th>
<th>B + $30 FR/MT</th>
<th>B + $75 FR/MT</th>
<th>USAID/RC Total Cost Ratio</th>
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<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
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<td>Bosnia-Herzegovina</td>
<td>Beans</td>
<td>5,598,000</td>
<td>2,448,480</td>
<td>2,520,710</td>
<td>2,592,940</td>
<td>2,809,631</td>
<td>0.44</td>
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<tr>
<td>Ethiopia</td>
<td>Wheat</td>
<td>6,158,850</td>
<td>5,353,250</td>
<td>5,843,072</td>
<td>6,332,894</td>
<td>7,802,362</td>
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<tr>
<td>El Salvador</td>
<td>Beans</td>
<td>822,920</td>
<td>584,050</td>
<td>601,279</td>
<td>618,509</td>
<td>670,197</td>
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<td></td>
<td>Corn</td>
<td>1,231,440</td>
<td>656,460</td>
<td>733,922</td>
<td>811,385</td>
<td>1,043,771</td>
<td>0.53</td>
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<tr>
<td></td>
<td>Rice</td>
<td>530,280</td>
<td>842,940</td>
<td>879,186</td>
<td>915,433</td>
<td>1,024,172</td>
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<td>India</td>
<td>Green Peas</td>
<td>1,403,820</td>
<td>1,489,220</td>
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<td>1,597,933</td>
<td>1,761,003</td>
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<td></td>
<td>Lentils</td>
<td>16,916,040</td>
<td>24,058,660</td>
<td>25,393,916</td>
<td>26,729,171</td>
<td>30,746,967</td>
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<tr>
<td></td>
<td>Wheat</td>
<td>285,438,235</td>
<td>281,690,550</td>
<td>307,465,235</td>
<td>333,239,921</td>
<td>410,563,977</td>
<td>0.99</td>
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<td>Nicaragua</td>
<td>Beans</td>
<td>2,900,950</td>
<td>1,839,320</td>
<td>1,893,580</td>
<td>1,947,840</td>
<td>2,110,620</td>
<td>0.63</td>
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<td></td>
<td>Corn</td>
<td>1,175,430</td>
<td>1,004,670</td>
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<td>1,241,772</td>
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<td></td>
<td>Rice</td>
<td>4,513,360</td>
<td>7,465,055</td>
<td>7,786,052</td>
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<td>9,070,042</td>
<td>1.65</td>
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<tr>
<td>Guatemala</td>
<td>Beans</td>
<td>14,762,740</td>
<td>15,780,800</td>
<td>16,246,334</td>
<td>16,711,867</td>
<td>18,108,468</td>
<td>1.07</td>
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<tr>
<td></td>
<td>Corn</td>
<td>28,726,010</td>
<td>16,173,720</td>
<td>18,082,219</td>
<td>19,990,718</td>
<td>25,716,215</td>
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<td></td>
<td>Wheat</td>
<td>4,536,000</td>
<td>1,328,000</td>
<td>1,449,512</td>
<td>1,571,024</td>
<td>1,935,560</td>
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### Table 3: Comparison of RC sourcing versus DC sourcing for selected countries

<table>
<thead>
<tr>
<th>Country/Sample</th>
<th>USAID/RC Cost at $15 FR/MT</th>
<th>USAID/RC Cost at $30 FR/MT</th>
<th>USAID/RC Cost at $75 FR/MT</th>
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</thead>
<tbody>
<tr>
<td><strong>Bosnia-Herzegovina</strong> (Beans &amp; Wheat)</td>
<td>0.66</td>
<td>0.71</td>
<td>0.76</td>
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<tr>
<td><strong>El Salvador</strong> (Beans, Corn &amp; Rice)</td>
<td>0.81</td>
<td>0.86</td>
<td>0.91</td>
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<td><strong>Ethiopia</strong> (Gr. Peas, Lentils &amp; Wheat)</td>
<td>1.01</td>
<td>1.10</td>
<td>1.19</td>
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<td><strong>Nicaragua</strong> (Beans, Corn &amp; Rice)</td>
<td>1.20</td>
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<td>1.32</td>
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<td><strong>Rwanda</strong> (Beans, Corn &amp; Wheat)</td>
<td>0.69</td>
<td>0.75</td>
<td>0.80</td>
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### Table 4: Comparison of RC sourcing versus DC sourcing for selected commodities

<table>
<thead>
<tr>
<th>Commodity</th>
<th>USAID/RC Cost at $15 FC/MT</th>
<th>USAID/RC Cost at $30 FC/MT</th>
<th>USAID/RC Cost at $75 FC/MT</th>
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<tr>
<td>Corn</td>
<td>0.57</td>
<td>0.64</td>
<td>0.71</td>
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<td>0.86</td>
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<td>0.91</td>
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<td>Green Peas</td>
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<td>1.14</td>
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<td>Lentils</td>
<td>1.42</td>
<td>1.50</td>
<td>1.58</td>
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<tr>
<td>Rice</td>
<td>1.65</td>
<td>1.72</td>
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Table 5: Savings from improved sourcing

<table>
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<tr>
<th>Scenario</th>
<th>US Sourcing only</th>
<th>RC Sourcing only</th>
<th>Improved Purchase Decision Min (US, RC)</th>
<th>Savings from Improved Purchase Decision over US Sourcing</th>
<th>Savings from Improved Purchase Decision over RC Sourcing</th>
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<tr>
<td>0: No FC</td>
<td>360,715,175</td>
<td>374,714,075</td>
<td>349,204,380</td>
<td>3.2%</td>
<td>7.3%</td>
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<tr>
<td>1: $15 FC/MT</td>
<td>391,561,815</td>
<td>374,714,075</td>
<td>355,811,990</td>
<td>9.1%</td>
<td>5.3%</td>
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<td>2: $30 FC/MT</td>
<td>422,408,457</td>
<td>374,714,075</td>
<td>358,431,171</td>
<td>15.1%</td>
<td>4.5%</td>
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<tr>
<td>3: $75 FC/MT</td>
<td>514,960,410</td>
<td>374,714,075</td>
<td>365,184,749</td>
<td>29.1%</td>
<td>2.6%</td>
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Table 6: Results of interviews

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<th>Rater</th>
<th>RBV (DC)</th>
<th>TCE (RC)</th>
<th>RDT (Improved)</th>
<th>Improved Solution (Practicality)</th>
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<td>4</td>
<td>5</td>
<td>6</td>
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<td>China 3 – Academic</td>
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<td>American RC 1</td>
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<td>American RC 2</td>
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<td>Mean</td>
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<td>5.27</td>
<td>5.18</td>
<td>4.9</td>
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Figure 1: A typical governmental food relief supply chain

Adapted from: Oloruntoba and Gray 2006 [emphasis on Government donor, International agency and International NGOs added]
**Figure 2: USAID's commodity procurement process**

1 FFP CBO: Country Backstop Officer – regional program managers
POD – Program Operations Division
USDA – United States Department of Agriculture
EOD – Export Operations Division
KCCO – Kansas City Commodity Office, USDA
OAA – Office of Acquisition and Assistance

Source: Milano, USAID, 2006
Figure 3: Overview of our study
Our responsibility is to provide strong academic programs that instill excellence, confidence and strong leadership skills in our graduates. Our aim is to (1) promote critical and independent thinking, (2) foster personal responsibility and (3) develop students whose performance and commitment mark them as leaders contributing to the business community and society. The College will serve as a center for business scholarship, creative research and outreach activities to the citizens and institutions of the State of Rhode Island as well as the regional, national and international communities.

Mission

The creation of this working paper series has been funded by an endowment established by William A. Orme, URI College of Business Administration, Class of 1949 and former head of the General Electric Foundation. This working paper series is intended to permit faculty members to obtain feedback on research activities before the research is submitted to academic and professional journals and professional associations for presentations. An award is presented annually for the most outstanding paper submitted.