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Integrating service-learning and humanitarian logistics education

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Abstract

Purpose – Humanitarian logistics is critical to providing relief to people in regions affected by hardship and disaster. This study examines literature on humanitarian logistics and service-learning and evaluates the integration of concepts.

Design/methodology/approach – An exploratory case study approach was used to understand the integration of service-learning and humanitarian logistics. This was achieved by exploring current literature, piloting courses, providing relief, and documenting factors that facilitate successful service-learning experiences.

Findings – Findings from this information-oriented work demonstrate the applicability of service-learning methods in humanitarian logistics education and contributes to current research by addressing urgent global needs.

Practical implications – This case has practical relevance for logistics educators, humanitarian agencies, and service-learning leaders as it outlines various challenges and steps to developing a humanitarian logistics course with potential pathways for research. By integrating the theories and principles of service-learning with major logistics and supply-chain management concepts, colleges, and universities in collaboration with relief agencies can facilitate an impactful humanitarian logistics learning experience that provides needed support to disaster response.

Originality/value – There is a scarcity of literature that connects humanitarian logistics and service-learning. This case shows that the service-learning movement shares a common purpose with many humanitarian organizations that work to foster citizenship, education, and community well-being. This paper is a first of its kind to study the efforts necessary to create a successful humanitarian logistics course that benefits students, faculty, communities, and institutions through applying service-learning principles.

Keywords Humanitarian logistics, Supply chain management, Service-learning, Servant leadership, Reciprocity, Reflection, Learning methods

Paper type Case study

1. Introduction

Humanitarian relief organizations face many challenges in responding to the increasing number of both natural and man-made disasters (e.g. drought, famine, war, and conflict) (Day *et al.*, 2012; Fawcett *et al.*, 2011; Hale and Moberg, 2005). The United Nations claims that the global demand for humanitarian assistance will continue to increase overtime. Causes for the expected rise are due to escalating conflicts and the dramatic increase in vulnerabilities to supply chains (www.un.org). Concurrently, many humanitarian organizations are experiencing a shortage of critical resources needed to facilitate an effective response. According to Thomas and Kopczak (2005), humanitarian relief efforts are strained by a lack of key members, particularly skilled logisticians and experts in affected areas.

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Financial support for humanitarian logistics has grown since the 1970s (Lindenberg and Bryant, 2001). However, humanitarian logistics capabilities for handling disasters have not developed at the same pace, which has resulted in waste and inefficiencies that need attention to improve response services (Beamon and Kotleba, 2006a, b). The complex nature of disaster response will inevitably result in inefficient humanitarian logistics and supply-chain management (SCM) efforts. Of the billions of dollars donated to humanitarian programs each year, nearly 30 percent is reportedly wasted in responding to disaster (Pettit and Beresford, 2009). Consequently, greater effort must be made to ensure that every disaster response is efficiently executed with appropriate logistics support and resources.

Through education and service, universities are uniquely positioned to support humanitarian organizations. The number of universities and institutions throughout the world that engage students in projects involving service learning is increasing. Campus compact, for example, is a growing international coalition of nearly 1,200 member institutions with the mission to promote service that develops student citizenship through service learning (SL). The coalition describes SL as a method that "incorporates community work into the curriculum, giving students real-world learning experiences that enhance their academic learning while providing a tangible benefit for the community" (www.compact.org). SL can provide transformational experiences that motivate students to connect to the real-world and learn through civic engagement (Checkoway, 2001; Mezirow, 2000).

SL has received increased attention in higher education, particularly in business education (see Andrews, 2007; Kenworthy-U'Ren, 2008; Papamarcos, 2005). SL course development, however, has not been widely studied in business education. To date there is little evidence of the application of SL in humanitarian logistics education. Therefore, this paper will address this void by describing the design, development, and delivery of a humanitarian logistics course that engages students in SL. This study aims to understand some of the major facets of humanitarian logistics and the connections with SL principles.

This paper is presented in three sections. The first section presents a brief qualitative review of humanitarian logistics and SL literature and provides background and rationale for the study. The second section describes the design and delivery of a special course that attempts to integrate SL and humanitarian logistics education and proposes a manageable pathway for students and faculty to research related processes and outcomes. The third section concludes with a brief discussion and a number of implications for education with suggestions for future research.

2. Literature review and rationale

2.1 Literature review – humanitarian logistics and SCM

A number of articles in logistics and SCM literature describe humanitarian relief. Helferich and Cook (2002), for example, claim that most relief projects follow a series of phases, specifically planning, mitigation, detection, response, and recovery. Several humanitarian logistics articles describe similar phases of relief (e.g. Altay and Green, 2006; Kovács and Spens, 2007). Business logistics includes planning, implementing, and controlling the flow and storage of goods, services, and information between the point of origin and the point of consumption to meet customer needs (www.cscmp.org). Humanitarian logistics assumes a similar definition but typically involves more actors and more variation as it aims to provide aid in major emergencies and disasters (Jahre and Heigh, 2008; Oloruntoba, 2005).

Several studies compare humanitarian relief chains and traditional commercial supply chains and identify opportunities for applying best practices in logistics and SCM to enhance relief (see Beamon, 2004; Helferich and Menzies, 2012; Long and Wood, 1995; Oloruntoba and Gray, 2006; Thomas, 2007; Thomas and Kopczak, 2005; Van Wassenhove, 2006). A number of studies in humanitarian logistics demonstrate specific activities needed to optimize relief in terms of reintroducing supplies and services through existing supply-chain networks (Balcik and Beamon 2008). Knott (1987), for example, describes last mile optimization between demand and delivery of food and water to refugee camps. Knott (1988) then evaluated truck scheduling, loading, and fuel allocations in disaster relief scenarios. Research conducted by Barbarosoglu *et al.* (2002), De Angelis *et al.* (2007), and Balcik *et al.* (2008) investigated transportation routing problems in delivering emergency supplies in humanitarian relief missions. Balcik and Beamon (2008) described a model for locating warehouse and distribution facilities and managing inventory levels as part of relief distribution strategy. Nolz *et al.* (2010) proposed an approach for delivering drinking water in a post-earthquake situation that accounts for factors such as road network conditions, water source locations, and travel time to determine transportation requirements. Balcik *et al.* (2010) described the cluster approach in coordinating supply of water, sanitation, logistics, and shelter during disaster relief. Cozzolino *et al.* (2012) put forth a framework that shows where lean principles apply in the humanitarian logistics process. Schulz and Heigh (2009) suggest aligning day-to-day business activities with Deming's Plan-Do-Check-Act (PDCA) approach and employ performance measure dashboards based on the balanced scorecard concept to assist on-site planning and response sustainability. Taylor and Pettit (2009) and Goffnett *et al.* (2012) demonstrated the applicability of value chain analysis and lean Six Sigma in humanitarian logistics, respectively. However, a limited number of studies exist in current literature that connect process improvement methodology and humanitarian logistics.

The studies above demonstrate a variety of logistical processes and service solutions that address needs that emerge in humanitarian relief, and literature suggests several concepts (e.g. routing, inventory, warehousing) for coverage in a humanitarian logistics course. Moreover, humanitarian logistics literature presents a plethora of SL opportunities that could be coordinated through key partners involved in providing relief in times of adversity. SL could be established with any number of independent organizations that respond to disasters. Organizations such as the United Nations, non-governmental organizations (NGOs), affected cities, community agencies, religious groups, and various service providers specializing in distribution of necessities that typically respond to disasters (Jahre and Jensen 2010; Kovács and Spens, 2011; Kovács and Tatham, 2009; Perry 2007). Humanitarian efforts have many needs that require citizen involvement, especially from those with logistics knowledge and skill.

2.2 Literature review – service-learning, transformational learning, and alignment

This study was grounded on the principles of SL (Godfrey *et al.*, 2005) and transformation theory (Mezirow, 2000). Jacoby (1996) defines SL as "a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to promote student learning and development" (p. 5). Similarly, Bringle and Hatcher (2009) define SL as an "educational experience in which students (a) participate in an organized service activity that meets identified community needs, and (b) reflect on the service activity in such a way as to gain further understanding of course

content, a broader appreciation of the discipline, and an enhanced sense of personal values and civic responsibility" (p. 38). Several researchers (e.g. Bringle and Hatcher, 2000; Checkoway, 2001; Giles and Eyler, 1994) cite the work of John Dewey (1916, 1938) and his strong advocacy for democracy, community, context, and experience as the basis for SL in education.

In higher education, SL is viewed as pedagogy for real-world skill development (Eyler and Giles, 1999; Zlotkowski *et al.*, 2011). The process of planning, organizing, setting and reaching objectives, and working as a member of a team allows a student to deeply learn the concepts surrounding that course and the service event (Knowles, 1980; HERI, 1996). Developing curriculum around this notion and evaluating it through well-planned learning outcomes will create an effective learning experience (Knowles, 1980; Posner and Rudnitsky, 2001). To help facilitate this important function of profession-related skill development and personal transformation, universities provide experiential learning opportunities such as service-learning courses, internships, immersion trips abroad, and co-curricular service engagements. Ongoing evidence reflects that active learning, specifically service-based learning, provides experiential opportunities that fosters personal and professional development (Berger and Milem, 2002). Service to others helps to create a sense of how to empower others, develop internal strength, understand the community, and develop value-based leadership skills in a chosen field (van Dierendonck and Nuijten, 2011).

Biggs' constructive alignment theory also informed this work by suggesting that effective course design have clear and consistent connections between learning environment, course content, instructional activities, and assessment of intended learning outcomes (Biggs, 1996; Biggs and Tang, 2011). Constructive alignment also suggests that students can enhance skill acquisition and retention through problem solving and active participation in relevant activities, including critical analysis of new and existing concepts, reflection and discussion, that instructors integrate into their course design (Biggs, 2012; Treleaven and Voola, 2008). In the same way, SL aims to provide a relevant learning environment that aligns with constructive application and reflection opportunities for learners (Yorio and Ye, 2012).

SL differs from traditional teaching methods, such as classroom lectures, internships, and fieldwork, through the act of "reciprocity" as put forward by Godfrey *et al.* (2005, pp. 316-317). The SL experience is not only about creating opportunities for learners to practice skills but also to build knowledge through citizenry by meeting needs and expanding viewpoints in a social context. Ongoing evidence points to service as a force that creates a strong connection between that student and his or her development as a person (Berger and Milem, 2002). Reciprocity establishes an implicit partnership to ensure students and service recipients (agencies, communities) benefit from the experience. Reflections on the service and course content are intended to expand knowledge and are key outcomes of the service experience that can result in deeper learning (Ash and Clayton, 2004; Buschlen and Dvorak, 2011; Eyler, 2002; Godfrey *et al.*, 2005), to the extent that some would classify many SL experiences as transformational (Kolb, 1984; Mezirow, 1991).

Mezirow (2000, pp. 7-8) defined transformational learning as a participative process where one approaches learning with a democratic view to be more "open" and "inclusive" of other situations and perspectives, while at the same time being "reflective" and "capable of change," which can promote new knowledge and beliefs. Transformational learning will occur when there is a change in one's beliefs or attitudes resulting from the learning experience. Learners analyze their own perceptions through critical reflection

and open discourse, for example, and reveal alternative viewpoints that manifest through actions, abilities, or expressions.

When describing transformation theory, Mezirow presented the need for a "disorienting dilemma" (p. 22), such as a tornado or famine, that spurs learners to engage in service, self-examination, and reflection that assists in shaping (i.e. transforming) experiences into newly assembled knowledge and skill. Godfrey *et al.* (2005) referred to this dilemma in SL as "reality" and "the magnitude of the social issue" (p. 315) that learners experience and attempt to grasp through action and reflection. Directed reports, journals, and rational discussions facilitate critical reflection that challenge assumptions in order to help learners achieve deeper thought and understanding that results in transformational learning. Transformational learning theorists advocate critical reflection on assumptions and perceptions one has about self, community and cultural systems, work environment, ethics, and feelings (Hedberg, 2009; Mezirow, 1998). Buschlen and Dvorak (2011, p. 52) argued that it is "important for faculty to develop lessons that will impact a student's [rationality and] common sense as well as his or her ability to develop and articulate a leadership vision through the means of personal reflection." Table I lists major phases of the transformational learning cycle, which begins with a disorienting dilemma and ends with a new-found perspective. The cycle makes clear that there are many important factors to consider when trying to develop a transformational SL experience.

When developing a SL course or a multifaceted SL program, Kolenko *et al.* (1996) warned of a number of challenges to overcome in the process, which were confirmed by Kenworthy-U'ren (2008, p. 4). Challenges to consider are: faculty resistance, unsuccessful or negatively perceived project or program outcomes, workload issues, selfish faculty "limelight" issues, insufficient institutional support, liability issues, student resistance, personal agendas, and on-site resistance from community organizations. Bringle and Hatcher (2000) identified a number of considerations, consistent with Kolenko, when attempting to implement a SL program. First, it requires faculty participation in planning the program. It also requires creating a SL office that is adequately funded. A third requirement is having the new office report to the executive responsible for academics to enhance the standing and support of SL. When designing the specifics of the course itself, Godfrey *et al.* (2005, pp. 315-318) suggest following the "3 R's," reality, reflection, and reciprocity, that they claim are essential to every SL experience. Yorio and Ye (2012) findings support Godfrey's *et al.* (2005) R's and are consistent with Kolenko *et al.*'s (1996) claims that by design a SL experience should involve personal insight, application of skill, and understanding of social needs and issues to realize the benefits associated with SL.

Research provides evidence of the benefits of SL. Students can experience higher grades, particularly on essays tests (Strange, 2000), as well as a deeper understanding

1. A disorienting dilemma
2. Self-examination with feelings of fear, anger, guilt, or shame
3. A critical assessment of assumptions
4. Recognition that one's discontent and the process of transformation are shared
5. Exploration of options for new roles, relationships, and actions
6. Planning a course of action
7. Acquiring knowledge and skills for implementing one's plans
8. Provisional trying of new roles
9. Building competence and self-confidence in new roles and relationships
10. A reintegration into one's life on the basis of conditions dictated by one's new perspective

Source: (Mezirow, 2000, p. 22)

Table I.
Summary of transformational learning cycle

of materials and an improved ability to apply what they have learned to real-world situations (Eyler and Giles, 1999) and do so in distinctly creative ways (Osborne *et al.*, 1998). SL can enhance student leadership and communication skills (Buschlen and Dvorak, 2011; Govekar and Rishi, 2007) and increase student citizenship behavior (Lester *et al.*, 2005). In addition, community agencies (i.e. service recipients) benefit by enhanced visibility, improved organizational learning, volunteer labor, and improved services (Gazley and Littlepage, 2009).

SL research in business education has been slow (Kenworthy-U'Ren, 2008), and research on SL applications in the area of humanitarian logistics education is sparse. More research is needed to understand how to design and implement SL courses (Eyler, 2002). Some argue that SL is not widespread or fully embraced because of concerns about its relevance and rigor (Abes *et al.*, 2002). However, there is growing evidence demonstrating the benefits and opportunities of SL that cannot be ignored. SL may be a practical and effective approach for teaching humanitarian logistics. This leads to the main research question that follows:

RQ1. How can humanitarian logistics and service-learning be integrated in a new course offering to facilitate a transformational service-learning experience?

2.3 Background and rationale for the study

A humanitarian logistics course initiative at a University in the Midwest region of the USA evolved from a piloted special topics course covering logistics and the need for clean water for many poverty-stricken families around the globe. The initial course, designated as the Clean Water Initiative, was developed and offered four times during two academic years at the Midwest University with the strategic intent of improving student learning by addressing major global issues through humanitarian logistics and SL integration. The main strategy in designing the course to meet such an intent was to align Godfrey's 3 R's (reality, reflection, reciprocity) and Mezirow's elements of transformational learning (disorienting dilemma, different perspectives) to assure agreement between learning environment, activities, and assessment, which is congruent with Bigg's (1996) constructive alignment theory. The course was offered at the 500 level to provide SL opportunities for both undergraduate and graduate students. Students were given a list of issues and countries affected by disaster to research or they could obtain approval for a related service project of their choice. The vast majority of students agreed that access to clean water is an ongoing global issue, and a very important cause to serve. Hence, the primary deliverable was a semester project that addressed an actual clean water challenge for poverty level families.

Several countries were identified as having water issues, including the Dominican Republic (DR), Haiti, India, and Kenya (www.water.org). During the two years of the special humanitarian logistics (clean water) course, faculty, and selected students accompanied a Rotary member team to the DR to participate in humanitarian projects to help poverty level families in the area of Puerta Plata. DR's proximity, accessibility, agency affiliations, positive relationship with the USA, and apparent need are reasons why the DR was chosen over other locations, like Kenya or India, for example.

The faculty member on the course development team has participated in additional trips to DR and other areas needing access to safe drinking water. The on-site humanitarian teams assist in distribution and installation of clean water filters. The objective of the trips is also to obtain information to document existing issues and

service needs as well as to develop solution opportunities that facilitate learning, enhance course design, and provide aid to those in need.

Based on the positive feedback on the Clean Water Initiative course, faculty, and students arranged to volunteer their humanitarian logistics experience on-site as part of future visits. Literature indicates a lack of availability of SL programs in business, which is due in part to limited faculty interest (Kolenko *et al.*, 1996). With the high-level of interest in SL and humanitarian logistics demonstrated by the faculty and students, the team decided to develop a course dedicated to the subjects. Literature also indicates that many humanitarian relief solutions primarily measured outputs rather than outcomes from the recipient perspectives (Helferich and Menzies, 2012). Faculty and student perspectives, however, are important inputs to course development and implementation.

The development team included faculty with over 20 years experience in humanitarian relief, including on-site experience (e.g. WTC 2001, Katrina Hurricane 2005), plus disaster logistics process re-engineering, and disaster logistics instruction. The team included a lean Six Sigma master black belt and operations research professionals, plus over 50 years of combined experience in teaching and industry logistics. The team envisioned a three credit hour, 500-level course open to a myriad of disciplines, including business, leadership, health, environmental science, and engineering. The course would cover logistics and SCM, international humanitarian relief, project management, and lean Six Sigma methods. There are numerous learning opportunities in humanitarian logistics education, as demonstrated by the increasing number of disasters and the growing body of research in this field.

3. Research methodology

This research employed a case study approach to explore the integration of SL and humanitarian logistics in new course design. This approach enables a focussed examination of special events and real-life circumstances observed over a period of time, or at a specific point in time (Gerring, 2007) and is believed to be appropriate for exploratory and observational studies of SL (Eyler, 2002). Case study research is a constructive approach for examining logistics concepts in order to understand under-explored areas (Ellram, 1996) including humanitarian relief (Fawcett *et al.*, 2011). Moreover, researchers have applied this method to understand aspects of course design (Biggs, 2012; de Jesus and Moreira, 2009), SL (Bringle and Hatcher, 2000), and humanitarian logistics (Jahre *et al.*, 2009).

3.1 Case study – humanitarian logistics course

In accordance with leading theory and influential course design methods, a preliminary course outline and syllabus (in appendix) were created to capture the intended course objectives, learning outcomes, and rationale for the humanitarian logistics course. Building on this foundation, the syllabus also reflects a sequence of learning units, an assortment of transformational instruction activities (e.g. reflection writings, status reports, discussions), and mechanisms for course evaluation that were designed to meet the course objectives while piloting the new logistics course (Biggs, 1996; Knowles, 1980; Mezirow, 2000; Posner and Rusnitsky, 2001). The course design process also included steps for instructor reflection to facilitate course refinement and improvement based on key lessons learned (Gagne and Briggs, 1979).

3.1.1 Course objectives. The aim of the humanitarian logistics course is to study logistics, SCM, organizational models, project management, and process improvement tools to develop effective humanitarian aid programs covering planning, detection,

mitigation, response, and recovery. In the context of this course, humanitarian aid is material or logistical assistance provided for humanitarian purposes, typically in response to crises including natural disaster and man-made disaster. The primary objective of humanitarian aid is to save lives, alleviate suffering, and maintain human dignity. Thus, the key learning objectives and expected competency outcomes of the course include being able to define a realistic project that addresses an actual humanitarian situation, to utilize project management and process improvement methods for a selected project, and to recognize the roles of key humanitarian agencies and stakeholders in a collaborative humanitarian logistics response (see syllabus in appendix).

3.1.2 Key roles for students and faculty. Defining student and faculty roles as major elements in course design clarifies and aligns tasks, responsibilities, objectives, and expectations, which facilitates effective course implementation and the achievement of course learning objectives (Biggs, 1996, 2012; Bringle and Hatcher, 2000). In the humanitarian logistics course, students received specific learning goals, and instruction regarding logistics and humanitarian aid through relevant lectures, presentations, readings, videos, research and writing activities, guest speakers, and discussions to expand their knowledge and complement their personal insight. Various methods were employed throughout the entire course to stimulate analysis and reflection to facilitate deeper learning. Students explored humanitarian logistics issues through academic research and hands-on application of acquired knowledge and skill. Proper data collection, for example, is an important research competency for completing a detailed journal or status report describing on-site activities, and is critical in the process of acquiring knowledge and skill for implementing plans (Mezirow, 2000). While on site in the affected area (DR) and through detailed lecture and discussion, students grasped the reality and enormity of the situation. At times, students follow the instructor's lead and other times they assume the role of logistics expert and leader. Students would also lead discussion and debriefing sessions to coordinate future activities (service) and to share what they discovered (learning). Service projects, as well as the many first-hand accounts discussed in class, give students greater awareness and understanding of social needs and issues that exist locally and throughout the world.

The instructor served as learning facilitator, site liaison, student guide and mentor, and university ambassador. Involvement in the course included contacting humanitarian agencies, planning site visits, coordinating projects and research, generating meaningful assignments and discussions, assisting with problems, assessing learning, and making expert observations during the service experiences and the overall course.

3.1.3 Key learning activities and tasks. The humanitarian logistics course includes a syllabus and schedule with key readings and class assignments presented for each class period. In addition, faculty members work with students to define teams and assist in project selection. The course covers logistics management concepts, such as procurement, routing, warehousing, distribution, inventory, and customer service. Project management and process improvement tools are defined by the faculty, used by the student teams (e.g. project charter, project plan), then graded by faculty. An actual ongoing humanitarian project involving the faculty will be discussed in class to demonstrate to students the application of logistics, project management, and lean Six Sigma techniques. The syllabus for the initial offering of the course is provided as Exhibit 1 in appendix and indicates where transformational service-learning activities are present. The syllabus provides general policy, reading materials with a general grading guideline. A course schedule with weekly deliverables is shown in Exhibit 2 in appendix.

The course is being developed based on inputs from disaster relief organizations and humanitarian projects. The faculty development team continues to obtain insights for the class through humanitarian teams working in such countries as Haiti, Honduras, DR, Ghana, Kenya, and India. The knowledge base is also enhanced through discussions with Rotary, Red Cross, and industry professionals involved in humanitarian relief. In addition, inputs are received from Department Chairs, the Dean's Office of the College of Business Administration, and faculty working in sustainability teams with the University.

3.1.4 Key lessons learned from initial course pilots. The pilot courses provided excellent background to evolve into the design of the desired permanent humanitarian logistics course. The longitudinal ongoing nature of the water project has minimized issues and warnings related to personal agendas and on-site resistance. The course offerings suggested that the students desired to study the broader scope of humanitarian challenges such as floods, famine, HIV, pandemic flu, earthquakes, tornados, child trafficking, and other tragedies. This suggested that a new course should have a broader scope such as humanitarian relief and development. This also makes sense given the increased need for professionals with training on these global challenges. In addition, the courses pointed out that the students should be provided a standard methodology that is likely to be used for project management once they enter the job market. This suggested that students should be given a briefing and use network project management tools for their primary project (e.g. Microsoft Project Management). Finally, given the literature and faculty experience that indicates the potential benefits of applying formal models to achieve sustainable service programs, the development faculty added the teaching of basic process improvement, including DMAIC (Define, Measure, Analysis, Improve, Control) and PDCA methods that are associated with lean Six Sigma and continuous improvement (Klefsjo *et al.*, 2001; Nair *et al.*, 2011; Schulz and Heigh, 2009). Students will be given basic information on the process improvement models and the design model for lean Six Sigma (see Amer *et al.*, 2007; El-Haik and Roy, 2005).

3.1.5 Key course development and implementation activities. The tasks for the launch of the humanitarian logistics course included results from course pilots and development of a detailed syllabus from the approved master syllabus and the initial course syllabus. Primary course development and launch tasks include:

- promote course and project ideas to faculty, students, community, and administration;
- collaborate with related campus programs (e.g. volunteer center, study abroad, alternative breaks);
- outline preparation tasks to obtain review and approval for a new university course;
- establish potential selection criteria for site and service activities (e.g. apparent need, relates to course, stimulates learning, proximity, relationship with agency or community, ample time to achieve objectives, provides potential for implementation with positive outcomes to recipients, provides students experience to enhance academic capabilities and job skills);
- connect with agencies to establish relationships and to identify potential SL opportunities;
- complete communication plan and affiliate agreements with agencies for risk and relationship management purposes;

- pursue informed consent and Institutional Review Board (IRB) approvals as necessary;
- propose upper level course approved for undergraduate and graduate students;
- define objectives for major domain areas: humanitarian logistics, lean Six Sigma, and project management;
- design reading assignments, directed journal assignments and discussions with targeted themes, project requirements, and other deliverables that provide opportunities for analysis and reflection and for learning evaluation and grade determination;
- create prompts and probing questions to guide and inspire thorough reflections;
- select supplemental instruction materials and activities (readings, videos);
- develop rubrics for reflections and other major assignments;
- design course to maximize value of online (e.g. blackboard) capabilities; and
- obtain buy-in and institutional support at various levels (department, college).

The approval process included review and approval of the course design at the department, college, and university curriculum levels for undergraduate and graduate programs. The overall process took place over one semester. The primary modification was to clarify if the course was to be a project course with minor domain lessons or a more traditional course with primary textbooks plus a student project. As presented in the syllabus, the latter is the design. The course utilizes chapters from three textbooks covering the domains of humanitarian logistics, Six Sigma for logistics, and Six Sigma for sustainability. Project management is covered through instructor handouts and use of project management tools required for the projects.

To help ensure reality, the humanitarian logistics course is incorporating information through two ongoing humanitarian activities. First, direct volunteer experience in disaster relief through assignments and training in over 20 years with American Red Cross Disaster Logistics assignments continues to provide reality for the course. The assignments include training at the national level for hurricane season, panel member presentations covering response to maximum potential disasters as defined by FEMA, and teaching current disaster logistics for the American Red Cross plus availability for on-site disaster recovery in logistics.

The second activity to demonstrate reality and to convey the magnitude of current issues is direct faculty involvement in ongoing humanitarian projects for distribution, installation, and process improvement of clean water projects in poverty level countries. Logistics activities in the ongoing Clean Water Initiative are being integrated into course lessons. The project objective is to use logistics skills (e.g. order processing, routing, scheduling, transporting, acquisition, warehousing, distribution, customer service) and basic process improvement (lean Six Sigma) for a clean water program in DR. DMAIC and PDCA process improvement methods will guide the initiative through various phases of relief, specifically planning, detection, and response to ensure proper service and continuous improvement monitoring for DR and other ongoing water programs. The DR project was initiated in 2010 to facilitate the distribution and installation of special bio-sand water filters in La Romana and Puerta Plata regions of DR (see Exhibit 3 Synopsis in appendix). The initiative has included ties with Good Samaritan Hospital, a partner university, and community leaders in DR. The team has coordinated shipment

and installation of numerous filters. The final pilot course, which also evaluated baseline performance operation of the water filters as part of a sustainability measures required by Rotary, was completed during summer 2012. The Final Report for the pilot will be published in the 2012-2013 academic year. Primary deliverables that are relevant for the humanitarian logistics course are application of logistics, project management, and process improvement principles (e.g. DMAIC) to an actual humanitarian project in the DR results of the Clean Water Initiative will also provide a recommendation for the application of lean Six Sigma to logistics for broad scope humanitarian initiatives.

3.1.6 Scholarship and research opportunities. The humanitarian logistics course provides continuous opportunity for professional reflection through required student projects on a variety of humanitarian topics including: corporate social responsibility (CSR), water needs for selected countries, micro business models, information technology, mapping chemical contamination, and roles for selected industry organizations. The temporary humanitarian courses and clean water projects generated a variety of research reports including but not limited to: Global water needs (e.g. Africa, China, DR, Ghana, Haiti, Honduras); CSR Manual-Template; Google Map/GIS Tracking; health and sanitation needs to increase success of clean water projects; information needs for humanitarian relief. Reports on several of the topics have been shared with profit as well as nonprofit organizations.

Over the past three years, while ideas for the course were evolving, the faculty provided opportunity for eight students to attend each year a Thirsting to Serve Conference in the USA with several students and faculty representatives presenting at each conference. Applied research and volunteer work has also provided opportunities for faculty and students to publish papers related to humanitarian relief (e.g. CSCMP Explores; Thirsting to Serve Conference Proceedings). SL presents a variety of research opportunities that can be included for students and faculty to engage in as part of the design of a humanitarian logistics course.

Since the humanitarian logistics course tends to have smaller enrollments, a possible way to fully understand and develop a course like this is through qualitative methods such as phenomenology, while examining the data through distinct theoretical lenses. Buschlen and Warner (2012) utilized a phenomenological research design while taking a small group of undergraduate students to assist with disaster relief after numerous tornados hit the south-eastern region of the USA in 2011. The experience provided ample opportunity to examine logistics while arranging participant schedules, meals, lodging, dumpsters for debris, transportation, and general coordination with local, national, and international agencies. Phenomenology is a way to reduce shared experiences down to a universal theme (Creswell, 2007). Moustakas (1994) explained transcendental phenomenology as outlining a phenomenon, removing one's personal connection to it, and collecting multiple reflections from those that experienced the phenomenon. In the tornado disaster relief case, the phenomenon studied was the shared experience of undergraduate college students and their faculty advisor who served six days clearing debris from homes and roadways in Virginia following the disorienting tornado event. The data were analyzed using the tenets of the Social Change Model of Leadership (HERI, 1996) to examine personal growth and Mezirow's (2000) phases of meaning making in a transformational setting. Mezirow (2000) described the need for a disorienting dilemma as a starting point that would force the participant into self-examination and reflection of their held assumptions. Both of these lenses fit well with the data collection method of keeping a journal while participating in humanitarian relief.

For the tornado devastation clean-up case, students kept a prompt-based journal as a way to create targeted reflections. For the humanitarian logistics course, the prompts

students reflect on can focus on logistics and SCM learning outcomes, disaster relief processes, etc. The faculty member, with IRB approval, can tailor prompts to cover multiple aspects of the process or a single aspect. Buschlen and Warner (2012), for example, asked students to complete prompt-based journals in three specific learning phases: before service, during service, and 30 days after returning from the service experience. The journal prompts were written in advance and provided to students in three sealed envelopes. Each journal prompt envelope had specific directions as to when the prompt should be opened. The goal for a research endeavor like this is to guide student narratives to facilitate understanding of events and course objectives. Student reflection can serve as data for future academic ventures by advancing SL and by refining humanitarian logistics curricular design. The research progress and continued interest has led to the adoption of the humanitarian logistics course now offered regularly at the university.

4. Discussion

The current semester is in full implementation with no major issues. Detailed lectures delivered in class are also available to students online, via Blackboard, to provide greater access to learning materials. Project charters using the basic lean Six Sigma DMAIC framework have been submitted by each student. The objective is to continue to follow the syllabus with flexibility to focus on new materials as well as to engage in discussion of the ongoing humanitarian logistics service project in DR and individual student SL projects.

At conclusion of the semester, the process to recommend improvements includes but is not necessarily limited to the following steps:

- review course outcomes, particularly reflections, for indication of needed improvements that will enrich student learning and enhance the service experiences of all participants (e.g. create working rubrics for student reflection documents);
- review course objectives with students and other stakeholders for input on course design and solicit suggestions for humanitarian logistics projects and possible improvements (e.g. enrich course with discussions on political ideologies in selected community);
- incorporate recognized models like Mezirow's (2000) Phases of Meaning and Biggs' Constructive Alignment and SOLO Taxonomy (2011) to formally evaluate the learning process and the overall course design;
- review course outcomes and consider student project reports for possible publication and distribution to nonprofit organizations involved in relief and to university leadership;
- select additional opportunities for presentation or publication of the course;
- support the development of a permanent SL office (Kolenko *et al.*, 1996);
- market SL course across multiple college programs;
- develop next phase of the ongoing clean water initiative and other educational programs that provides service opportunities and value for the next course offering;
- work with partners and cooperating agencies to monitor humanitarian relief performance indicators and sustainability measures in served communities (Schulz and Heigh, 2009);

- incorporate more local humanitarian logistics projects into the course that will impact nearby communities; and
- implement an IRB approved phenomenological research project to examine vital elements of the course: student growth, learning outcomes, service quality, etc.

5. Conclusion

5.1 Discussion and implications

The primary objective of humanitarian logistics is to improve lives, alleviate suffering, and maintain human dignity, all of which coincide with the tenets of SL. This study is the culmination of a course development process that examined the integration of SL in humanitarian logistics education. The humanitarian logistics course was designed to model the tenets of SL with the primary expectation that students would benefit from active involvement in high-impact learning experiences. In this case, multiple stakeholders and participants benefited from the course. Findings from the piloted course, current literature, and the authors' experience in on-site application of logistics in disaster relief present a number of implications for stakeholders and participants in a new humanitarian logistics course, specifically educators, students, higher education institutions, humanitarian agencies, and communities.

The paper is relevant for logistics educators and SL leaders as it outlines various challenges and steps to implement a similar course. It depicts a number of important steps, based on theory, and practice, such as establish service criteria, outline tasks, and develop reflection assignments, that faculty should consider in the process of developing a humanitarian logistics course. There are many design challenges that faculty must surmount to deliver an effective SL course such as promoting the course and gaining institutional support. However, faculty receive satisfaction in helping students learn in the process of helping to restore lives. An important conclusion to take from this paper is it demonstrates successful integration of SL and humanitarian logistics that offers a positive learning experience with additional pathways for research and collaborations that can transform lives.

Students benefit from participating in a humanitarian logistics course as it provides the opportunity for student interaction across multiple disciplines and cultures. The course builds SCM and logistics acumen and skill. Student resumes are enhanced through application of logistics, project management, and lean Six Sigma to real opportunities that provide skills fitting most organizations and career fields. The course provides direct knowledge for students who desire positions in public sector and NGOs (e.g. Peace Corps, AmeriCorps, Red Cross, World Health Organization, etc.), and will better prepare students to evaluate policy, funding, and decisions at national and local levels. The results of this case mirrored a number of student benefits presented in related literature. Like many student participants in a SL endeavor, students in the humanitarian logistics course left with a stronger sense of self, a better understanding of teamwork, and the realization that their service made a positive impact on others while they honed their professional skills in an academic course (cf. Buschlen and Dvorak, 2011; Govekar and Rishi, 2007). This course pushed students beyond an academic experience by developing a resume portfolio of both curricular and co-curricular business leadership education focussed on societal awareness, civic engagement, multiculturalism, skill development, and service-based philanthropy, which can lead to greater personal growth and to stronger, more productive citizenship

through high-impact SL (Boyle-Baise and Langford, 2004; Dugan, 2006; Einfield and Collins, 2008; Kuh, 2008).

The higher education institutions that students and faculty represent develop prominence in local, national, and international venues by creating courses, developing connections, and engaging in co-curricular service projects. That prominence comes in the form of recognition of the service act, the experiential learning opportunities provided for participants, the exposure to research opportunities provided for participants, and the new pathways for grants to help fund these endeavors. These acts of service lead to stronger community partnerships with local, national, and international agencies and with those in need. However, many colleges and universities are uncertain on how to implement SL programs. This paper presents a single case that serves as an example of implementing a SL course in logistics. Many steps and challenges described herein can help instruct logistics educators and faculty from other disciplines interested in adopting SL at their respective institutions. As more faculty and institutions answer the calls to embrace SL and to support humanitarian causes, cases of SL implementation in a humanitarian context will continue to grow.

SL has also been shown to positively impact humanitarian agencies and communities by helping to rebuild the lives of those affected by disaster. Poverty stricken communities in the Puerta Plata region of the DR, for example, received water filtering systems that provided access to clean water in homes. Participating agencies reap benefits as well by providing the service opportunity where and when it is needed, through active participation from credit-based and co-curricular servant leadership (i.e. humanitarian logistics) students. Agencies and humanitarian leaders receive satisfaction in helping students learn in the process of aiding those in need. Exploratory findings from this case show how SL in humanitarian relief can provided service recipients (e.g. agencies, communities) with much needed resources in the form of low cost (volunteer) services and logistics support to improve relief services and minimize waste. Many agencies and relief operations are in desperate need of people with logistics acumen (Thomas and Kopczak, 2005). Moreover, the course continues to draw interest and attention to global needs and community challenges, to responding agencies working to meet community needs, and to the importance of SCM and logistics in providing relief. These findings are consistent with literature that show agencies and communities benefit through heightened awareness, greater access to volunteer labor, and improved services (Gazley and Littlepage, 2009).

The conclusions drawn largely from experience contribute to current research by answering the call for more papers that describe the development of SL courses in business education, and by answering the call for greater civic involvement in humanitarian efforts. A single case, however, is unable to fully predict or generalize about what other course development attempts might experience. The select projects and small class sizes of the humanitarian logistics course, for example, may not be consistent with what transpires in other settings. Generalization from case studies can be achieved through replication (Pedrosa *et al.*, 2012). Therefore, it is recommended that other comparable case studies examine humanitarian logistics education.

Given the growth and enormity of disasters throughout the world and the need for additional resources, particularly greater assistance from service experts and logisticians (Thomas and Kopczak, 2005), future research is needed to explore opportunities that expand disaster response collaborations that enhance relief and offer hands-on learning. More qualitative and quantitative research is needed to understand humanitarian logistics education and key outcomes from SL projects

involving key actors (e.g. students, faculty, agencies, service recipients). Structured research that focusses on outcomes and other facets surrounding a new course is a natural extension to an exploratory case like this. Focussing on data collected through critical reflections before, during, and after student service, for example, will help uncover strengths and weaknesses of an established SL course (Hedberg, 2009). It is recommended that course data be examined using Mezirow's (2000) Transformational Learning process and other theories to expand humanitarian logistics education and research.

It is clear that the SL movement shares a common purpose with many humanitarian organizations that work to foster citizenship, education, and community well-being. By integrating theories and principles of transformational learning and SL (disorienting dilemma, reality, reflection, reciprocity, and new roles) with major logistics and SCM concepts, colleges, and universities can enhance student learning and improve humanitarian response in fostering citizenship behavior through meeting global needs.

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Further reading

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Appendix

Exhibit 1. Humanitarian logistics course syllabus

Midwest university college of business administration			
MKT	599	Humanitarian logistics project	3
Design	No.	Title	Credit (mode)

I. Bulletin description

Provide students the opportunity to work on a large-scale service-learning humanitarian logistics project supervised by a faculty member.

II. Prerequisites

Completion of 86 credit hours, preferred MKT 300 or 304; or permission of the Instructor.

III. Rationale for course level

This course requires the ability to manage a complex project and work independently in cross-functional teams. The project format allows students with different levels of educational preparedness to take on roles in the project that differ in their level of complexity/need for discipline-based knowledge. As a result this course should be offered at the 500 level.

IV. Textbooks and other materials to be furnished by the student

Textbooks will be required for the course in the topic areas of humanitarian logistics and lean Six Sigma management. The textbooks for the course include:

(1) Humanitarian Logistics, Meeting the Challenge of Preparing for and Responding to Disasters, Edited by Martin Christopher & Peter Tatham, The Chartered Institute of Logistics and Transport (UK), Kogan Page, 2011.

(2) Six Sigma for Sustainability, Thomas McCarty, Michael Jordan, Daniel Probst, McGraw-Hill, 2011.

(3) Lean Six Sigma Logistics, Strategic Development to Operational Success, Thomas Goldsby and Robert Martichenko, J. Ross, 2005.

V. Special requirements of the course

None.

VI. General methodology used in teaching the course

Lectures and discussions will be used to introduce students to best practices and strategies. Both individual and team assignments (e.g. reflection writing) will be used to reinforce learning and apply course concepts. Project papers (journal, research), student presentations, and written exams will be used to assess performance.

VII. Course objectives

This course is a study of organizational models, logistics, project management, and process improvement tools to develop effective humanitarian aid programs covering planning,

preparation, response, and recovery stages. In the context of this course humanitarian aid is material or logistical assistance provided for humanitarian purposes, typically in response to humanitarian crises including natural disaster and man-made disaster. The primary objective of humanitarian aid is to save lives, alleviate suffering, and maintain human dignity. It may therefore be distinguished from development aid, which seeks to address the underlying socioeconomic factors which may have led to a crisis or emergency. Upon completion of this course, students will be able to:

(1) develop an effective project to address an actual humanitarian logistics (aid) scenario;

(2) utilize project management methods and logistics techniques for the selected project;

(3) utilize process improvement (lean Six Sigma) tools for the selected project; and

(4) recognize the roles of government agencies, commercial firms, non-government organizations, and military for collaborative humanitarian scenarios.

VIII. Course outline

This course will include a traditional detailed syllabus with reading and in class assignments presented for each class period of the semester. In addition, the faculty will work with the students to define the teams and the humanitarian project scope within the first few class sessions. Project management and process improvement tools will be defined by the faculty and used by the student teams (e.g. project charter, project plan, status report, and final report requirements) and graded by faculty.

Week	Topic
1	Course introduction to humanitarian logistics, process improvement, and project management
2	Humanitarian strategic review – concepts, models and issues Developing the business case Sustainability and the collaborative management model
3	Humanitarian study humanitarian logistics Sustainability measurement and reporting Six Sigma sustainability Discuss the graduate individual assignment – handout
4	Humanitarian Logistics Six Sigma sustainability – Six Sigma methodology *Final Selection of Projects and Draft of Charter*
5	Logistics management overview lean Six Sigma logistics and humanitarian logistics Design for Six Sigma Six Sigma sustainability *Submit Project Charter*
6	*Mid Term Examination* Review DMAIC project for clean water sustainability Dominican Republic. project management
7	Strategy and planning tools – Lean Six Sigma logistics Stakeholder management: Six Sigma sustainability Discussion of project planning
8	Humanitarian logistics metrics Lean Six Sigma problem-solving tools *Students Submit Project Plan*
9	Review of selected humanitarian scenarios-plan, preparation, response and recovery Operational and measurement tools Lean Six Sigma Review student project and instructor DMAIC status in class

(*continued*)

Week	Topic
10	Importance of information technology in humanitarian operations Discuss information systems needs, issues/opportunities *Students Submit Project Status Report* *Graduate Students submit Individual Additional Assignment*
11	Commercial vs humanitarian programs – similarities and differences: business models, funding, and logistics commercial vs humanitarian logistics
12	Combining humanitarian logistics and military supply-chain capabilities Discuss projects *Graduate Students Present Additional Paper*
13	Professionalism in humanitarian in logistics
14	Advancements and priority developments in humanitarian aid *Students Present Semester Projects*
15	*Lesson 29: Students Present Semester Projects*
16	*Final Exam Week and Submission of Final Projects*

IX. Evaluation

The students will be evaluated on the three primary course topics of logistics, project management, Six Sigma process improvement tools/techniques, and humanitarian relief concepts through examination and in class assignments. Topic knowledge will be evaluated using exams and individual assignments. The evaluation rubric for the humanitarian project will include points for the following: project charter, project plan, status reports, application of process improvement tools (plan, do, check, act and lean Six Sigma) and the Final Project Report (Findings, Analysis, Recommendations and Presentation).

Graduate students will be required to take on the more complex and demanding roles within the project plus prepare an additional individual paper on use of the process improvement tools for a humanitarian scenario separate from the semester project.

Semester evaluation	Undergrad	Grad
Exams	25%	20%
Assignments (reflection writings and discussions) on primary topics	25%	20%
Individual graduate research paper	na	20%
Humanitarian logistics project	50%	40%
Total	100%	100%

Rubrics will be entered in blackboard for each of the four evaluation categories: exams, assignments, individual paper (MBA only), and semester project.

Exhibit 2. Fall semester 2012 humanitarian logistics class schedule and assignments

Week	Topic
1	Course introduction to humanitarian logistics, process improvement, and project management
2	Humanitarian strategic review – concepts, models and issues Developing the business case Sustainability and the collaborative management model Lessons 3 and 4: Read Humanitarian Logistics Chapters 1 and 2 and Six Sigma Sustainability Chapters 1 and 2 *Submit Draft of Research Statement*
3	Lesson 5: Assignment – Read Humanitarian Study Humanitarian Logistics Chapters 3 and 4 Lesson 6: Assignment – Read Sustainability Measurement and Reporting Six Sigma Sustainability Chapters 3 and 4 Initiate draft of Project Charter Discuss the Graduate Individual Research Assignment – Handout
4	Lesson 7: Assignment-Read Humanitarian Logistics Chapter 5 Lesson 8: Assignment- Read Six Sigma Sustainability Chapters 5 and 7. Discuss Six Sigma Methodology *Final Selection of Projects and Draft of Charter*
5	Lesson 9: Assignments- Read Logistics Management Lean Six Sigma Logistics Chapters 1 and 2 and Humanitarian Logistics Chapters 8 and 9 Lesson 10: Read Design for Six Sigma Six Sigma Sustainability Chapter 8 *Submit Project Charter* *Handout Take Home Exam*
6	*Lesson 11: Assignment October 2 Tuesday – Mid Term Examination Take Home* Lesson 12: Instructor Review DMAIC project for Clean Water Sustainability Dominican Republic. Project Management – Concepts and Tools Information provided by Instructor
7	Lesson 13: Assignment Read Strategy and Planning Tools – Read Lean Six Sigma Logistics Chapter 20 Lesson 14: Assignment Read Stakeholder Management: Six Sigma Sustainability Chapter 9 Discussion of Project Planning and Reflection *Students submit word processed Take Home Exam at start of class 10/11*
8	Lesson 15: Assignment Read Humanitarian Logistics Chapter 4 Metrics Lesson 16: Assignment Read Lean Six Sigma Chapter 21 Problem-Solving Tools *Students Submit Project Plan at start of class 10/18*
9	Lesson 17: Review of Selected Humanitarian Scenarios-Plan, Preparation, Response and Recovery- Instructor provided Lesson 18: Assignment Read Operational and Measurement Tools Lean Six Sigma Chapters 22 and 23 Review student Project and Instructor DMAIC Status in class
10	Lesson 19: Assignment Read Importance of Information Technology in Humanitarian Operations Humanitarian Logistics Chapter 3 Lesson 20: Discuss information system needs, issues/opportunities – Instructor provide *Status Report – one page dot point with work completed, work to be done, reflections and issues* *Graduate Students submit Individual Assignment at start of class 11/01. Definition is in Blackboard*
11	Lesson 21: Assignment Read Commercial versus Humanitarian Programs- Similarities and Differences: Business Models, Funding, and Logistics – Instructor provide document to read Lesson 22: Assignment Continue Review of Commercial vs Humanitarian
12	Lesson 23: Assignment Read Combining Humanitarian Logistics and Military Supply Capabilities Humanitarian Logistics Chapter 12

(*continued*)

Week	Topic
	Lesson 24: Assignment Read Humanitarian Logistics Combining Chapter 13
	Graduate Students Present Additional Research Paper handed in 11/01
13	Lesson 25: Assignment Read Professionalism in Humanitarian
	in Logistics Chapters 10 and 11
	Lesson 26: Holiday No Class 11/22
14	Lesson 27: Assignment Read Advancements and Priority Developments
	in Humanitarian Aid Humanitarian Logistics Chapter 14
	Lesson 28: Students Present Semester Projects with Key Reflections
15	*Lesson 29: Students Present Semester Projects with Key Reflections*
	& Complete Course Evaluation
16	*Final Exam Week and Submission of Final Project Reports*

Exhibit 3. Pilot humanitarian logistics sustainability service program summary

Sustainability has multiple meanings in the humanitarian context. It can be applied in relation to sustaining an operation, e.g. maintaining aid through continuous funding (financial continuity) and/or embedding it within development activities (long-term development). It can also relate to the design and plan to continue support of recipients needs after humanitarian organizations have left a disaster area (sustainable exit strategy).

The UN Brundtland Commission (1983) defined sustainability as "meeting the needs of the present without compromising future generations' ability to meet their own need." A sustainable project typically involves local community leaders in planning so that they are invested in the project's long-term success. Training and the exchange of information prepare communities to maintain results and solve problems on their own.

The entire field of humanitarian relief has broadened from a narrow focus on operations in particular response situations to strategic considerations of how best to operate a sustainable humanitarian support network:

- There is a need to close the large gap between short-term relief and long-term development.
- There is a need for performance metrics with increased recognition that, historically, humanitarian initiatives have in general focussed on outputs with too little attention to outcomes.
- Sophisticated donors are now more likely to require documentation of the results of humanitarian programs in terms of the impact of their support over the expected life of their donations.
- To design and execute a pilot program based upon continual process improvement to demonstrate a practical approach to ensuring humanitarian project sustainability.

The humanitarian logistics project used to test humanitarian sustainability involved the provision of safe water to a number of households in the La Romana and Puerta Plata regions in the DR. Safe drinking water is provided through the installation of bio-sand filters manufactured and distributed by organizations located in the Midwest region of the USA. The filter is designed to provide safer water for a family for more than ten years.

The humanitarian organization providing funding for the purchase of the filters and overall project management is by a nonprofit (501 c3) relief organization committed to connecting organizations concerned with the growing dangers surrounding safe drinking water and sanitation issues around the world with communities in need.

The objective is to achieve a set of actionable recommendations, based upon the execution of a continual improvement process-based pilot test, to embed concepts and tools of humanitarian project sustainability:

- Plan: the main project followed the improvement model of PDCA – plan, do, check/analysis, and act, which parallels the lean Six Sigma (LSS) DMAIC process. The initial steps included development of the Project Charter and the Project Plan. The clean water initiative in DR utilizes LSS tools including project charters, checklists, flowcharts, control charts, and control plans.
- Do: What was actually done in preparation for project implementation? The Do phase developed Protocols, Guidelines, Information Collection Tools, Information Collection and Analysis, and End-to-End In-Field Performance Tests. The Protocol was specific to the monitoring and evaluation program for the sustainable implementation of the bio-sand filter. The document addressed: Summary of Monitoring & Evaluation by Village, Installation Review, Uptake and Usage, Continued Usage, Microbiological & Other Contaminant Efficacy, Health, Medical, Social and Economic for the household with the bio-sand filter.
- Check/Analysis: What was learned by the analysis of the data collected and review of the overall PDCA process including practical issues faced when applying the concept of PDCA to achieve continuous improvement and its implied informational infrastructure to a safe water humanitarian project. The Analysis of data collected in the field relied upon both the built-in analytical tools of Survey Monkey and the use of Microsoft Excel.
- Act: A key goal of the Pilot Sustainability Project was to use proven tools to demonstrate in a very practical manner how humanitarian project sustainability can be implemented, monitored, and constantly improved. Review of impact on key effects- health, education, economic and social interaction will be the targets for households with the Bio Sand filters. A review of failure modes and cause and effect will then be useful in the analysis and prioritization of the options to achieve continued improvement.

About the authors

Dr Sean P. Goffnett is an Assistant Professor of Logistics and Marketing at Central Michigan University. Dr Goffnett received his Doctor of Philosophy with concentration in Quality Management from Eastern Michigan University, a Master of Human Resources and Labor Relation from Michigan State University, and a Master of Science in Engineering Management from Western Michigan University. He is also a Certified Lean Six Sigma Master Black Belt. Dr Goffnett has worked with a number of companies, including the Dow Chemical Company, Ford Motor Company, Johnson Controls Inc, United Parcel Service (UPS), Regional Steel Distribution Center (RSDC), and Genesys Health Systems. Dr Goffnett has published in logistics and supply chain management journals such as the *International Journal of Logistics Management*; *Distribution Business Management Journal*; and the *International Journal of Logistics Systems and Management*. His research interests include humanitarian logistics, leadership, supply chain security, process improvement, talent management, and innovation. Sean P. Goffnett is the corresponding author and can be contacted at: goffn1sp@cmich.edu

Dr Omar Keith Helferich's experience includes 25 plus years as a CEO, VP and Partner in consulting covering environmental engineering, supply chain management, and humanitarian/disaster logistics. Keith earned a BS and MS in Civil/Environmental Engineering and an MBA from the University of Michigan and doctorate in operations, logistics and information management from Michigan State University. After a tour as a US Army Missile Officer Keith was employed for five years as an engineer in nuclear, biological, and chemical

safety/environmental engineering for Atomic Energy Laboratories, Westinghouse nuclear power plant safety design, and DOD nuclear weapons testing. He continues as a 20 year Red Cross disaster logistics volunteer with assignments at Oklahoma Bombing, Mississippi Floods, transportation incidents, WTC 2001, and major hurricanes. Keith is currently a CMU professor teaching logistics and humanitarian relief. Dr Helferich's professional emphasis is applying improvement models to humanitarian logistics.

Dr Eric Buschlen is an Assistant Professor of Leadership Studies at Central Michigan University. Prior to this, he served as a Director of Student Life. Through this broad experience base of working with students out of class and within the classroom, he has developed a keen direction for leadership education. He earned a BA in Communication from Saginaw Valley State University and from Central Michigan University he earned a MA in Interpersonal and Public Communication, and an EdD in Educational Leadership. Dr Buschlen has received multiple teaching awards. He has published in leadership journals such as the *Journal of Leadership Education* and has presented both nationally and regionally through NASPA. His research focusses on student leadership development by measuring undergraduate leadership education and student service endeavors. He has consulted with many local colleges, universities, and high schools to enhance their student leadership offerings.