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Linking the principles of supply chain management to aid and development: A case study - Waters of Ayole'

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Keywords

linking, study, aid, case, management, waters, chain, supply, ayole, principles, development

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LINKING THE PRINCIPLES OF SUPPLY CHAIN MANAGEMENT TO AID AND DEVELOPMENT: A CASE STUDY - WATERS OF AYOLE'

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Abstract

The current protocols used in humanitarian aid management date back to the 1970's. Since the introduction of these protocols, there is little evidence to suggest that a paradigm improvement in overall efficiency has occurred in humanitarian aid compared for example, to industrial process improvements within the same time frame.

Fundamentally, humanitarian aid is an end-to-end process demonstrating similar aspects to any other business organisation (for profit or not). This raises the possibility that the use of supply chain theories, including the Supply Chain Operating Reference (SCOR), are relevant and can play a part in developing initiatives to improve the end-to-end process for humanitarian aid management.

Through a case analysis of the "Waters of Ayole'", this paper will discuss how implementing SCOR in the planning process creates the potential for the development of logical and measurable frameworks to provide secure, practical protocols for the end-to-end process of the delivery of aid initiatives, which would at the same time reduce waste.

Key Words

Humanitarian Aid Management, Strategic Supply Chain Management, SCOR, Strategic Decision Making

1.0 Introduction

In looking at ways to promote a better perception of how government agencies and non-government organisations spend donor dollars for the disbursement of aid funding, the priority by many institutions has been to develop better policies that will compliment this aging model of aid programming.

The model for programming a humanitarian aid initiative is based on '*management by objectives*' theory better known as Log Frame Analysis (LFA). USAID began using LFA in the 1970's and it is now adopted by a large number of international and government agencies as the preferred model for creating development initiatives.

LFA is an analytical management tool to help strategic decision makers analyse existing situations. Identifying existing situations involves participatory learning approaches to understand the root cause of the problem and who it impacts the most (Roark et al 1988). LFA identifies key stakeholders and how they will be affected and benefited; identifies risks in the effective delivery of an aid initiative. A humanitarian aid initiative has components that include a number of variables such as technical, geographical, organisational structures and the phasing of activities (AusGUIDE 2000). In delivering an aid initiative LFA is determined under project management control. It provides a hierarchy of aims and outcomes and how they can be monitored.

For the effective delivery of a humanitarian aid initiative, policies are implemented to assist in the management of risk. However, the call for the effective delivery of humanitarian aid is not bringing into question the reliability of these policies. What is being questioned is the current method of planning and implementing an initiative using current management protocols.

2.0 Background to Humanitarian Aid Management

In assessing the delivery and return of micro humanitarian aid initiatives many questions have been raised about the overall effectiveness of such initiatives. Questions are raised about end-to-end flow and why were there gaps in achieving the objectives and goals of many initiatives.

In reviewing the literature on humanitarian aid and Supply Chain Management the analysis revealed that a large portion of literature focussed on developing LEAN and agile supply chains for disaster relief and food distribution humanitarian aid (Oloruntoba and Gray 2006). There is little literature that looks at other forms of humanitarian aid (i.e. the seven areas that are the focus for the Millennium Development Goals). The literature in general indicated that humanitarian aid (specifically disaster relief and food distribution) has included a "recognisable" Supply Chain operating under the same "laws of supply" as other supply chains. However there was little evidence to support the analysis. As such an experiment in the form of analysis of a publicly available case study was conducted to determine if the basic "laws of supply" could be overlaid onto a humanitarian aid case study.

3.0 The Rationale That Humanitarian Aid Organisations Possess a Fundamental Value Chain and the Similarity of Humanitarian Aid with Management Protocols

A key element that can be recognised is that a humanitarian aid initiative demonstrates the basic fundamental principles of Demings View of a Production System (see Figure 1) and, with it, that they should share the legacy of modern management and customer improvement systems.

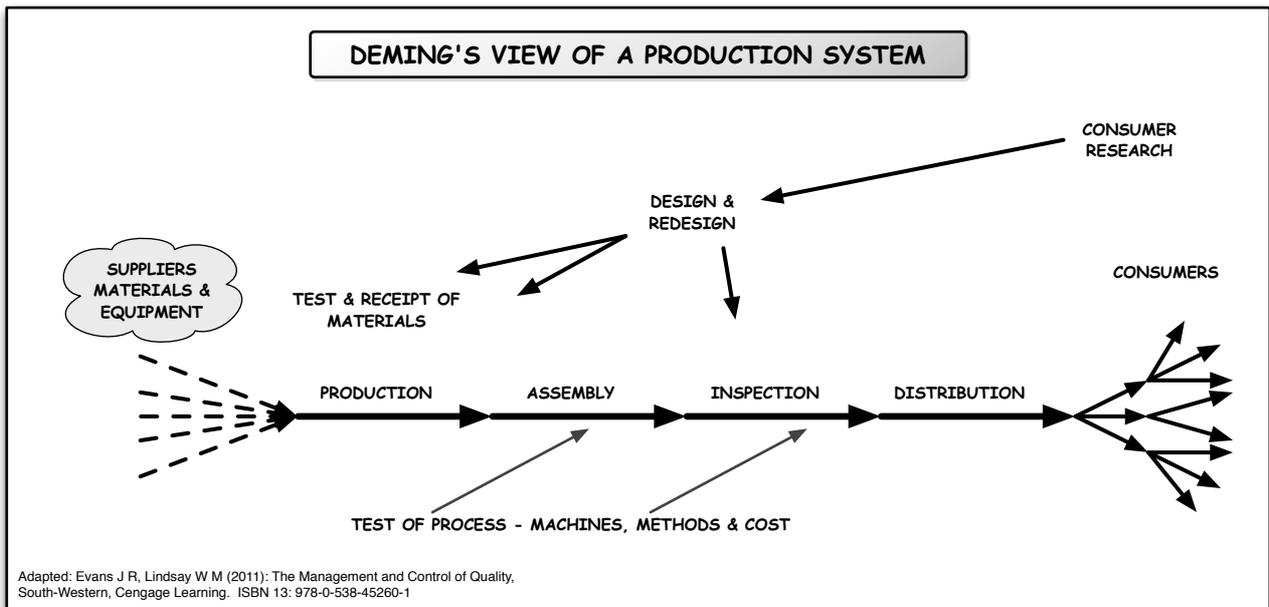


Figure 1: Deming's View of a Production System

Importantly, the fundamental elements of “input - process - output” (see Figure 2) present in Demings model are inherent in any commercial or not for profit organisation. Moreover, the “input - process - output” or Value Chain model is present in any humanitarian aid initiative, where it can be demonstrated for example that “input” may include the donation of funds or services, “process” could be the collation of medical or agricultural goods, and “output” could be the distribution of those good to the recipients. As such, this model provides the tangible link between the process of humanitarian aid and the process of other activities such as commercial businesses or not for profit endeavors.

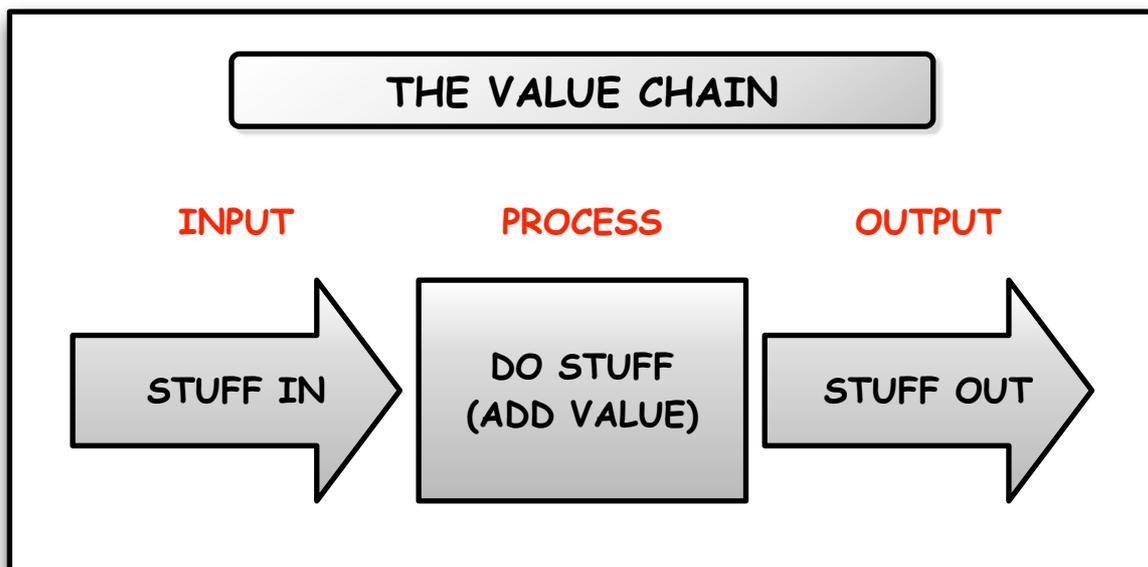


Figure 2: The “Input - Process - Output” or Value Chain Model

In recognising that humanitarian aid initiatives demonstrate input, process and output, and that the core elements can in fact be coupled to other “external” elements, then it can be said that humanitarian aid initiatives are in fact supply chains.

The identification of a “humanitarian aid supply chain” raises the possibility that the use of other supply chain theories and frameworks such as the Supply Chain Operating Reference (SCOR) can play a part in developing an initiative's end-to-end process. The addition of a framework like SCOR provide benchmarks that can monitor success. Implementing SCOR in the planning process creates the potential for creating logical, measurable frameworks to develop secure, practical processes for the end-to-end process of the delivery of aid initiatives.

3.0 SCOR

The Supply Chain Operating Reference (SCOR) framework was developed in 1997 (Cohen and Roussel 2005). SCOR helps analyse processes of a supply chain from an operational perspective (Zhou 2011, Siegl 2011). Because each process relies on each other, SCOR was originally developed with business processes, reengineering, benchmarking and process measurement across the functional framework of the supply chain to measure, evaluate and configure an organisations supply chain (Li 2011).

SCOR has three formal process levels. Level 1 focusses on the 5 major supply chain processes of Plan, Source, Make, Deliver and Return (Cohen and Roussel 2005). The planning process focuses on the entire supply chain. The aim of the planning process is to meet strategic goals. This can be done through the creation of an information system to improve flow. The planning process balances resources (Siegl 2011) by balancing the aggregate demand and supply process. This will develop a course of action that meets the sourcing, make, delivery and return process (Zhou 2011). The Source process is about meeting planned, anticipated and actual demands with the right amount of raw materials and service by establishing long term relationships between recipients and suppliers (Siegl 2011, Zhou 2011). The Make Process transforms the raw materials and services to the finished product. For an effective result, the measurement of quality in the infrastructure and production may use frameworks such as:

- Just-In-Time (JIT)
- Total Preventative Maintenance (TPM)
- Human Resource Management (HRM)

These specific frameworks are a way of ensuring quality (Zhou 2011). The Deliver process is where the end product and service meets the anticipated and planned demands (Siegl 2011).

The Level 2 process considers the market, product and company constraints so that the internal and external core processes developed in Level 1 can be reconfigured (Zhou 2011). By reconfiguring the supply chain processes a level of flexibility begins to develop that can assist in aligning an organisations infrastructure (Cohen and Roussel 2005). At level 3, the ability to measure best practice for each activity is able to be identified (Huang etal 2005; Persson 2010, Siegl 2011, Zhou etal 2011). This level identifies the underlying processes defined in level 2.

Siegl (2011) and Hwang (2011) include levels 4-6. Level 4 activities focus on organisational design, process systems and individuals within an organisation (Siegl 2011) and defines specific Supply Chain management processes to increase the level of efficiency within the marketplace. The level 4 process identified by Siegl (2011) can be found in the sourcing process in level 1 (Zhou 2011).

Hwang (2011) includes levels 5 and 6 as part of the SCOR process. Level 5 is concerned with planning of activities within each task. This level forms part of level 1 where the planning process includes activities of plan source, plan make, plan deliver and plan return. Whang (2011) includes level 6 as being concerned with describing the rules within each activity. Each process identifies procedures and processes that conform to best practice rules and is a duplication of what is performed in level 3 (Figure 3 provides an illustration of the basic SCOR model with an identification of the Value Chain model within it).

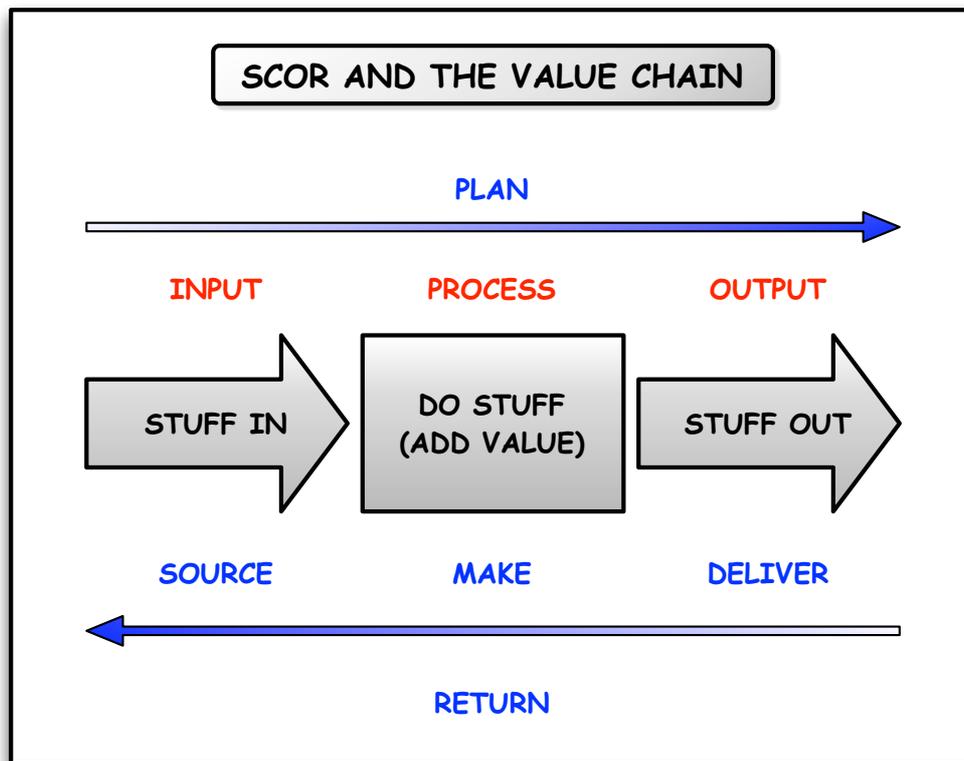


Figure 3: SCOR and the Value Chain

4.0 End-To-End Configuration

The process of managing an organisation strategically needs to have an effective framework. Cohen and Roussel (2005) see that the focus of attention on developing a strong framework is not about end-to-end distribution but end-to-end supply. Therefore, end-to-end configuration is concerned with the flow of goods and services from conception to delivering to the end customer (i.e. or recipient).

5.0 Strategic Supply Chain and its Application for Humanitarian Aid

An organisation's supply chain has an end-to-end configuration. For humanitarian aid organisations the customer is at both ends of the chain¹. Donors and stakeholders are customers. SCOR can communicate the way different levels of processes work independently and also, how they interact.

¹ This poses the question, is humanitarian aid management a supply chain that can be described linearly and therefore within the context of traditional supply chain theory, or does it consist of a more complex closed loop system or random / non-rational variant - this is however, outside the scope of this work.

The scope of a humanitarian aid initiative is to incorporate all the interactions from end-to-end. This network, when identified, will detail the supply chain of the aid initiative. SCOR can identify and measure the way financial, human resources and procurement interact. This information can be used to assess how this initiative compliments the business' strategy and the way in which an organisation can communicate back to its key stakeholders or customers in terms of a "scorecard" for setting and managing the performance targets of a planned initiative (Chen and Roussel 2005).

6.0 Case Study - Waters of Ayole'

The following case study uses Roark (1988) as a basis for the evaluation. Roark provided the best overview of the WASH program for the relevant period.

In recognising the phenomena of humanitarian aid initiatives mimicking a supply chain system, the Waters Of Ayole' case study demonstrates that the structure is reliant on activities and frameworks such as SCOR to reduce risk and increase effective delivery of outcomes and involves many partners that have mutual objectives. This is an important breakthrough because it raises the suggestion that business principals such as end-to-end configuration and supply chain management that are applied to profit based entities, can also apply to the not for profit industry and in particular to humanitarian aid.

The village of Ayole' is situated 130 km from Lome, the capital of Togo (Figure 4). At the time of the study, it had a population of over 10,000 people. During the 1980's the Amlame region was one of many set apart for the purpose of providing safe drinking water and sanitation.

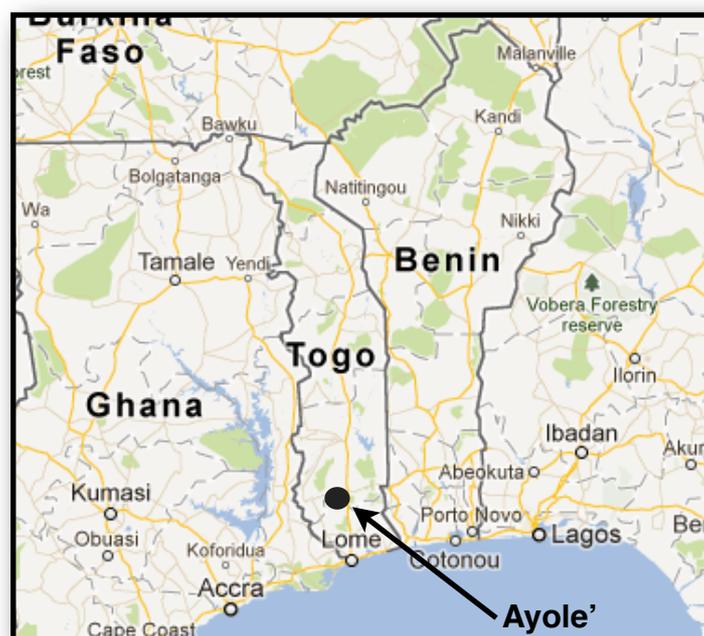


Figure 4: Map of Togo
(Sourced www.google.com/mapmaker?tab=mm)

Up until the introduction of this initiative the main source of water for rural people in Togo was from traditional sources such as shallow wells, ponds and rivers. The quality of water was dubious and without guarantee of supply. The initial plan was to provide 400 drilled and functioning wells

to 128,000 people in 350 villages of the Plateau and Savannah regions. An extension program was developed to extend the funding of this program to be completed by 1987 (Roark et al 1988).

The new objective was to increase construction to 1048 wells and pumps for 600,000 people in 864 villages. This program was again extended From 1988 to 2000. Togo became one of 20 African nations to benefit from the Water and Sanitation for Health (WASH) project (Hafner 1989). The total cost of this program was approximately US\$422 million (Hafner 1989).

The principal donors for the initial water supply project were; USAID, French Fund for Aid Cooperation, European Development Fund, Peace Corps and the Government of Togo who provided approximately (US)\$17 million to complete the initial project. This equalled \$19,000.00 per village or \$24.00 per person. The construction of wells expended 57% of donor funds and 25% of funds were attributed to community development (Roark et al 1988).

The project design was developed from an organisational or relational perspective. It was designed as a top down approach. There were problems with the construction phase as there was a 2 year delay in procurement of the pumps for the boreholes. It was found that one third of the 1578 boreholes were dry, 15% had bacterial contamination and 340 boreholes were without pumps for up to 2 years. Each foot pump (i.e technology) cost approximately \$900.00 and the testing and drilling of each well was approximately \$8300.00 (Roark et al 1988).

The difficulties experienced in implementing the planned initiative related to the supply chain process. The goals of supplying water was not shared because of the limited consultation between government agencies and with the local villages (end-to-end communication). The agreed goal from a government and donor perspective was to improve the health of the people in both rural and urban areas by providing clean, safe supply of water and sanitation systems (i.e. a defined end user and end customer).

The government and villages had a different perspective on specific functions such as; who would maintain the pumps after the wells were drilled and the pumps installed? There were delays in the processing of funds and project coordination problems that caused delays in the delivery of the pumps. The reason for the delays could not be defined. A review at the end of the project realised that the procurement method and system could have been better developed (Roark et al 1988).

After the USAID program was completed the next phase of funding from UNICEF realised that a special emphasis needed to be placed on the inclusion of community development and health education components. This was due to the recognition on the part of the Togolese Government and funding agencies alike that: communities who where expected to maintain the water and sanitation equipment need to be prepared organisationally to fulfill their responsibility (i.e. self empowered work group, a basic principle of LEAN). As a result of shared communication, communities will be more likely to fulfill this responsibility if they are aware of the health implications of the improved water supply.

However, this specific program of providing education and participatory development was severely hampered by financial constraints. The lessons learnt from the program in 1981 compared with the extension of the program from 1988 saw the realisation that participatory training methods were necessary for getting better results (again, a basic principle of LEAN).

The WASH team saw that this was the best method to engage members of each village to make the program work (Roark et al 1988). Other issues that were a problem that needed to be addressed included:

1. Lack of appropriate water and sanitation policies and coordination
2. Unclear and uncoordinated divisions of responsibility between governments and agencies
3. Lack of manpower skills
4. Lack of suitable design and contracting procedures
5. Lack of sound management procedures
6. Lack of adequate measuring of performance or performance monitoring (Hafner 1989)

6.1 The Waters of Ayole' and the Identification of SCOR.

SCOR was identified both visually from the 'Waters of Ayole' documentary and from Roark's (1988) review of the program.

6.1.1 Plan

Oloruntoba and Gray's (2006) review of humanitarian aid initiatives suggest that there is evidence of a frequent lack of planning in humanitarian supply chains, resulting in inefficiencies, for example failure to pre-plan stocks, congestion caused by unplanned deliveries, and a lack of inter-organisational collaboration for information systems. This was one of the areas that the review of the USAID program distinguished as being a problem area (Roark et al 1988).

The strategic goal was to design a program that provided safe drinking water and sanitation to rural and urban areas of Togo and to assist in reversing the high level of infant mortality due to waterborne diseases and diseases related to poor sanitation.

The planning process did not balance the resources necessary for the rest of the processes to flow smoothly. Between the end of the first program in 1981 and the development of the WASH program in 1988, several changes needed to be made in the planning stage. Several of the components, outputs and activities were planned differently. This included working with government agencies to:

- Strengthen community development knowledge
- Strengthen the skills of the Government field agents
- To establish Village Development Committees
- To establish a pump maintenance system
- To educate communities to use safe drinking water
- To assist communities to recognise and act upon any health problem
- To assist each village in implementing a project around an identified health problem
- To confirm the central role women played in the planning and management of the community water supply activities
- Participatory training methods were systematically used at all levels from the region to the village (Roark et al 1988)

6.1.2 Source

The coordination of a project as complex as the rural water supply program to the rural areas of Togo was likely to be problematic. The ability to meet planned, anticipated and actual demands were inherently problematic because of the need to coordinate highly technical activities with social interventions (Roark et al 1988).

At the end of the USAID program, approximately 340 villages had not been equipped with a pump, some for more than two years. There was little or no recipient supplier relationship and this saw at least 80% of the active pumps being out of service. The coordination of repairs became a problem because of the uncertainty of who was responsible for maintenance and ensuring the availability of parts.

The other coordination issue related to the lack of provision of new pumps because of poor procurement strategies. Roark's (1988) review of the program found that the failure in the delivery of the pumps was not clear and the reasons were disputed among the different organisations involved in the project.

6.1.3 Make

The Make process came in two phases. The drilling of the boreholes was well coordinated and there was an increase from 34 boreholes per month to 38 boreholes per month. The drilling techniques and methods were suitable for the geological conditions within the project area. Roark's (1988) report indicated that a success rate of 66% was considered good in relation to the condition of the aquifers.

The installation of the pumps was the second phase. The institutional framework developed to manage changes to the program did not function as well as designed. Spare parts had not been stocked in sufficient supply at the designated stores, resulting in further delays. Spare parts become more expensive than planned indicating a breakdown in maintaining inventory/replenishment/present time maintenance.

There were administrative delays in obtaining funds that would further delay the maintenance system. The result for the villages with working pumps meant that when the pumps did break down it was beyond their capabilities to repair them. This resulted in delays of several months before technicians were able to respond to repair requests. Other issues were:

1. Cost of replacing the bladder² was expensive
2. The bladder was guaranteed, yet it was unknown how many were replaced for free
3. Insufficient number of repairmen and spare parts

6.1.4 Deliver

From observing the results and efficiencies of the project, the end product and service did not meet the anticipated and planned demands or indeed the warranty period. This resulted in increased costs and this reduced the cost/value rates for the initiative. In the early stage of the program the

² A critical component of the pump

source and deliver aspects were not planned to cope with potential and latent problems such as poor water quality and equipment failure. Eventually the plan was reconfigured so that the source and make process became well³ developed to cope with product problems or failures. Efforts were being made by the government and aid agencies to deal with failures in the "supply chain". With the development of simple procedures (standards and protocols), major problems that could prevent the supply of safe drinking water were resolved within 24 hours of the problem occurring (agile supply).

6.1.5 Return

The return process in humanitarian aid is not specifically about providing financial profit. In the case of humanitarian aid management "profit" is where the outcomes of a planned initiative builds capacity in human capital. An increase in the level of human capital will result in a reduction of people living in extreme poverty, and any improvement in the supply process will free funds to increase or broaden the recipient base.

Not having access to safe drinking water (a logistic issue) can push families and villages into living in extreme poverty. Safe drinking water is important to the life of a village. An increase will add and grow the human capital of a family or village (Myer 2000). From this case study, the return process saw the development in the form of capacity building projects within the village.

Increasing human capital for the village of Ayole' saw the recovery of traditional methods to sustain their lifestyle. It saw the development of collective agricultural fields to fund future development projects (increase in wealth [profit from good Supply Chain Management]/reduction in waste/better use of resources i.e. human capital). In the village of Ayole', the success in developing the traditional activities of village life was attributed to the improvement in village health because of the provision of clean water. Having a clean water source returned the village back to living a sustainable existence with a measurable increase in wealth generation in the village.

7.0 Analysis of SCOR from The Waters of Ayole' Case Study

The Waters of Ayole' demonstrated that outside the boundaries of the planned initiative development had begun on creating methods and procedures that would reduce the delay in maintaining a safe and secure supply of clean water. From the development of a village committee, the identification of a local repairer to the surity of parts from the government via recommended supply agencies, a supply chain was developed. This supply chain confirmed the existence of an end-to-end process. This process ensured that the flow of goods and services was maintained to provide a continuing supply of safe and secure drinking water for villages in the Amole region.

Roark's (1988) review of the program noted that 25% of funding went towards the introduction of a participatory learning and action approach. This allowed the extension agencies and the government to understand the needs of the people (customer/stakeholder) and together develop strategies that closed the missing links in the development chain. What was re-designed was an end-to-end configuration system. The redesigned plan sourced what was needed to ensure the sustainability of the project. Once all the parts of the program were sourced it allowed the make process achieve the goal of sourcing a supply of sustainable safe drinking water.

³ Cost of rework

From a strategic perspective humanitarian aid initiatives has a beginning and an end. In each stage of the process SCOR can be seen in action. When the pump needed servicing it was conducted quickly and effectively because at the planning stage the infrastructure and human resources had been sourced and developed to manage the problem and rectify any maintenance problem within a 24 hour period. The continuous supply of safe drinking water created an ongoing effect within the Ayole' village. As the health and level of well being of the villagers increased so did access to a collective supply of revenue for further development work. The village became less reliant on government funding to survive and became both profitable and sustainable.

8.0 Conclusions

The Waters of Ayole' demonstrated the view that the application of SCOR within a humanitarian aid initiative verifies that it is in fact a Supply Chain (i.e. in its simplest terms, a demonstrable case of "input - process - output"). This is an important first principle for improving the effectiveness and impact for humanitarian aid initiatives into the future.

The Waters of Ayole' also provided insight for development agencies into how an effective supply chain management framework can measure the performance of the supply chain. This measurement can develop processes and procedures that will create consistent end-to-end flow for the purpose of achieving (for key stakeholders) a sustainable result that a policy alone cannot remedy.

The Waters of Ayole' Case Study highlights the importance for humanitarian aid agencies to audit their internal and external relationships of their entire supply network. An end-to-end configuration perspective will need an appropriate method to support it in a sustainable way. What appears to be missing from an overview of current methodology in programming an aid initiative is that managing the process of providing aid has no procedures or ability to measure the safety in the delivery of aid initiatives output. A review of the literature reveals that a model (SCOR) was in existence and at that time had not been theorised or formally developed.

The Waters of Ayole' as a humanitarian aid initiative confirms that the development of an initiatives architecture may benefit from the inclusion of Supply Chain Management principles such as SCOR in its planning and rollout, to document and measure the supply chain from an end-to-end perspective to assist in the effective delivery of a humanitarian aid initiative.

9.0 Recommendation for Further Work

At present there is little research currently being undertaken that focusses on Supply Chain Management principles and humanitarian aid. Further work needs to be conducted into how Supply Chain theory can potentially support the effective delivery of all forms humanitarian aid currently being provided for developing nations.

This paper has demonstrated that, in principle, strategic supply chain management theory, and in particular SCOR principles, can be applied to the management of humanitarian aid. It is recommended that a program of work be conducted to map SCOR within real world examples of humanitarian aid initiatives to establish if there is evidence to substantiate the work to date.

References

- Cohen S, Roussel J 2005. Strategic Supply Chain Management: The Top 5 Disciplines for Top Performance. McGraw Hill, New York, NY, USA.
- Evans J R, Lindsay W M (2011): The Management and Control of Quality, South-Western, Cengage Learning. ISBN 13: 978-0-538-45260-1
- Hafner C. 1989 Water and Sanitation Sector profiles of Twenty African Countries. Water and Sanitation for Health Project June 1989.
- Hafner C. 1989 Strategy Recommendations for Water Supply and Sanitation in Africa. WASH Field Report No.290, Water and sanitation for Health, USAID, Washington DC, USA.
- Huang S H, Sheoran S K, Quester H 2005. Computer-assisted supply chain configuration based on supply chain operations reference (SCOR) model. Computers and Industrial Engineering 48 (2005) 377-394.
- Hwang Y-D, Lin Y-C, Lung Y 2008. The performance evaluation of SCOR sourcing process-The Case Study of Taiwan's TFT-LCD industry. International Journal of Production Economics 115 (2008) 411-423.
- Li L, Qin S, Xu C 2011. Ensuring supply chain quality performance through applying the SCOR model. International Journal of Production Research. Vol. 49, No.1, 1 January 2011, 33-57.
- Lockamy III A, McCormack K 2004. Linking SCOR planning practices to supply chain performance - an exploratory study. International of Operations and Production Management. 2004, 24, 11/12, ProQuest Central p.1124
- Myer, B. (1999), *Walking With the Poor*, Orbis Books, New York, USA.
- Oloruntoba R, Gray R 2006, 'Humanitarian Aid: an agile supply chain', *Supply Chain Management: An International Journal*, 11/2, pp. 115-120
- Persson F 2010. SCOR Template - A simulation based dynamic supply chain analysis tool. International Journal of Production Economics, 131 (2011) 288-294.
- Roark P, Aubel J, Hodin K, Kankarti O, Mafra teal 1988. Final Evaluation of the USAID/Togo Rural Water Supply and Sanitation Program. Water and Sanitation for Health Project, Office of Health, Bureau for Science and Technology, US Agency for International Development, Washington DC.
- Siegl M J Major 2008, Understanding the Supply Chain Operation Reference Model. Army Logistician, May/June 2008, 40, 3, ProQuest Central pg 18.
- Waters of Ayole' 1988. Funded by United Nations Development Program, Written and Produced by Sandra Nichols, Sandra Nichols Production.
- Evans J R, Lindsay W M (2011): The Management and Control of Quality, South-Western, Cengage Learning. ISBN 13: 978-0-538-45260-1