An Investigation into Establishing the Validity of the Supply Chain Operations Reference (SCOR) Model within Aid and Development Initiatives

Mark Grierson Edwards

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An Investigation into Establishing the Validity of the Supply Chain Operations Reference (SCOR) Model within Aid and Development Initiatives

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This thesis is presented as part of the requirements for conferral of the degree:

Masters of Business Research

The University of Wollongong
Sydney Business School

August, 2018
Declaration

I, Mark Grierson Edwards, declare that this thesis is submitted in partial fulfilment of the requirements for the conferral of the degree Masters of Business Research, from the University of Wollongong, is wholly my work unless otherwise referenced or acknowledged. This document has not been submitted for qualifications at any other academic institution.

________________________________________
Mark Grierson Edwards

Date: 31st August, 2018
Abstract

In 2016, USD$142.6bn was invested into the global Aid and Development sector. Unfortunately, up to 30% wastage and 22.85% overhead and retention costs have been recorded in Aid and Development programs, at a time when more funding is needed to raise developing nations out of poverty. The inefficiency of Aid and Development programs can, in part, be attributed to the management, standard and quality of the aid agencies supply chain systems. An interesting question arises around the feasibility of transferring commercial supply chain systems management protocols and standards into aid agencies with an expectation that, if successful, similar efficiency gains would be observed in Aid and Development programs as they are in commercial organisations continuing to use the same protocols and standards.

The Supply Chain Operations Reference (SCOR) model is the recognised “gold standard” for commercial supply chain systems management and improvement. This work seeks to establish if the six primary management processes of SCOR could be overlaid onto the supply chain systems of aid agencies. To achieve this objective, this work has adopted a comparative case study approach to map the supply chain systems of three Aid and Development programs to investigate if the core elements of SCOR are present within these supply chain systems.

The findings of this work suggest that despite the theoretical divide between aid agencies and commercial organisations, for example culturally, objectively and the institutional language used to describe both types of organisations, the core elements of SCOR were found to be present in the three case studies and it is possible to overlay SCOR onto the mapped Aid and Development supply chain systems of these case studies. The implications of this work are significant, because SCOR could be a positive disruptor in the global Aid sector if adopted by aid agencies.

Along with the identification of the six primary management processes of SCOR within Aid and Development supply chain systems and the determination that SCOR does represent a valid alternative management framework for Aid and Development programs, this work has also contributed by identifying the atypical nature of Aid and Development supply chain systems, and the unit of standard in which to measure SCOR within these supply chain systems. The mapping process for an Aid and Development supply chain system has also been established, along with the foundation principles of forensic supply chain auditing.
Acknowledgement

I would like acknowledge the assistance of Dr Lee Styger for his knowledge, insight and direction without him this work would not have been written. His ability to see the big picture of what I am researching and his experience and wisdom to pursue what is important and relevant.

I would like to thank the UOW Supply Chain Management research team of Pauline Ross, Carol McGowan, Pradeepa Jayaratne and Peter Critchley for their assistance and camaraderie as we explored and discovered together knowledge building aspects of Supply Chain Management theory. For Lauren Richardson in providing her expertise in road-mapping the breadth and depth of getting the right information for my literature review.

I finally would like to thank Helen Edwards for her ongoing support and interest in my research work.
Published Works


# Abstract

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List of Abbreviations

3PL - Third Party Logistics
4PL - Fourth Party Logistics
APICS - American Production and Inventory Control Society
CSR - Corporate Social Responsibility
DAC - Development Assistance Committee
DLA1 - Dadaab Lead Agency
DLA2 - Dadaab Donor Third Party One
DLA3 - Dadaab Donor Lead Agency Kenya
DTP1 - Dadaab Donor Third Party Two
FAC - Fonds d'Aide et de Cooperation (France) (Fund for Aid and Cooperation)
FED - Fonds European de Development (European Development Fund)
GIZ - Deutsche Gesellschaft fur Internationale Zusammenarbeit
GNI - Gross National Income
GNP - Gross National Product
IMF - International Monetary Fund
IP - Intellectual Property
IT - Information Technology
LFA - Log Frame Analysis
MDG - Millennium Development Goals
NGO - Non Government
NFP - Not For Profit
ODA - Official Development Assistance
OECD - Organisation for Economic Co-operation and Development
ROI - Return on Investment
SCOR - Supply Chain Operations Reference
TBC - The Brandt Commission
WCED - World Commission on Environment and Development
CHAPTER 1 - INTRODUCTION
1.0 Introduction to Chapter 1

This work investigates the mapping of Aid and Development Supply Chain Systems. By using this method to establish if the six primary management processes of the Supply Chain Operating Reference (SCOR) model can be overlaid into the Aid and Development supply chain system with a view to using SCOR as an operational tool within Aid and Development programs.

In 2016, USD 142.6Bn was invested within the global Aid and Development sector by developed nations, indicating at least a commitment by developed nations to raising developing nations out of poverty (OECD 2016). However, the concept of Aid and Development is not new, formal systematic programs date back to as early as 1812 when the US Congress passed legislation to provide funding and other support for their colonised subjects (Hjertholm and White, 1998, p. 4). Early history suggests that few policies or importantly processes were established in early programs. This led to fragmentation within operational terms and also the emergence of, often, conflicting agendas and outcomes (Picciotto, 2007, pp. 13,20).

Fragmentation and conflicting objectives appear to have become the norm within the Aid and Development context. This has in turn led to a common belief that many Aid and Development programs are rife with fraud, corruption and enable “dipping” (i.e. theft) along the way (White, 2007, p. 11, Overstreet et al., 2011, p. 118 and Burnley, 2010, p. 3). Indeed studies by Petitt and Beresford (2009, p. 450) for example have suggested that some programs have as high as 30% wastage, thus supporting the accusation of corrupt management and all too often calling into question the validity of Aid and Development programs as a means of improving the quality of life for the citizens of developing nations.

The validity concerns of Aid and Development programs are further exacerbated by suggestions that many Aid and Development agencies are inefficient in their management and distribution of funding and/or self serving in terms of the funds retained within the Aid agency and its program partners. Walker (2007, p.8) attempts to illustrate the overhead and retained costs for organisations involved in Aid and
Development programs, but admits that it is difficult to gain an accurate picture of these costs. Published overhead and retained costs include:

- Retained costs between 3% - 15% of program value per supply chain system node (Walker 2007, p. 8)
- Administration costs between 5.7 and 6.1% (Nunnenkamp 2012, p. 81), while Australian Federal Government cap the administration costs at 10% per program (DFAT 2015)
- Evaluation costs 5% (Werker and Ahmed 2007, p. 24)

Assuming that the values noted above are representative of the sector, the average percentage of the overhead and retained costs is 22.85%\(^1\) (This may vary some of the time. Appendix 7 provides a table outlining the calculations used in the footnote.) of the total Aid and Development program value. Importantly, this figure could represent the extraction value at each node in the supply chain system (Walker 2007, p. 8) suggesting that:

\[ A \text{ law of diminishing impact exists regarding actual recipient value as a percentage of program value, compared to the size of the Aid and Development supply chain system (nodal links) that exists to serve the program} \]^2

(Edwards & Styger, 2017)

There could be several reasons why many Aid and Development programs lack the efficiency that would be generally expected of, for example, more commercial supply systems. It is not the intent of this work to investigate all possible risk and failure nodes within Aid and Development (A&D) supply chain systems, but rather to take a systems approach (Caddy and Helou, 2007, p. 322) to establish and map how Aid and Development programs operate and if commercial supply chain management principles

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\(^1\) Based on the average sum of 5%*15%/2=10%, 5.7%*10%=7.85%, 5% - Resultant average = 22.85%

\(^2\) This observation has profound implications regarding the effectiveness, efficacy and governance of Aid and Development programs, and of itself warrants further research. Although outside of the scope of work for this research, as this work does not focus on how administration costs and retained funding affects recipient value. Appendix 7 provides a brief narrative and a table representing retained funding scenarios in multi-nodal supply chain systems.
could be applied to Aid and Development programs with a view to improving their efficiency, management and governance.

During the early stages of the work, it became apparent that the management of the system of Aid and Development programs did not conform to recognised standards such as ISO 9001:2015: A Complete Guide to Quality Management Systems or those by the APICS for example. However, standards do exist within the Aid and Development sector and this is to be discussed later in Chapter 3.3. Yet, collateral data collected during the research indicated that managers involved in Aid and Development systems management were more focussed on nebulous measurements in terms of “good works” rather than the efficiency of the system (see Section 2.5). Those involved in Aid and Development systems management typically focussed their effort and measured their performance in terms of shared value, community impact and benefit to the recipient of the work (Ranis 2007). This is in direct conflict with more typical performance measures generally quoted in the literature (Georgise, 2012, p. 3) for commercial supply chain systems managers who measure end-to-end collaboration, efficiency, waste/cost reduction and benefit to the corporation or shareholder in terms of retained profit at the focal node.

The initial motivation for the work was triggered by the question; what would result if an Aid and Development supply system could be managed like a commercial supply chain system? To begin to investigate this question rigorously it was first necessary to establish if sufficient similarities could be identified between an Aid and Development supply system and a commercial supply system. If a similarity could be established then could a commercial supply chain management system (i.e. the SCOR standard) offer a valid and standard approach to managing and improving the efficiency and efficacy of Aid and Development supply chain systems (See Section 1.5). 

Aid and Development is highly competitive as indeed is Commercial Supply Chain and Logistics. SCOR is an international performance enhancer for Supply Chain Management. By viewing Aid and Development as a Supply Chain and applying SCOR

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3 APICS (formerly known as the American Production and Inventory Control Society) merged with the Supply Chain Council in 2014
then the findings for this research indicate that better performance in the form of delivery to the recipient and overall transparency removal of the grey zones would indeed improve the overall performance of the case studies in the form of tangible delivery to the recipient. The significance of the research is that a SCOR atypically viewed commercial methodology has never been considered applicable to any Not For Profit organisation, and, in the context of this work, Aid and Development. As such, this work demonstrated that if the juxtaposition of For Profit and Not For Profit can come together within a united objective of better service delivery will benefit both the recipient and ultimate primary stakeholder.

1.1 Definition of Aid and Development

We begin with some definitions before looking at the SCOR standard. Aid and Development has many dimensions. For example, it assists with the changes to both social structures and political structures so that growth can occur to ensure an increase in the level of well being. To assist with achieving this freedom and growth, development assistance is provided by developed nations, corporations and individuals to help with key areas that provide access to ensure the functionality of a persons ability to obtain food, water and housing, education and health, freedom both socially and politically (Sen, 2001, CoA, 2012, p. 7). The OECD’s (2011) Development Assistance Committee (DAC) define aid as:

“Grants and loans to countries or territories on the DAC list of ODA recipients and multilateral agencies that are undertaken by the official sector at concessional terms (i.e. with a grant element of at least 25%) and that have the promotion of the economic development and welfare of developing countries as their main objectives in the recipient country as the main objective...”

(OECD, 2011 p.251)
1.2 Principles of Commercial Supply Chain Operations Management, Measurement and Improvement

The principles of commercial supply chain management have long been established in both academic literature and business literature at large (Storey et al (2006)). Typically a supply chain is considered to consist of a series of interlinked nodes that, via logistic activities, add value to a raw material that results in a final, finished product for the end customer. In the context of this work, the end customer (Oloruntoba and Gray 2006) (Principal) is defined as the person or entity who puts “new money” or original funding into the system (i.e. the Aid and Development funder).

There is extensive literature from both academic and business sources that document and describe the typical mapping of a system (Touboulic & Walker, 2015, pp. 36, 37). However, the literature contains little information on mapping a system where the payment for the product or service is not undertaken by the end consumer. As such, in the context of this work, supply systems demonstrating this characteristic are considered to be “atypical” in nature, where the consumer (i.e. the recipient of the output of the supply chain system) is not the Principal or funder. This scenario is typically more often associated with not-for-profit (NFP) and non-government organisation (NGO) activities.

In traditional commercial supply chain systems (Gardner & Cooper, 2003, pp. 46, 56) mapping, the transfer of value from node to node is often easy to establish from either an end-to-end customer point of view, by following a straight forward investigation process of “what happens before” (i.e. retrospective investigation), or from a raw material side by following a process of “what happens next” (i.e. futuristic investigation) (see Figure 3.3). In either instance, the line of inquiry can be mapped as either a flow diagram and/or a time and motion type diagram. Additionally, in both instances of mapping, the values and associated linkages can be established and a model or simulation of the supply chain system produced.
It has long been established that if a system can be measured then it can be improved
(Drucker, 1959, Deming, 1986). The mapping and recording of commercial supply
chain systems was first demonstrated within the manufacturing industry in the 1950’s
through Deming’s interconnected and continuous improvement process, the Deming’s
view of a Production System (Deming, 1986). Deming’s model (see Figure 1.1) has
provided the basis for improvement tools developed over time to enable the
measurement of value, quality and sustainability in commercial supply chain systems
(Bolstorff & Rosenbaum, 2003, Knouse et al., 2009, p. 449, Habib & Junghirpanich,
2010). Post the identification of the system (i.e. the supply chain system map) other
tools existed to improve the system and/or redesign the system and manage it, for
example, Quality Management Systems such as ISO 9001:2015, LEAN, Six Sigma and
Additionally, the system must be mapped if it is to be measured for improvement to
occur. 49).

Figure 1.1 - Deming’s View of a Production System

As noted previously, much work has been conducted to establish robust measurement
tools for traditional “commercial” type supply chain systems, such as SCOR. A
commercial supply chain system is a large system comprising of smaller systems that
work within their own boundaries towards a common goal, the end customer. These
systems have interconnected nodes, each of which adds value to the next (Plenert, 2014,
The measurement of a typical commercial supply chain system is undertaken through the identification of a tangible input of materials or service and the mapping of this tangible constant from input to value added output (Gardner & Cooper, 2003, Hines, 2006). The mapping of the supply chain system identifies the value-addition of the inputs in the system; the process of developing the raw materials into a value added product; the output of the product and its relationship to the customers’ specification and finally the exchange of money for the product or service. It is important to note that the new money entering into a commercial supply chain is paid by the recipient of the goods (the end customer) on the provision of the end product (output). Figure 1.2 illustrates a conceptual commercial supply chain system and the counter flow of money within the System.

![Figure 1.2 - Illustration of a Conceptual Commercial Supply Chain Systems and the Counter Flow of Money](source: Edwards, Ross and Styger (2017))

*Figure 1.2 - Illustration of a Conceptual Commercial Supply Chain Systems and the Counter Flow of Money*
Unfortunately, less work has been conducted around the mapping, measuring and improving of humanitarian Aid and Development supply chain systems that are, by their very nature, more complex and containing more variables due to the plural nature of the products yielded by the system (i.e. the benefit to the principal and the recipient). The literature typically outlines the supply from a limited specific point, such as, how many human hours were invested; the measurement of tangible product being shipped between countries; or, the outcome of grant funding, however, the literature does not provide a discussion on the holistic (end-to-end) measurement of the flow of value within the atypical supply chain system (ARC, 2012, USAID, 2008).

Conceptually, the supply chain systems of Aid and Development can be represented as a linear path from the identification of need or opportunity to an output or deliverable from the system. Although a closed loop of supply is perceived to be present in this supply system, critical interactions and players are not typically identified, because each node represents a destination point within the linear system, rather than a value addition to that system (i.e. from a need/raw material input to finalised output).

An illustration of the conceptual linear supply chain system of Aid and Development programs (see Figure 1.3) was introduced in Edwards, Ross and Styger (2017, pp. 5-6).

Source: Edwards, Ross and Styger (2017, p.5)

Figure 1.3 - Aid and Development Linear Model
The concept of this linear model is that a crisis is identified by the lead agency, who in turn, seek funding from a governing body, when funding is received by the lead agency, second and third tier suppliers are tasked with addressing the crisis (i.e. providing the aid). The measurement of this model typically reports the outcomes of the funding, not the “value for money” attained. The model is reliant on understanding the forward flow of the need, but not systems complexity and the interactions or hierarchical nature of the nodes within. The concept of mapping Aid and Development supply chain systems was tested within this work and it was found that this conceptual model which bore little resemblance to the final mapped models discussed later in Chapter 5 and 6

1.3 The Core Challenges of Mapping Aid and Development Supply Chain Systems

Importantly, two main issues that have been identified in the mapping of Aid and Development supply chain systems:

1. **Establishing the Efficacy of Aid and Development Supply Chain Systems** - Establishing if Aid and Development supply chain systems demonstrate similar attributes to commercial supply chain systems and if so, could improvement tools used within commercial supply chain management and improvement be used to manage and improve the atypical supply chain systems.

2. **Finding the Constants to Map an Aid and Development Supply Chain System** - How to overcome the multiple point of entry into an Aid and Development supply chain system such that the multiplicity of beneficiaries and end customer (i.e. the Principal) associated with an Aid and Development supply chain system is represented accurately within the finalised map.

1.3.1 Establishing the Efficacy of an Aid and Development Supply Chain System

At face value, there appears to be a reluctance in the literature to recognise Aid and Development supply chain systems as supply chain systems at all, let alone, consider the complexities of those systems. Much of this reluctance might be due to main stream researchers following a line of inquiry based on commercial supply chains such as retail (Segetlija and Dujak, 2014), automotive (Madenas et al, 2015), aerospace (Koblen &
Nizni’kovaka’, 2013) etc. Alternatively, it may result due to the focus on linear supply chain systems such as health industry (Bohme et al., 2013), where an entity can be tracked from its entry point into the system, through to its multiple ‘value added’ nodes to an exit point from the system. As such, much of these body of knowledge has focused on the product of the system being the constant and not necessarily the limited input of the system (i.e. money/funding to mobilise the supply chain system) (Christopher, 2011).

1.3.2 Finding the Constant to Map an Aid and Development Supply Chain System

The major challenge of this work to date has been identifying a constant within an Aid and Development supply chain system that could be tracked, measured and used to identify key nodes within the system. Most mapping methodologies focus on using the product in, and output of the product in the supply chain system as a constant. As such, within a traditional supply network it is reasonably straightforward to trace the product, even in its raw form, from the point of entry into the system to its point of exit to the end customer, and therefore making it possible to map and measure it.

This is not, however, often possible within an atypical supply chain system, where the end customer (The Funder) who injects the funding into that system to initiate the “flow” in that system, is not usually the recipient of the end product produced from that system. Put simply, the core challenge and indeed argument, has been that a significant element of an Aid and Development supply chain system - the money provider - is not the recipient, cannot be negated from the mapping process of that system for an easy, convenient fit to a more standard process in a commercial supply chain system.

To add more complexity, the constant that is to be mapped to the end customer, is not readily obvious. The dual beneficiaries in the Aid and Development supply network, the principal (funder) and the recipient of the product of service; do not make an obvious identification of a single constant for measurement.

It was identified by Bohme et al (2013) that the flow of money (funding) could be used as a constant in an Aid and Development atypical supply chain network (See figure 1.3). Funding can be traced from the input by the funder at the beginning of the system,
through to the output that has been created for both the Principal (funder) and the recipient of the system. Using funding as the constant enabled a holistic look at the process because, typically, funding is needed to trigger any supply network functions, including those of Aid and Development programs. Mapping the path of funding through the whole system provides a visual of how the supply system operates, identifying the constraints on the flow of the system and any opportunities to add value.

This method is not without precedence. Bohme et al (2013) successfully mapped the flow of a tangible element through a Healthcare system that was not a product of the system, to map constraints and opportunities. It was further considered that, once the path of funding “disappeared” within the line of enquiry, then tracing the flow of value creation back out of the supply chain system, should provide a more holistic interpretation of the supply chain system under investigation.

1.4 Research Question

Within the constraints and challenges discussed above, the research question was established as:

“Does the Supply Chain Operation Reference (SCOR) framework represent a valid alternative management framework for Aid and Development Programs”.

1.5 Hypothesis

The hypotheses to be tested in this work are:

Hypothesis 1 - By adopting a method of tracking funding from the funding provider (Principal) and returning value to the recipient of services, is it possible to map the supply chain system of an Aid and Development program.

Hypothesis 2 - Aid and Development supply chain systems demonstrate similar common characteristics of commercial supply chains.
This leads to our final Hypothesis - If an Aid and Development supply chain system can be mapped and subsequently demonstrate common characteristics to a commercial supply chain system, then it should be possible to adopt commercial principles of supply chain management to improve the efficiency and efficacy of an Aid and Development program. This should be demonstrated in the overlaying of the six primary management processes of SCOR that should be evident in the systems map of the Aid and Development agency under investigation.

1.6 Methodology

The methodology adopted for this work was a comparative case study analysis where three case studies were selected with a view of gaining triangulation of data (see section 4.2.5) via a field investigation. This is further discussed in detail in Chapter 4. The case studies used for this work were:

1. Case study 1, Amos Aid - A small Australian based Civil Society Organisation (CSO),
2. Case study 2, - Dadaab - A Regional Water and Sanitation Hygiene (WASH) Program.
3. Case Study 3, Waters of Ayole’ - An historically documented case study which was called Waters of Ayole’

1.7 Justification for the Work and Contribution of the Research

As discussed in Section 1.2 previously, much has been written around the design, management, measurement and indeed improvement of commercial supply chain systems. Discussion in Chapter 2 will demonstrate further literature around humanitarian disaster relief systems and management. Unfortunately, comparatively little has been written in the context of, often more longer lasting Aid and Development

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4 In the context of this sector, a Civil Society Organisation (CSO) is defined by the OECD as “non-market, non-state organisation…which people organise themselves to pursue shared interests in the public domain” (OECD, 2009).

5 The names and details of location for this case study was kept confidential at the request of the third party providers. This request was submitted and approved by the University of Wollongong Ethics Committee, approval number HE14/359.
programs. As such, there is little evidence for academics or practitioners to base best practice upon and this could be a contributing factor to the negativity surrounding the sector.

This work makes a contribution to the field of study by identifying the six primary management processes of SCOR with an Aid and Development supply chain systems and providing evidence that SCOR does represent a valid alternative management framework for Aid and Development programs. Further contribution includes the identification of the atypical nature of Aid and Development supply chain systems and a unit of standard to measure SCOR within Aid and Development supply chain systems. The mapping process for Aid and Development supply chain systems has been established along with the foundation principles of forensic supply chain auditing.

1.8 Limitations of the Work

The limitations of this work include:

- The aim of this research is to understand if SCOR could be identified rather than the implementation of SCOR into the broader sector.
- No correlation can be assumed between these case studies and potential other cases. Can the data sourced from the case studies provide sufficient depth to fully map all nodal links and key elements within the supply chain system map or SCOR framework
- Limited amount of formal documentation kept on Aid and Development programs

1.9 Organisation of the Study

In order to satisfy the research question and establish the validity of the Supply Chain Operation Reference Framework as an alternative management tool for Aid and Development program, the remainder of the thesis is structured in the following manner:
• **Chapter 2** - Provides a contextual discussion on Aid and Development from both an historical and contemporary operational perspective.

• **Chapter 3** - Provides a critical review and analysis of relevant literature concerning supply chain theory, design, management, mapping and improvements. This Chapter also discusses the structure of SCOR, its applications, strengths, weaknesses, opportunities and threats to it and process and system mapping.

• **Chapter 4** - Discusses possible research methodologies, focusses on the proposed comparative case study approach and how this approach marries into the mapping and overlying functions of the research.

• **Chapter 5** - Discusses the mapping of the three case studies used in this research and the key observations from the mapping process.

• **Chapter 6** - Draws together the maps from the case studies to develop a single theoretical map for Aid and Development supply chain systems. This chapter then moves forward to overlay the SCOR framework discussed in Chapter 3 onto the theoretical Aid and Development supply chain systems map and the maps of the three case studies that were discussed in Chapter 5. This Chapter then moves forward and discusses the implications of the mapping and overlaying the six primary management processes of SCOR onto the maps and argues that, in the context of the work, SCOR has validity as a framework for managing Aid and Development programs.

• **Chapter 7** - Provides a conclusion to the work suggesting that, if adopted by Aid agencies, SCOR could be become the disruptor of the sector and change agent for improvement. The Chapter closes by suggesting further work including further case study analysis, the expansion of the findings within all levels of SCOR and the development of a working protocol for Aid and Development management professionals.
Chapter 1 provided an introduction to the work, by discussing a gap in research between more “classical” research into commercial supply chain systems that are designed with an end customer in mind and that of an “atypical” supply chain system of Aid and Development programs, where there is a duality of key players, specifically the Principal or funder, who would typically be referred to as the end customer in classical supply chain management theory, and the recipient of the output of the Aid and Development supply chain system.

It was further suggested that if the six primary management processes of SCOR could be established in the supply chain system of Aid and Development programs then, if SCOR was implemented into Aid and Development supply chain systems, it should be possible to improve the efficiency, transparency and governance of such supply chain systems in a similar manner to commercial supply chain systems. This Chapter discusses the background to Aid and Development and provides data on the sector demonstrating the extent of research and the impact Aid and Development has had on the national economies and the global economy.

As such, this research is a suggests that if measurable improvements could be made within the Aid and Development sector and this closed the shortfall of funding and/or increased the flow and inputs within the sector, it may be possible to reduce the inherent waste within the sector, close the shortfall funding and/or increase the flow and output within the sector.

This chapter discusses the following areas:

1. A compact historical perspective on Aid and Development
2. Data on Aid and Development funding
3. Aid and Development processes and planning
4. Aid and Development co-operation and partnering
5. Aid and Development effectiveness
2.1 A Compact Historical Perspective of Aid and Development

The history of Aid and Development can be traced back to the 19th Century when imperialistic nations developed support programs for their colonies (Hjertholm and White, 1998, pp. 10,12). Fundamentally, at this time colonised people were being kept at a subsistent level by their imperial rulers that did not allow them to keep pace with global economic growth. The modern construct of Aid and Development however, appears to have gained traction post the Second World War and the pivotal publication of the Marshall Plan in 1947. Although targeted at the rebuilding of Europe after the destruction left at the end of hostilities, the Marshall Plan also recognised the need for the continuation of funding (aid) to the developing world. At this time, aid was provided for relief assistance and was held in tension with the political expedience of donor nations. Many of the organisations that were created to assist with the reconstruction of Europe became the drivers for promoting the needs of developing nations to the peoples of the developed world. There has been some interesting evolution of these supporting organisations since their inception, for example, Hjertholm & White (1998, p. 10) and Tarp (2000, p. 82) offer some interesting examples such as:

- *Oxfam* - Originally created to assist refugees from Greece
- *CARE* - Originally the Centre for American Relief in Europe, now known as Cooperative for American Relief Everywhere.
- *The United Nations (UN)* - Originally created as the United Nation Relief and Rehabilitation Administration (UNRRA)
- *The International Bank for Reconstruction and Development (IBRD)* - Evolved into the World Bank

A more structured focus for Aid and Development came about in the 1950’s with the economic classifications of:

1. First world nations
2. Second world or Communist nations
3. Third world nations
These classifications were subsequently redefined as:

1. Developed nations
2. Developing nations

There was and remains an early need for Aid and Development programs to align with measurable policies, strategies and deliverables and as the global political landscape changed so did that of Aid and Development. Change was instigated often by the lessons learned from earlier programs. Table 2.1 illustrates the evolution of Aid and Development since the 1940’s.

<table>
<thead>
<tr>
<th>Year</th>
<th>Dominant or Rising Institution</th>
<th>Donor Ideology</th>
<th>Donor Focus</th>
<th>Types of Aid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940’s</td>
<td>Marshall Plan and UN system (including World Bank)</td>
<td>Planning</td>
<td>Reconstruction</td>
<td>Marshall Plan was largely programme aid</td>
</tr>
<tr>
<td>1950’s</td>
<td>United States, with Soviet Union gaining importance from 1956</td>
<td>Anti-communism but with role for the state</td>
<td>Community Development Movement</td>
<td>Food aid projects</td>
</tr>
<tr>
<td>1960’s</td>
<td>Establishment of bilateral programme</td>
<td>As for the 1950’s with support for state in productive sector</td>
<td>Productive sectors (e.g. Support to the green revolution) and infrastructure</td>
<td>Bilaterals gave technical assistance (TA) and budget support; multilaterals supported projects</td>
</tr>
<tr>
<td>1970’s</td>
<td>Expansion of multilaterals, especially World Bank, IMF and Arab funded agencies</td>
<td>Continued support for state activities in productive activities and meeting basic needs</td>
<td>Poverty, taken as agriculture and basic needs (social sectors)</td>
<td>Fall in food aid and start of import support</td>
</tr>
<tr>
<td>1980’s</td>
<td>Rise of NGO’s from mid 1980’s</td>
<td>Market based adjustment (rolling back the state)</td>
<td>Macroeconomic Reform</td>
<td>Finance programme aid and debt relief</td>
</tr>
<tr>
<td>1990’s</td>
<td>Eastern Europe and FSU become recipients rather than donors; emergence of corresponding institution</td>
<td>Move back to the state toward end of decade</td>
<td>Poverty and then governance (environment and gender passed more quickly)</td>
<td>Move toward sector support at end of decade</td>
</tr>
<tr>
<td>2000’s</td>
<td>IMF, DAC member countries</td>
<td>International Development Targets (IDT)</td>
<td>Development policy - poverty and the poorest</td>
<td>Millennium Development Goals Micro-level support</td>
</tr>
</tbody>
</table>

Source: Tarp (2000), Ali and Zeb (2016)

Table 2.1 - An Illustration of the Evolution of Aid and Development since the 1940’s
From the 1940’s the focus of developing nations was to move out of a low economic environment and subsistence living into independent and globally significant entities. This situation was originally due to limited retained wealth and minimal global trading of the developing nations. As such, much of the focus centred around gaining international trade and increasing Gross National Profit (GNP) (Tarp, 2000, p. 20, Ali and Zeb, 2016 p.111). To do this, developing nations had to generate and attract funding for infrastructure and industrial capital needed to stimulate growth in an industrialised economy (Easterly. 2007 p.645). Unfortunately this was not the case, aid did increase the retained wealth, but it did not increase economic growth, suggesting that there was an error in the overall system of Aid and Development or at least a disconnect between the intent of the Principal (funder) and what was delivered to the recipient.

By the 1960’s “aid fatigue” was also becoming an issue and was affecting the overall performance of Aid and Development (White, 2007 p. 1). This “fatigue” or pessimism was due to developed nations seeing very little growth in GNP from the aid being given and the increase in the political instability that existed within developing nations. From 1964 to 1973 annual giving by OECD nations did not increase and in 1968 to 1969 aid giving for ODA actually decreased. Post 1973 the annual ODA given by OECD nations doubled and continued to grow.

Five development problems highlighted in the 1970’s resulted in Aid and Development being focussed on the poorest nations only (Tarp, 2000, p. 28, Ali and Zeb, 2016), these reasons were:

1. Increased levels of unemployment
2. Unequal income distribution
3. An increase in the level of people living in poverty
4. An increase in the migration of rural/urban population
5. Increase in foreign debt and increasing pressure to service that debt

By the 1980’s it was estimated that there were in excess of 280 organisations offering Aid and Development (Kent, 2004 p.860) with many of these organisations having
grown into multinational, multi million dollar service providers (Carroll and New, 2009 p.1024), further adding support for an argument in favour of increasing the efficiency, transparency and governance of Aid and Development programs. Funding by the International Monetary Fund (IMF) and World Bank was moving towards those developing nations who would agree to grow private industry, advocate for free trade and seek economic stability (Easterly, 2007 p. 645). Brandt’s report (TBC, 1980) highlighted that Aid and Development was becoming more criticised by developed nations (i.e. funders) due to the political instability typically identified within the recipient nations.

In 1987 “Our Common Future” was published (WCED, 1987). The author, Brundtland, assimilated the work of both Brandt (1980) and Palme (1982) that looked into the issues facing Aid and Development and concluded that focus was needed to address two key issues, these were:

1. The environment
2. Poverty

Throughout this period, work was also being conducted on the “Bottom Up” approach or microeconomic project approach. This was significant because it focussed for the first time on offering aid targeted directly at the end recipient and at a local level instead of macro aid targeted at supporting a developing nation’s economy (Tarp. 2000, p. 238). The concept of a “bottom up” method was that Aid and Development would be channeled to the actual recipient (i.e. where it was needed), and was successful because, as with all improvement initiatives, those who are the players in the event, in this case those who are poor, are the best people to know how to improve their situation (Myer, 1999 p.147, Atkociuniene and Vaisnoraite 2011). This approach later combined with the macroeconomic strategy to become more holistic in nature ensuring the delivery of Aid and Development and also foreign direct investment, from developed nations into developing nations.

The 1990’s saw a change in focus once again, this time, new approaches to Aid and Development were investigated to support the emergence of democratic governments

The strategy for the beginning of the 21st century saw aid focus on poverty reduction. The 15 years of aid delivery focussed on eight interrelated poverty reduction strategies known as the Millennium Development Goals (Ali and Zeb 2016 p. 118). In 2000, 189 nations signed the Millennium Agreement (Norton 2014 p. 633). The Millennium Development Goals main focus was eradicating extreme poverty and contains eight areas in which to achieve this goal. The Millennium Development Goals are:

1. Eradicate extreme hunger and poverty
2. Achieve universal primary education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, Malaria and other diseases
7. Ensure environmental sustainability
8. Develop a global partnership or development

Moving into the current decade, reviews of the Millennium Development Goals suggests that it is becoming unlikely that all of the goals will be achieved (McMichael, 2008 p. 50). Some success has been achieved in areas such as the reduction of poverty and the increase in the primary education of children. More modest success has also been noted in areas such as extreme poverty and maternal mortality and infant/child death rates (UN, 2015). Table 2.2 provides details of what each goal achieved from the beginning of the agreement until its culmination.
Source: UN (2015)

Table 2.2 - The Millennium Development Goals

McGillvray’s (2006) reflection on Aid and Development from a macroeconomic point of view suggests that transparency of the effectiveness of Aid and Development was lacking. Both McGillvray (2006) and Easterly (2007) were however united in their view that aid did provide an overall positive effect on an economy. A discussion has been long running where there is overriding assertion that players within the sector are
certain that Aid and Development works, or at least some of it works. The problem is that many players are not certain what part of Aid and Development works best and as such are reluctant to lose any part in fear of breaking the overall system. Within the context of this work it is legitimate to suppose that those who hold the purse strings of Aid and Development have typically been economists who have focussed on the economics of Aid and Development and not always on the operational efficiency of the supply chain system of an Aid and Development agency.

### 2.2 Data on Aid and Development Funding

Since 1960 the Development Assistance Committee (DAC) has allocated USD $3.5 trillion towards Official Development Assistance (ODA) (Qian, 2014 p. 9). Post the Second World War, 80% of the bilateral aid come from the United States, Great Britain and France. In 1958 it was proposed by the World Council of Churches that 1% of the donor nations wealth should be provided to the developing world. The Developing nations themselves lobbied for 0.75% of Gross National Income (GNI) of the donor nations, but it was not until 1970 that 0.7% of GNI was finalised (OECD, 2011).

It was estimated by the OECD that developing nations had received in the region of USD $23.7 million per country, plus an additional USD $1.90 per person in the first half of the 1960’s (Dudley and Montmarquette, 1976 p.133). This funding was delivered under a shroud of skepticism, based around the intent of the funding being targeted at infrastructure and economic growth, whereas basic humanitarian needs such as food, clean drinking water, health and education were often being overlooked (OECD, 2011). This scenario suggests a “push” type system (Tarp, 2000, p. 84,85) was in place where it was the Principal (funder) who decided where and how the funds were spent instead of a “pull” system where the recipient of the product or output of the system called forward based on their needs.

Moving forward, it was expected that all developed nations would contribute the agreed figure of 0.7% of GNI in order to achieve the Millennium Development Goals. With a few notable exceptions from Scandinavian countries most developed nations failed to
reach the target and the result was the MDG’s were not achieved as targeted. Figure 2.2 illustrates the contribution by developed nations to The Millennium Development fund:

**Figure 2.1 - Contribution by Developed Nations to the Millennium Development Goals**

Currently half of the world population live on USD $2.50 per day and over 1 billion people live on under USD $1.25 per day (OECD, 2011). This raises an interesting question by those involved in the sector regarding just how much it would take to raise the bar on reducing poverty. The World Bank estimated that an increase of 50% more funding (i.e. from USD $73 Billion to USD $135 Billion) would be needed (Baulch, 2006, Kenny and Summer 2011 p. 4, Higgins 2013). However, simply “throwing more resources” at a system does not necessarily improve the performance of that system (Ford, 2015,) and as such it is perhaps pertinent to consider investigating the overall system to see if its efficiency can be improved without further resources being added (Soltani et al 2004, Dong et al, 2016, p. 291).
2.3 Aid and Development Processes and Planning

The literature suggests that over the years a significant volume of money has been distributed through established channels with developing nations, and yet there appears to be uncertainty within the players of the Aid and Development sector and there appears to be perpetual underperformance of the system. This would typically indicate a new chaotic or random management system (Landoni and Corti, 2011, p.48), but this is not however the case. Since the 1970’s Aid and Development agencies have typically adopted the Log Frame Analysis (LFA) matrix as a management framework for their programs (AusAid, 2003, p. 2). Originally requested and adopted by USAID it was later taken up by the Canadian International Development Agency (CIDA) in the late 1970’s. The United Kingdom’s Department for International Development (DFID) added LFA in 1985 and the German agency Deutsche Gesellschaft fur Internationale Zusammenarbeit (GIZ) enhanced and adopted it in 1983. Australia currently uses LFA for developing Aid and Development programs (Landoni and Corti, 2011, p. 55).

LFA is based on Management by Objectives (AusAid, 2003) principles and is used to analyse existing situations and develop strategic outcomes. At the core of this is a participating learning element used to investigate the root causes of the problem (Myer, 1999). There are many variables in Aid and Development programs (AusAid, 2003, p. 18), these include:

- Technical
- Geographical
- Organisational
- Phasing/roll out of aid

These variables necessitated amendments to the core LFA framework and this in turn eliminates consistency and standardisation resulting in increased program risk and potential learning curve issues, alongside issues of self generated waste within the program management framework (Landoni and Corti, 2011, p. 58,59, Dong et al 2016, p. 291, Golini et al 2017, p. 128).
Importantly, LFA is fundamentally a project management framework, indicating that Aid and Development agencies have viewed their work on a project by project basis. Where as this view would be logical, it is important to note that the Project Management Institute define a project as:

“A temporary endeavor undertaken to create a unique product or service”

(PMI 2017)

It may be considered that the “temporary” view of Aid and Development (now into its eighth decade) might be the reason why a systems approach to improvement has not been undertaken. It is interesting to note that both USAID and CIDD have removed LFA from their guidelines and there are calls for a more embracing standard for Aid and Development. To date agencies have typically not looked towards supply chain management protocols, including SCOR, as a possible, viable, method of managing programs (Tatham and Spens, 2011, p. 7). This is somewhat challenging, because supply chain management protocols have existed as long as LFA for example and are well documented in terms of the improvements they have delivered to their users globally (du Toit and Vlok, 2014, p. 26).

Paradoxically, and somewhat disappointingly Lu and De Souza (2016) do suggest that SCOR can indeed be used in humanitarian initiatives. Unfortunately this work was based solely on the logistics element of disaster relief and took a “fit of convenience” by only including only four of the six primary management processes of SCOR (See Section 3.7) in their analysis and omitting manufacture (i.e. Make) and enable (i.e. Do) suggesting that Aid agencies and NGO’s do not make or even “do”. However, in the context of supply chain management and the principles of value addition throughout all nodes (i.e. along the supply chain), Make is a relevant term as value for an Aid agency as it is for an Auto manufacturer (Roder and Tibken 2006, p. 1028) as it has been proven to be for service providers (Malin 2006) and indeed government related organisations such as the military (Lockamy & McCormack 2004). The concept of Enable, is embedded in one founding principle of Demming’s philosophy that has carried through to modern quality management principles in terms of ongoing continuous improvement.
2.4 Aid and Development Cooperation and Partnership

The mandate of an Aid and Development agency is to help reduce poverty and act as the central hub for the multiple objectives of often many stakeholders within a program. Most Aid and Development organisations are involved in both disaster relief and Aid and Development programs (Thomas and Kopczak, 2005, p. 3). Disaster relief have typically shorter timeframes (i.e. 90-120 days) and are therefore more aligned with the “temporary” nature of “projects” (Charles and Laurus, 2011, p. 819) and Aid and Development programs have longer time scales and are more aligned with the ongoing principles in supply chain management (Oloruntoba and Grey, 2006, p. 118). Thomas and Kopczak (2005, p. 3) describe how governments use Aid and Development to distribute funding again aligning with the principles of commercial supply chain management and 3PL and 4PL activities (Tatham and Pettit, 2010, p.615, Jensen 2012, p, 158, Abidi et al, 2015, p. 51).

As early as 1969, the Pearson Report (CoID, 1969) highlighted issues around the need for improved partnerships, greater linkage and coherence by linking aid to the development objectives of the recipients (OECD, 2005, p. 59), i.e. end-to-end configuration (Rugumamu, 2011, p. 115). But it wasn’t until the beginning of the 21st Century that the Millennium Development Goals took on board these issues and included one goal on developing global partnerships (UN, 2015, p. 7) (The full list of MDG objectives is illustrated in Appendix 1).

The Development Assistance Council (DAC) (OECD, 2008, p. 11) estimated that 45% of Aid and Development funding was distributed through domestic regional players (nodes). 57% of Aid and Development funding was reported to be aligned with national (not local) priorities with the remaining funding being outside the control of the recipient, suggesting a disconnect between the Principal (funder) and recipients and end-to-end alignment of the Aid and Development supply chain system. Disconcertingly only 33% of Aid and Development funding was reported as being dispersed on schedule thus calling into question the operational efficiency of many Aid and Development agencies. Kovacs and Spens (2011, p. 34) compared commercial Aid and Development supply chain systems and highlighted challenges around collaborative...
incapabilities of many players (nodes) in Aid and Development supply chain systems due to their core functional remits (i.e. government, defence, NGO etc). This was also found to be the case by the OECD (1999, p. 9) who suggested the wide ranging remits of the players (nodes) in Aid and Development would almost guarantee that objectives would not be shared and that internal conflict would replace collaboration.

On a more positive note, the rise in Corporate Social Responsibility (CSR) in many large global corporations (Maon et al, 2009, p. 150) has seen a rise in cooperation in Aid and Development programs (Ibid, 2009, p. 150), but without the correct end-to-end supply chain system management it is possible that the cooperation could turn into more system constraints as the number of players will increase program risk, complexity and bureaucracy (Tatham and Pettit, 2010, p. 615).

2.5 Aid Effectiveness

Developed nations have expended considerable funds on trying to improve the social and economic position of developing nations. There remains however two schools of thought regarding aid effectiveness, these are:

1. Sachs (2005) who argues more funding is required to reduce poverty and increase the economic position of developing nations
2. Easterly (2007) who counters the argument stating aid funding has not helped reduce poverty

There appears to be a general consensus that there has been significant waste both in the planning and execution of Aid and Development programs and also technical aid recipient focus issues, that suggest a change in operational protocol is needed regardless if more money should be committed by developed nations (Bourgnignon and Sandberg, 2007, p. 316). For example, questions have been raised since the 1960’s regarding Aid effectiveness. There has been more focus recently due to the Millennium Development Goals and multiple nations now coming together under one roof. The core issue centres around the accountability of NGO’s and their distribution of billions of dollars if government funding. There is an axiom that it is easy to lose track of program specifics
during and post delivery phases because of the cyclic nature of funding and the need for NGO’s to “chase” the next grant cheque. This in turn raises questions of governance that boils down to ultimately who do the NGO’s represent, the Principal (funder), recipient or themselves (Keely, 2012, p. 52, Amagoh, 2015, p. 224). The complex nature of NGO accountability is illustrated in Figure 2.2.

![Figure 2.2 - Illustration of the Complex Nature of NGO Accountability](source: Amagoh, 2015, p.3)

Amidst growing concerns regarding sovereign security and the possibility that some NGO’s could be fronts for organised crime or knowingly or unknowingly provide distribution channels for illicit activities such as drug or people trafficking, money laundering or indeed access for the child sex industry\(^6\), the public and their representatives are becoming evermore sensitive to the “doing good message” and are typically seeking assurances of legitimacy (Murtuza 2012, p. 123, Gibelman and

\(^6\) Figure 5.4, 5.7 and 5.9 illustrate the resolved supply chain systems maps of the three case studies of this work. In each case, there are significant proportions of the maps where there was no evidence that nodal players existed. However, for them not to exist would have resulted in an inoperable system or for example a system that could have been set up for illicit activities. Determining the ultimate legitimacy of the case studies supply chains is outside the scope of this work. It does however illustrate the power of forensically mapping supply chain systems and support some of the negative comments recorded in the literature.
Gelman 2004, p. 366, Vestergaard 2014, p. 510). Table 2.3 provides a data set pertaining to a specific literature review on aid effectiveness.

<table>
<thead>
<tr>
<th>Search</th>
<th>Keyword 1</th>
<th>Keyword 2</th>
<th>Keyword 3</th>
<th>Limit</th>
<th>Database search system used</th>
<th>How many results</th>
<th>How many of the results were useful?</th>
</tr>
</thead>
<tbody>
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<td>effectiveness</td>
<td>Review Report</td>
<td>ProQuest</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Humanitarian Aid</td>
<td>effectiveness</td>
<td>evaluation report</td>
<td>Review Report</td>
<td>Proquest</td>
<td>24</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Aid</td>
<td>inefficiency</td>
<td>effectiveness</td>
<td>Review Report</td>
<td>Scopus</td>
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<td>0</td>
</tr>
<tr>
<td></td>
<td>Humanitarian Aid</td>
<td>effectiveness</td>
<td>evaluation report</td>
<td>Review Report</td>
<td>Scopus</td>
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<tr>
<td></td>
<td>Aid</td>
<td>inefficiency</td>
<td>effectiveness</td>
<td>Review Report</td>
<td>Web of Science</td>
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<td>0</td>
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<tr>
<td></td>
<td>Humanitarian Aid</td>
<td>effectiveness</td>
<td>evaluation report</td>
<td>Review Report</td>
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<td>1</td>
</tr>
<tr>
<td></td>
<td>Aid</td>
<td>inefficiency</td>
<td>effectiveness</td>
<td>Review Report</td>
<td>Abi/Inform</td>
<td>74</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Humanitarian Aid</td>
<td>effectiveness</td>
<td>evaluation report</td>
<td>Review Report</td>
<td>Abi/Inform</td>
<td>288</td>
<td>81</td>
</tr>
</tbody>
</table>

Table 2.3 - Aid Effectiveness Literature Review

The literature review on aid effectiveness indicated that data on hard numbers are rare, suggesting operating standards (such as SCOR) are lacking. There is however much debate in the literature regarding focus, motivation and currency of aid agencies and Aid and Development programs (see Table 2.4).
<table>
<thead>
<tr>
<th>Reason</th>
<th>Description</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aid Policies</td>
<td>Major agencies are not effective in reducing poverty because of a convergence of roles. Where both Disaster and Development Aid are merged together to try be defined as poverty reduction</td>
<td>Easterly, 2007</td>
</tr>
<tr>
<td>Fraud</td>
<td>DFID as an example will increase its aid giving to countries that have an high incidence of fraud 50% by 2012. On average, foreign aid as an example, Uganda’s education system, (the data only reflects the period 1991-1995, no new data was available) only 13% of grants made it to its recipient. Governments do not measure fraud related losses for future budgetary requirements for aid. The cost to monitor fraud/corruption is between $50,000-$100,000 per project</td>
<td>Button et al (2015)</td>
</tr>
<tr>
<td>Serving the Need</td>
<td>Devise policies that will meet the needs of the poor. How do agencies serve the goal that meets the needs of that community will determine if it is effective or not. Paris Declaration on Aid Effectiveness centred on effectiveness being driven by people centred development goals.</td>
<td>Svizzero &amp; Tisdell (2016), Adelman (2002)</td>
</tr>
<tr>
<td>Lack of coordination</td>
<td>The declaration of Paris and the summits in Accra in developing aid effectiveness have not assisted in reducing ineffectiveness due to a difference between international and national policies. Is the direction of aid becoming vague and does the tying of aid still exists? Aid giving is the highest in Africa but its income growth is the lowest.</td>
<td>Svizzero &amp; Tisdell (2016), DFAT (2014), Adelman (2002)</td>
</tr>
<tr>
<td>Lack of Transparency and accountability</td>
<td>Lack of coordination at country level, rivalry between NGO’s Accountability Issues relating to reporting between NGO and agencies. Accountability has moved from ‘felt’ to performance, tangible evidence on aid agencies. Accountability has moved in the last 10 years from government guidance to a threat of imposed accountability.</td>
<td>Reisen (2010), O’Dwyer &amp; Boomsma (2015), Clark (2016)</td>
</tr>
<tr>
<td>Macro or Micro Aid</td>
<td>Aid effectiveness is generally viewed and reported at a macro level. This determines the amount of donor dollars versus the desired outcome of aid to reduce extreme poverty. The macro perspective looks at whether the money donated has provided for GDP growth.</td>
<td>Ranis (2007), Williamson (2010)</td>
</tr>
<tr>
<td>Poor implementation and return</td>
<td>Lack of understanding by local field agencies of codes and standards. Poor evaluation of needs for recipients of aid. Donor funds from governments that are funnelled through agencies are poorly spent and open to corruption.</td>
<td>Piciotto (2007), DFAT (2014), Henderson &amp; Lee (2015)</td>
</tr>
</tbody>
</table>
Table 2.4 - Issues Relating to Aid Effectiveness

| Value for money metrics | Cost is dependent on variables. The value of hygiene training compared with a medical procedure or the provision of a water pump compared to the construction of a latrine will be different therefore affecting the measurement of value for money. Managing for results may mean that goals and a commitment to outcomes are achieved as a way of defining aid effectiveness. | DFAT (2014), OECD (2011), Keely (2012) |

The key points of concern regarding aid effectiveness can be summarised as:

1. Fraud/corruption
2. Questionable fund raising
3. Management
4. Misuse/mishandling of funds
5. Embezzlement
6. Theft

With these issues foremost in the minds of legitimate aid participants, there have, in the last decade, been increased calls for more accountability and the introduction of standards to manage, measure and report on Aid and Development programs (Omona and Ronard 2013, p. 315, Murtaza 2012, p. 111, Piccioto 2007, p. 4, Ranis 2007, p. 4, Oxfam 2010, p. 20). In many cases, these calls are now coming from the Principal (i.e. funder of the program) (OECD 2011, p. 126, DFAT 2014, p. 39).

Put simply, the rationale of this work is based on the premise of why re-invent the wheel, and possibly waste many millions of dollars, when a suitable standard for managing, measuring and monitoring Aid and Development programs already exists in SCOR.

### 2.6 Summary of Chapter Two

This Chapter discusses the history of Aid and Development, the often lack of consistency, communication and collaboration in the system. It has highlighted that waste and often poorly executed programs are common in the Aid and Development sector. Some of the reasons appear to be connected to a historical view that Aid and...
Development (like disaster relief) is in fact a temporary solution and should be managed along project management principles. However, now into its eighth decade, Aid and Development has evolved into mainstream conscious and indeed underwritten through CSR initiated by global corporations alongside government agencies and their nominated representatives. The debate continues regarding whether Aid and Development should attract more funding, but regardless of the outcome it is clear the processes of Aid and Development need rethinking to achieve better results. One such possibility could be the implementation of commercial supply chain management systems such as SCOR into Aid and Development programs, because SCOR has been established to have had a major impact in terms of efficiency improvements and waste reduction in commercial application.

Chapter 3 discusses the theory and principles of supply chain management, supply chain design, supply chain mapping and improvement. The chapter also discusses SCOR and its applications. A SWOT analysis of SCOR is also included. Supply chain mapping is discussed in the last section of Chapter 3 as the process for understanding the overall supply chain system and its dynamics.
CHAPTER 3 - LITERATURE REVIEW
Chapter 2 provided an overview of Aid and Development and the historical divergence from a system based management approach, into a more project management approach that is more typically associated with crisis management of disaster relief initiatives compared to the more longer term focus of Aid and Development projects. Whereas supply chain management is touched on in the literature, and indeed discussed further in this Chapter, the Aid and Development sector has not typically adopted leading commercial industry standards and it is argued that this might be one of the reasons for the many claims of inefficiency in Aid and Development programs.

Supply chain management is about change management and the ability for an organisation to efficiently deliver value at each node of the chain to the final end customer (Recipient) (Braziotis et al 2013, p. 645), whereas LFA is about a single unique project management type activity, (i.e. a sequence of unique events managed over a set period of time). Many aid agencies have been using a consistent (i.e. already established and operational) channel to deliver multiple outputs to multiple recipients specifically a supply chain. By adopting commercial supply chain management principles, and focussing on channel optimisation, aid agencies could be able to standardise throughput management and optimise the operational and logistics activities of their organisations even if the output (“end product”) varies on a recipient by recipient basis, as indeed it does in a customer by customer basis in the commercial sector.

The overriding challenge of this work is to establish if the “standard” and framework for supply chain management (SCOR) is represented in Aid and Development supply chain systems. If so, this would allow a systems perspective in terms of management and as such it is reasonable to expect to see similar operational and efficiency gains in Aid and Development as there is already documented for commercial supply chains.
In this chapter there is a line that is being drawn to connect the reader to the focal point of the research and that is the topic of SCOR. It was important to draw this line by focussing initially on Humanitarian Supply Chain Management and noticing what was lacking. By doing this it showed that there are issues surrounding this topic within the Aid and Development industry. The next point of reference needed to point towards what is understood about commercial supply chain literature and in doing so reviewing what can be known and understood from the literature and agreed upon. Unlike Aid and Development, Commercial Supply Chain Management has been researched intensively and from this research there has been developed tried and proven practice. By acknowledging how this practice has benefitted the industry in its entirety this can then leads to the topic of SCOR and the improvements it provides to a business’ supply chain can be allied to humanitarian supply chains.

In order to explore these concepts it is necessary to investigate more fully, and in the context of Aid and Development, supply chain management principles. This Chapter discusses the following areas:

1. Aid and Development supply
2. Supply Chain definition
3. An unclear perspective on the role of supply chain management
4. Supply chain management Theory
5. End-to-end configuration principles and the identification of atypical supply systems
6. How supply chain management principles drive competitive advantage
7. Supply Chain Operations Reference (SCOR)
8. The impact, measures and data relating to the exploitation of SCOR within Supply Chain Systems
9. Supply Chain Mapping
3.1 Aid and Development Supply

Fundamentally, aid agencies suffer from long delivery chains and significant structural issues are present within these long chains. Easterly (2007, p. 636) noted that structural issues were documented as long ago as 1969 in the Pearson Report (Pearson, 1969). At the time there was a call for better partnerships, collaboration and more focus on the recipient (i.e. the end customer) (Barder, 2009, p. 6). It is interesting to note that these principles are at the core of world class commercial supply chain management principles.

At the turn of the century the Millennium Development Goals were designed to develop partnerships and to link Aid and Development initiatives to the development objectives of the recipients (Wood et al, 2008, p. iv, OECD, 2005, p.1). To achieve these goals the Paris Declaration (OECD 2005) and the Accra Agenda for Action (OECD 2008) designed measures for developing nations that were monitored internationally by targeting five key areas and twelve indicators to assess the overall performance of Aid and Development programs and harmonising and aligning of program deliverables. Table 3.1 provides the measures of the Agenda for action mapped against collaboration, recipient objectives alignment.
The literature available on Aid and Development supply chain systems is limited and can typically only be sourced through literature that is based on short term humanitarian disaster relief aid. Oloruntoba and Grey (2006, p. 115) note that Aid and Development initiatives or disaster relief aid are both interchangeable, not well coordinated and as a result there is no single form of Aid and Development supply chain because of five reasons, these are:

1. Lack of Planning
2. Aid giving instability
3. Humanitarian networks are not clearly defined

<table>
<thead>
<tr>
<th>Ownership</th>
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<tbody>
<tr>
<td>1. Partners have operational development strategies</td>
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<table>
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<tr>
<th>Alignment</th>
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<tbody>
<tr>
<td>2. Reliable country systems for procurement and public financial management</td>
</tr>
<tr>
<td>3. Aid flows are aligned on national priorities</td>
</tr>
<tr>
<td>4. Strengthen capacity by coordinated support</td>
</tr>
<tr>
<td>5a. Use of country public financial management systems</td>
</tr>
<tr>
<td>5b. Use of country procurement systems</td>
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<tr>
<td>6. Strengthen capacity by avoiding parallel implementation structures</td>
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<tr>
<td>7. Aid is more predictable</td>
</tr>
<tr>
<td>8. Aid is untied</td>
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<tr>
<th>Harmonisation</th>
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<tbody>
<tr>
<td>9. Use of common arrangements or procedures</td>
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<td>10. Encourage shared analysis</td>
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<thead>
<tr>
<th>Managing for Results</th>
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<tr>
<td>11. Results oriented frameworks to assess progress against national</td>
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<td>development strategies and sector programs</td>
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<tr>
<th>Mutual Accountability</th>
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<tr>
<td>12. Partner countries undertake mutual assessments of progress in</td>
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<tr>
<td>implementing agreed commitments on aid effectiveness</td>
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</tbody>
</table>

Source adapted: The 2005 Paris Declaration on Aid Effectiveness and the Accra Agenda for Action

Table 3.1 - The Agenda for Action and Partnership, Collaboration and Recipient Alignment
4. There are difficulties in applying external principles and theories to benefit the work of humanitarian aid

5. There are differences between commercial and not for profit supply chains and commercial is focused on the end customer (Oloruntoba and Grey, 2006, p. 116)

Although discussing disaster relief, the last point is particularly pertinent insofar as most Aid and Development management is based on disaster relief principles and yet even within this context, focus on the end customer (Recipient) does not appear to carry the same level of importance as it would in a commercial supply chain.

Thomas and Kopczak (2005, p. 7) identified five main areas of improvement for aid agencies, these are:

1. Lack of recognition of the importance of logistics
2. Lack of professional staff
3. Inadequate use of technology
4. Lack of institutional learning
5. Limited collaboration

These five areas lie at the core of commercial supply chain management principles but appear to have been negated in the aid sector. Table 3.2 illustrates how humanitarian aid disaster relief supply chain has been defined. For example, Scholten et al (2010, p. 625) provide a definition not that dissimilar to management. Overstreet et al (2011, p. 116) adopted the Council of Supply Chain Management Professionals in providing a definition, which again is useful in identifying the similarities of aid and commercial systems. Van Wassenhove (2006, p. 479, 488) called for a widening of scope for both aid and commercial and although incorporating more aspects of supply chain management it still does not cater for every aspect or derivative.
It is estimated that 80% of disaster relief effort is concerned with logistics and logistics management (Van Wassenhove 2006, p. 475, Charles and Laurus, 2011, p. 817, Overstreet, 2011, p. 114, Oloruntoba and Grey, 2006, p. 118). Much of the literature consequently separates logistics as a separate function from supply chain management creating in the process a separate theoretical body of knowledge and a way of defining humanitarian aid and disaster relief (Ilhan, 2012, p. 45), and as a result relegating supply chain aspects (Oloruntoba and Grey, 2006, p. 116).

Table 3.3 provides an illustration of the different definitions of humanitarian aid and disaster relief logistics.
Table 3.3 - Illustration of the Definitions of Humanitarian Aid and Disaster Relief

Logistics

Tatham and Pettit (2010, p. 611) adopt Thomas and Mizushima (2005, p. 60) definition. Overstreet et al (2011) focus on a definition specifically related to logistics, yet the concept is the same as supply chain management. Thomas and Kopczak (2005, p. 2) adopt the Fritz Institutes definition for humanitarian logistics. Thomas and Kopczak (2005, p. 2) and Kovac and Spens (2007, p. 106) adopt a specific definition that relates to how supply chain management is defined. Importantly all of the above authors talk about the need to manage the “flow of goods” and associated elements such as information, people and importantly finance (which is argued in the following Chapter to be the constant in Aid and Development supply chains). The basic concept of the management of the flow within a humanitarian logistics function is valid as it is for an Aid and Development supply chain and indeed a commercial supply chain.

Charles and Laurus (2011, p. 816) noted that much of the published research of the time focussed on specific aspects of managing humanitarian aid and disaster relief supply chains such as network management, collaboration, agile and LEAN principles. Oloruntoba and Grey (2006, p. 117) provide evidence that LEAN principles could be

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tatham and Pettit (2010), p. 611</td>
<td>“The process of planning, implementing and controlling the efficient, cost effective flow and storage of goods and materials as well as related information from the point of origin to the point of consumption for the purpose of meeting the end beneficiary’s requirements.”</td>
</tr>
<tr>
<td>Overstreet et al (2011), p. 116</td>
<td>“The process of planning, implementing and controlling the efficient, cost effective flow and storage of goods and materials as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people. The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing and customs clearance”</td>
</tr>
<tr>
<td>Thomas and Kopczak (2005), p. 2</td>
<td>“The process of planning, implementing and controlling the efficient and effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people”</td>
</tr>
<tr>
<td>Kovacs and Spens (2007), p. 106</td>
<td>“The process of managing the flow of goods, information and finances from the source to the final customer”</td>
</tr>
</tbody>
</table>
applied in disaster relief (see Figure 3.1). In their study, Beamon and Balcik (2008, p. 8) further confirmed the work of Oloruntoba and Grey (2006).

Figure 3.1 - Illustration of LEAN and Agile Supply Chain in the context of Humanitarian Aid and Disaster Relief

Although Oloruntoba and Grey (2006, p. 116) were considering overlaying of commercial logistics, supply and operational principles with the aid sector, they continued to represent a typical humanitarian supply chain in a linear form (see Figure 3.2).
Although many of the authors noted above describe humanitarian aid and disaster relief supply chains as being uncertain, difficult and unpredictable and therefore unstable, Sheffi and Rice (2005, p. 43) did note that although most disaster relief projects will carry their own signature, for example a tsunami will be different to an earthquake, all disaster relief programs will have a typical profile. This once again offers the possibility of overlaying a recognised industry standard such as SCOR. Unfortunately, however and in common with the work of Lu, Goh and De Souza (2016, p. 223) noted in Section 2.3, the aid sector appears resolute in its stance that there are differences between aid supply chains and commercial supply chains. Charles and Laurus (2011, p. 818) identified six categories of difference between humanitarian aid and commercial
supply chain focus. These differences are illustrated in Table 3.4 with suggested commercial supply chain similarities

<table>
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<tr>
<th>No.</th>
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<th>Supply Chain Management</th>
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</thead>
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<td>1</td>
<td>Stakeholders</td>
<td>The Global Environment</td>
</tr>
<tr>
<td>2</td>
<td>Categories of flows managed</td>
<td>Supply Chain Flows</td>
</tr>
<tr>
<td>3</td>
<td>Funding process</td>
<td>Inter Corporate Coordination</td>
</tr>
<tr>
<td>4</td>
<td>Dynamics and the complexity of the environment</td>
<td>Inter Functional Coordination</td>
</tr>
<tr>
<td>5</td>
<td>Humanitarian Life Cycle</td>
<td>Value/Profitability/Competitive advantage</td>
</tr>
<tr>
<td>6</td>
<td>Humanitarian space</td>
<td>Customer Satisfaction</td>
</tr>
</tbody>
</table>

*Source: Charles and Laurus (2011) du Toit and Vlok (2014)*

Table 3.4 - Six Categories of differences between HSCM and SCM

Despite an almost self imposed segregation policy by humanitarian aid and disaster relief agencies with regard to adopting, or at least considering adopting commercial supply chain principles, Blecken (2010, p. 678) and Tathem and Spens (2011, p. 14) have laid the foundation of looking into the possibility of using SCOR in the context of humanitarian aid and disaster relief (not long term Aid and Development programs). This work has focussed on gaining accurate information on the status of goods and equipment (typically a logistics centred view).

### 3.2 Supply Chain Definition

Stock and Boyer (2009, pp. 698, 699) identified three key themes and six sub themes concerning supply chain management. The three key areas are:

1. Activities
2. Benefits
3. Constituents/components
The six sub themes are:

1. Material/physical, services, finances and information flows
2. Networks and relationships (both internal and external)
3. Value creation
4. Creates efficiencies
5. Customer satisfaction
6. Constituents or component parts

Defee et al (2010, p. 407) identified two overriding themes associated with supply chain management, these are:

1. *Transaction Cost Economics* - This theory presents a “view of firm behaviour based on the value associated with its unique assets” and explains internal governance, channel structure, ways of entering foreign markets, collaboration and supplier selection.

2. *Resource Base View* - That identifies the resource owned by the firm as the source of the firm’s sustainable competitive advantage.

Table 3.5 provides details of the literature search undertaken to provide definitions for supply chain management and humanitarian aid supply chain management.
Table 3.5 - Literature Search

From the results of each search a number of papers were found to be useful. Table 3.6 provides a list of definitions for supply chain management.
<table>
<thead>
<tr>
<th>Author</th>
<th>Definitions</th>
<th>Page</th>
<th>Methodology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hassini, Surti &amp; Searcy (2012)</td>
<td>“we define a supply chain as all parties involved in fulfilling a customer order.”</td>
<td>70</td>
<td>Review</td>
</tr>
<tr>
<td>Wang, Wallace, Shen &amp; Choi (2015)</td>
<td>“A network of suppliers, service providers, consumers, and other supporting units that performs the functions of transactions of resources required to produce services; transformation of these resources into supporting and core services; and the delivery of these services to customers”</td>
<td>686</td>
<td>Literature review</td>
</tr>
<tr>
<td>Melnyk, Lummus, Vokurka, Burns &amp; Sandor (2009)</td>
<td>“Supply chain management as an integrated system that brings together the supply base (the upstream portion including the supply network), the firm, and its customers (the downstream portion including the distributive network).”</td>
<td>4632</td>
<td>Literature review</td>
</tr>
<tr>
<td>Mehmeti G (2016)</td>
<td>“The systematic, strategic coordination of the traditional business functions and the tactic across these business functions within a particular company and across businesses within the supply chain, for the purpose of improving long-term performance of the individual companies and the supply chain as a whole.”</td>
<td>1</td>
<td>Literature review</td>
</tr>
<tr>
<td>Mentzer, DeWitt, Keebler, Min, Nix &amp; Smith (2001)</td>
<td>The systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.</td>
<td>18</td>
<td>Literature review</td>
</tr>
<tr>
<td>du Toit &amp; Vlok (2014)</td>
<td>“A set of approaches utilised to efficiently integrate suppliers, manufacturers, warehouses and stores so that merchandise is produced and distributed at the right quantities, to the right locations, and at the right time, in order to minimise system wide costs while satisfying service level requirements.”</td>
<td>28</td>
<td>Literature review</td>
</tr>
<tr>
<td>Giunipero, Hooker, Joseph-Matthews, Yoon &amp; Brudvig (2008)</td>
<td>The systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole</td>
<td>67</td>
<td>Literature review</td>
</tr>
<tr>
<td>Ho, Au &amp; Newton (2002)</td>
<td>“The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.”</td>
<td>4421</td>
<td>Review</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Definition</td>
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<tr>
<td>Burgess, Singh &amp; Koroglu (2006)</td>
<td>The systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>Pounder, Bovell &amp; Pilgrim-Worrell (2013)</td>
<td>Multiple definitions with none specifically chosen</td>
<td>Literature review</td>
<td></td>
</tr>
<tr>
<td>Naslund and Williamson (2010)</td>
<td>Multiple definitions with none specifically chosen</td>
<td>Literature review</td>
<td></td>
</tr>
<tr>
<td>Chen and Paulraj (2004)</td>
<td>“..defining it in terms of a firm’s involvement in managing relationships with its suppliers,…”</td>
<td>Literature review</td>
<td></td>
</tr>
<tr>
<td>Halldorsson, Kotzab, Mikkola &amp; Skjott-Larsen (2007)</td>
<td>“…an integrative philosophy to manage the total flow of a distribution channel from supplier to the ultimate user.”</td>
<td>286 Review</td>
<td></td>
</tr>
<tr>
<td>Seuring &amp; Muller (2008)</td>
<td>“The supply chain encompasses all activities associated with the flow and transformation of goods from raw materials stage (extraction), through to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain. Supply chain management (SCM) is the integration of these activities through improved supply chain relationships to achieve a sustainable competitive advantage.”</td>
<td>1700 Literature review</td>
<td></td>
</tr>
<tr>
<td>Alfalla-Luque &amp; Medina-Lopez (2009)</td>
<td>“SCM is the integration of all the activities that relate to the flow and transformation of goods, including associated information flows, from the raw materials stage right through to the end user by means of improved supply chain relationships, in order to achieve a sustainable competitive advantage.”</td>
<td>204 Literature review</td>
<td></td>
</tr>
<tr>
<td>Talib, Hamid &amp; Zulfakar (2015)</td>
<td>“…the systematic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purpose of improving the long-term performance of the individual company and the supply chain as a whole.”</td>
<td>46 Literature review</td>
<td></td>
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</table>

Table 3.6 - Supply Chain Management Definitions

A further set of keywords were added to the search for a definition for humanitarian supply chain management. From the results of this specific search a number of appropriate papers were found and the definitions for humanitarian supply chain
management are listed below in table 3.7. The literature search shows that even though Humanitarian Supply Chains do not relate to their Commercial Supply Chain practitioners, the definitions they use appear to be similar, if not the same. In defining their role Humanitarian Aid supply chain practitioners do not appear to be distancing themselves from Commercial practitioners in defining the function of providing supply management.

<table>
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<tr>
<td>Haavisto &amp; Kovacs (2014)</td>
<td>“Humanitarian supply chains can be understood to encompass the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities. Importantly it also includes co-ordination and collaboration with actors, which can be suppliers, intermediaries, third party service providers, donors, implementing partners and beneficiaries.</td>
<td>611</td>
<td>Review</td>
</tr>
<tr>
<td>Lijo &amp; Ramesh (2012)</td>
<td>The process of planning, implementing and controlling the efficient, cost effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people.</td>
<td>218</td>
<td>Review</td>
</tr>
<tr>
<td>Overstreet, Hall, Hanna &amp; Rainer Jr (2011)</td>
<td>Supply chain management: encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies (CSCMP, 2009)</td>
<td>116</td>
<td>Review</td>
</tr>
<tr>
<td>Tatham &amp; Spens K (2011)</td>
<td>Supply chain management as viewed by the Council of Supply Chain Management Professionals (CSCMP), encompasses the planning and management activities involved in sourcing and procurement, conversion, and all logistics management activities.</td>
<td>7</td>
<td>Review</td>
</tr>
<tr>
<td>Sharma &amp; Srivastava (2016)</td>
<td>Social welfare supply chains defined as chains of processes of designing, planning and implementing a wide range of social development and improvement programmes involving logistical activities to meet the needs of the population requiring the programmes, managing social problems and maximising opportunities for the purpose of improved social welfare activities.</td>
<td>511</td>
<td>Review</td>
</tr>
<tr>
<td>Adivar, Atan, Oflac &amp; Orten, (2010)</td>
<td>Processes of designing, planning and implementing a wide range of social development and improvement programs involving all the logistics activities in meeting the needs, managing social problems and maximising the opportunities for the purpose of improved social welfare.</td>
<td>292</td>
<td>Review</td>
</tr>
</tbody>
</table>
Table 3.7 - Humanitarian Supply Chain Definitions

<table>
<thead>
<tr>
<th>Author(s)</th>
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<th>Type</th>
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<tr>
<td>Van Wasserhose (2006)</td>
<td>A supply chain is essentially a network consisting of suppliers, manufacturers, distributors, retailers and customers. The network supports three types of ‘flows’ that require careful design and close coordination: Material flows; Information flows; Financial flows.</td>
<td>480</td>
<td>Review</td>
</tr>
<tr>
<td>Burkart, Besiou &amp; Wakolbinger (2016)</td>
<td>HSCM as “…the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people”</td>
<td>32</td>
<td>Review</td>
</tr>
<tr>
<td>Buddas (2014)</td>
<td>“…the management and design of the delivery and transportation of first aid relief items such as food, water, sanitation solutions and shelter to disaster-struck areas, most often from government and private donors via humanitarian aid agencies and organisations.”</td>
<td>222</td>
<td>Literature review</td>
</tr>
<tr>
<td>Falasca &amp; Zobel (2011)</td>
<td>“…the process of planning, implementing, and controlling the efficient, cost-effective flow, and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of improving social welfare and alleviating the situation of vulnerable people.”</td>
<td>152</td>
<td>Literature review</td>
</tr>
</tbody>
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3.3 An Unclear Perspective on the Role of Supply Chain Management and the Application of Systems Theory as a Common Framework

In the context of supply chain management, Bohme et al (2012, p. 370) defines the supply system as encompassing interconnected components separated from their environment by a system boundary (i.e. network, framework or ecosystem). Kerzner (2009, p. 48) in linking systems theory to project management (i.e. LFA and disaster relief management principles) describes a system as a group of elements, either human or non-human that is organised and arranged in such a way that the elements can act as a whole toward achieving a common goal or objective.

Although supply chain management is an accepted term in business language there is much confusion regarding what it actually is (Mentzer et al, 2001, p. 2, Svensson, 2002, p. 735, Lambert et al, 2005, p. 30). Storey et al (2006, p. 758) and Halldorsen et al (2007, p. 286) suggest that the unclear perspective on the role of supply chain management is due to the functional focus by practitioners and as such confusion around terms and institutionalised language. In an attempt to overcome some of the confusion around the perspective and management role of supply chain management,
Caddy and Helou (2007, p. 321) explored the concept of associating system theory to Supply Chain Management with a view of identifying more common generic themes for both supply and supply chain management.

Systems theory as a management approach attempts to integrate and unify information from all fields of knowledge. It attempts to solve problems by observing the big picture instead of analysing independent components and as such is particularly relevant in the context of supply chain management. Of particular interest in the context of this work is the understanding of the interrelationship between different elements in the system to provide process visibility (Fawcett et al, 2007, p. 367). Childerhouse et al (2011, p. 6) noted that the importance of optimising the whole system rather than each subsystem, which corresponds to the principles of Quality Management and the ISO family of continuous improvement standards (Abuhav, 2017). The key to providing whole system integration is dependent on three elements (Childerhouse et al 2011, p. 5), these are:

1. Organisational relational linkages or nodes
2. Information integration
3. Coordination and resource sharing/flow of goods planning and control

### 3.4 Supply Chain Management Theory

The concept of supply chain management began to emerge in the 1980’s, however, terminology such as pipeline, network or chain have been interchanged long before the emergence of “supply chain” as terminology (Halldorssen et al, 2007, p. 286). Supply chain principles incorporate the wider business context, outside of a functional logistics element, and represents the multi-disciplined approach needed in modern business context (Lummus et al, 1999, Svensson, 2002, Mentzer et al, 2001, Halldorssen et al, 2007, p. 284). Originally considered as a process management function (i.e. an extension of the internal operations function of a business) supply chain concepts now include all aspects of a business including for example technology and marketing (Svensson, 2002).
Core to supply chain thinking is the concept of product delivery to the end customer. To achieve optimum and efficient product delivery, most practitioners adopt a systems approach and look to improve constraints in that system as a method of improving efficiency (Melnyk et al, 2009, p. 4646). The principle dates back to the work of Deming (Knouse et al, 2009, Douglas and Fredendall, 2004) and has been adopted into other principles and philosophies such as Theory of Constraints (Nave, 2002, Naor, 2012), LEAN (Cozzolino et al, 2012), Agile (Charles et al, 2010), Six Sigma (Chiarini, 2011, Aboelmaged, 2010) and the quality management system ISO 9001:2015 (Abuhav, 2017).

Importantly, many authors such as Mentzer (2001, p. 7), Caddy and Helou (2007, p. 321) connect supply chain theory with systems theory, and by taking a systems approach view a supply chain as a single entity, although often containing multiple sub-systems. A systems approach aids in understanding how the components of any supply chain interact, and the value, bureaucracy or indeed constraints they place on the system (Caddy & Helou, 2007, p. 319). This is important from an Aid and Development point of view, where, as previously noted, “differences”, conflicts in strategic direction and imbedded cultural norms for example can adversely affect the efficiency of an Aid and Development program. Caddy and Helou (2007, p. 323) have provided some specific observations regarding systems that when extrapolated can have a direct impact on the performance of an Aid and Development program, these are:

- **If a system is complex it is less adaptable to change** - Aid and Development programs are typically complex and change in process and procedure is rare.

- **If a system is large it will need more resources to source the system** - Aid and Development systems are typically large and contain a heavy (compared to commercial supply chain systems) element of bureaucracy typically slowing the system and increasing the amount of resources (money) needed to keep the system (flow) operational.

- **As a system becomes larger it behaves more non-linear as a result** - This is particularly relevant to the whole system because as discussed in Chapter 5, the initial perception of the research of each of the case studies suggests that participants did indeed view their supply chain as a linear progression (as
typically depicted in Figure 3.2), however, mapping each of the supply chains identified a more complex, non-linear system.

From the literature reviewed, common terms were identified that are useful in understanding what it means to manage supply chains, these terms include:

- Network
- Communication
- Sustainability (both triple bottom line (Carter & Rogers, 2008) and longevity of the supply chain
- Value creation
- Collaboration

These terms help build the theory of supply where as other terms identify areas of management, these terms are:

- Upstream (see Figure 3.5)
- Downstream (see figure 3.5)
- Supply demand
- Input
- Output
- Supplier
- Customer
- Flow

### 3.4.1 The Theory Extended

One of the underlying themes of supply chain management is that of a value added progression from input to output to the end customer (commercial system) or recipient (Aid and Development system) (Suarez-Baraza, 2016, p. 520, Hines & Rich, 1997, p. 49). Supply chains are often depicted as a “bow tie” model with the focal company as a hub, and suppliers feeding “value” in the form of goods and services into it and from which more value is created and subsequently the product or service is “passed down
the line” (chain) to the end customer. Figure 3.5 illustrates a typical “bow tie” supply chain system.

In developing a systems perspective, it is advocated that a supply chain will have an “end-to-end” configuration (see Section 3.5) and in order to simplify the concept single linear models (often lacking detail) are made to fit the classic bow tie model. The work from this research demonstrates that, post mapping, the cases studied did not resemble the classic model of supply and indeed could not be made to fit without omitting significant (relevant detail). Importantly, however, flow, input, output, supply demand, customer, and upstream and downstream were identified (This is discussed further in chapters 4,5 and 6).
3.5 End-to-End Configuration and the Identification of an Atypical Supply System

End-to-end configuration is a concept used extensively in supply chain management (Cohen and Roussel, 2005, p. 178). Typically referring to the management of the supply chain from the original input of raw materials, through all stages of value creation, to the final delivery to the end customer and more recently including things such as after market (Cuthbertson and Piotrowicz, 2011) and end of product life management (Kang et al, 2010). Although critical in understanding the multi-discipline nature of supply chain management and the “total” systems approach needed to manage it, end-to-end configuration can often perpetuate the classical concept of a bow tie (i.e. linear) concept (Lambert et al, 1998, p. 7). Although end-to-end configuration is a well versed topic, little research can be found on the mapping of a supply chain in its entirety. Jayaratne (2015) did attempt this when mapping the Sri-Lankan tea industry. However, it was noted in the work that in actual fact only the primary sub-set was fully mapped (raw materials, distribution/blending, final retail supply were omitted) demonstrating that even in a geographically and industrially contained supply chain, complexity and the volume of nodal interactions become extremely difficult to establish. Importantly Jayaratne (2015) recognised a complex ecosystem existed within the supply chain, however, it was still described and mapped as a linear progression type, model.

Moving outside of the linear concept of supply, it is still possible to identify the originating input or node and the final output or delivery node of the supply chain. For example Oloruntoba and Gray (2009, p. 490) stated that the only new money in a supply chain was inputed from the end customer, the rest was simply redistributed throughout the system. This point became a pivotal factor in this work when it became clear that Aid and Development supply chains did not have an obvious, originating raw material, but they did have originating money that triggered the supply. Oloruntoba and Gray (2009, p. 490) said it is the transfer of money that mobilises the entire supply system. Furthermore it was identified that Aid and Development supply systems had an obvious output. In a classical sense this would be determined to be the end customer, however, in the context of Aid and Development the Recipient was not found to be the “supplier”
of the money into the system. This duality of funder or “Principal” and Recipient is not uncommon and has also been identified in government funded university research for example (Edwards, Ross and Styger, 2017, p. 6) and has been defined as an atypical supply chain. Interestingly both “input” and “output” would be graphically represented on the right hand side (i.e. “customer side”) of the classical bow tie model (see Figure 3.4).

This work identified that end-to-end configuration was present in all the case studies, albeit in the demand side of the classical model and there was a definite, consistent, 

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7 Figure 3.4 first mentions a node, “Homolagation”. Homologation means to approve or confirm which indicates that it meets regulatory standards and specifications and is used as a term for bringing together all subsets of the supply chain value creation and then “approving” for finish forwarding to the end customer or recipient.
“flow”, in this case money and returning value, in this case in the form of goods and/or services. As such the constant for mapping became money, and the return flow of value creation thus eliminating many contradictions and conflicts in the Aid and Development supply chain mapping process.

3.6 How Supply Chain Management Principles Drive Competitive Advantage

Businesses exist to create a product or service to sell to a customer for a profit. Government and not for profit organisations exist to satisfy the needs of their “customers” (i.e. recipients of those services) without the need for profit, but typically delivered at the lowest possible cost (Burt, Petcavage & Pinkerton, 2011). Lowest cost represents a clear common denominator between both the commercial and not for profit sectors insofar as less cost which results in more profit or the ability to deliver services for less. As early as 1982 Ohmae (1982) discusses the principles of the “Three Cs’”, which from the basis for successful business ventures and the relationship between customer, company and competition (this is illustrated in figure 3.5).

![Source: Ohmae (1982)

Figure 3.5 - Competitive Advantage and the Three Cs’](image-url)
Christoper (2011) states:

“Let us consider the basis of success in any competitive context. At its most elemental, commercial success derives from either a cost advantage or a value advantage or, ideally, both.”

(Christopher 2011, p. 4)

The mobilisation of all business functions to achieve competitive advantage is an absolute imperative for any business leader and this will take a multidisciplinary approach (i.e. a system approach) (Sheffield et al, 2012, p. 135). Moving forward and taking a total systems approach and looking outside of the organisation as well as inside (i.e. supply chain) results in greater strategic advantage and ultimately a strong competitive position (Mentzer et al, 2001, p. 10). As such, supply chain thinking becomes value chain thinking. Porter (1986, p. 17) took a novel approach to value chain analysis, that has become a cornerstone of business and strategic thinking ever since. In Porter’s case, he took the total business system and “disaggregated” it with its “strategically relevant activities” and argued that this was necessary to understand “the behaviour of costs and the existing and potential source of differentiation”. In doing so Porter identified the concept of sub-systems operating within the system and the importance of integration (see Figure 3.6). It is integration of these systems or the integration of “supply” that drives competitive advantage.

Source: Porter (1986), p. 18

Figure 3.6 - The Value Chain
3.7 Supply Chain Operation Reference (SCOR)

The objective of this work is to establish if the six primary management processes of SCOR (see Section 3.7.1) can be identified within and overlaid onto Aid and Development programs. SCOR is an international cross industry, best practice benchmarking standard and framework established by the Supply Chain Council in 1997 (Georgise et al 2012, p. 4) and has now merged with APICS (formerly known as the American Production and Inventory Control Society) in 2014. SCOR is a comprehensive standard that is aligned with modelling and mapping flows within a supply chain such as materials, infrastructure and financial (Long, 2014). Designed around a generic process and a common language, SCOR can be used to determine accurately the changes that need to be made to strategy and processes within a supply chain to achieve optimum performance and efficiency (Stewart, 1997, Verdouw et al, 2011, Burgess and Singh, 2006, Wong and Wong, 2008).

To measure the supply chain, SCOR evaluates transactions that are both physical and material as well as all customer interactions from concept, production and delivery to the end customer (Jalalvand et al 2011, p. 84, Verdouw et al, 2011, p. 367, Stewart 1997, p. 2). The result is that SCOR enables the setting of realistic performance targets, provides necessary information for the change management of the end-to-end configuration of a supply chain. SCOR has a “transactional efficiency focus” (Burgess and Singh, 2006) consisting of a benchmarking and modelling capability (Persson, 2011, p. 289) that, it is argued, if applicable, could be the basis of improvements in Aid and Development programs because as noted by Li et al (2011), SCOR can define supply chain process and activities and provide performance measures.

Wong and Wong (2008) note that the origin of using benchmarking with SCOR comes from the Deming Cycle (Plan, Do, Check, Act) (Schulz and Heigh, 2009). SCOR is also a diagnostic tool to configure optimum supply chain performance alignment with the business process. Wang et al (2010), Tatham & Spens (2011), Siegl (2008), Huang et al (2005) suggest that alignment is achieved by investigating four categories, these are:
1. Resources
2. Strategy
3. Capacity
4. Technology

Version 12.0 (APICS, 2017) of the SCOR standard states that:

“The Supply Chain Operations Reference (SCOR) model describes the business activities associated with all phases of satisfying a customer’s demand. The model itself is organized around the six primary management processes of Plan, Source, Make, Deliver, Return and Enable. Using these process building blocks, the SCOR model can be used to describe supply chains that are very simple or very complex using a common set of definitions across disparate industries. Today public and private organizations and companies around the world use the model as a foundation for global and site-specific supply chain improvement projects.

SCOR spans all customer interactions (quote to cash), all physical material transactions (procure to payment, including equipment, supplies, spare parts, bulk product, software, etc.) and all market interactions (manufacturing, from the understanding of aggregate demand to the fulfilment of each order).

The model is designed and maintained to support supply chains of various complexities and across multiple industries. The model focuses on three process levels and does not attempt to prescribe how a particular organization should conduct its business or tailor its systems or information flow.”

(Source, APICS, 2017)

Integration of the supply chain is the key to competitive advantage for a commercial supply chain system and is indeed the same for an Aid and Development supply chain system. As noted earlier, there has been a divergence of supply operating and improvement principles between the commercial and Aid and Development sectors. This is unfortunate because the commercial sector appears to have made great improvements in supply efficiency and therefore competitive advantage over the years.
SCOR focuses on inter-organisational integration (i.e. end-to-end configuration) including both the physical flows of money, goods and services and information/communication flows and the connectivity and flow of IT systems and data (Ntabe et al 2015, p. 326). By using SCOR as the mapping tool to improve the quality of these supply chain systems elements, SCOR places, at the heart of the supply chain system, metrics to measure and report supply chain system performance (i.e. efficiency and efficacy) (Gulledge and Chawslolu 2008 pp. 756ff, Lima-junior and Carpinetti, 2016, p. 129).

The SCOR standard (APICS 2017) states that:

“The performance or metrics section of SCOR focuses on understanding the outcomes of the supply chain and consists of two types of elements: Performance Attributes and Metrics., and introduces the concept of Process/Practice Maturities”.

(Source, APICS, 2017)

There are five performance attributes recognised within the SCOR standard, these are:

1. **Reliability** - This is outcome based and combines three aspects of supply chain process performance of on-time action/delivery, right quality and right quantity.

2. **Responsiveness** - This relates to the speed of the processes conducted in the supply chain, from the point of input into the supply chain to the point of exit and between each node. By focusing on cycle time (a metric) it is possible to analyse and adjust supply design or nodal performance. The return includes increased speed within the supply chain system and therefore shorter delivery time to the end customer (i.e. recipients in the case of an Aid and Development program). Increased speed to a customer does not negate an ongoing commitment to quality throughout the supply chain system and it is the focus on quality that will reduce costs within the system.
3. **Agility** - The overall impact of internal or external pressures in the supply chain system will be dependent on how agile the supply chain system is and therefore how quickly and how well it responds to those pressures.

4. **Cost** - Outside of basic personnel costs, other costs affecting a supply chain system can include capital equipment, bought in items, logistics, exchange rates and basic fixed operational overhead costs.

5. **Asset Management Efficiency (Assets)** - “Make or buy” decisions have long been associated with both LEAN and agile manufacturing, and more recently service, management philosophies. This in turn has an effect on supply chain configuration and the capital and intellectual assets needed to support the supply chain system. In the context of Aid and Development, an Aid agency needs to be mindful of what it does in-house compared to what it outsources to others and indeed how much capacity it retains.

The standard continues by stating that:

“A performance attribute is a grouping or categorization of metrics used to express a specific strategy. An attribute itself cannot be measured; it is used to set strategic direction”.

(Source, APICS, 2017)

Within the premise of improving the efficiency of Aid and Development supply chain systems, it is these strategic performance attributes that would catalyse operational efficiency if applied within the framework of the SCOR standard to Aid and Development supply chain systems. SCOR uses three levels of metrics to understand and measure the performance of the supply chain system. The metrics are considered within the standard to be diagnostic, and are discussed below:

- **Level 1 Metrics** - These are strategic diagnostic metrics focused on the overall health of the Supply Chain System and form the focus of this work (see Section 3.7.1).
- **Level 2 Metrics** - These are relational diagnostic metrics for the Level 1 Metrics and help to identify gaps in the performance of the Supply Chain System. SCOR
has typically been known as a mapping tool where the inter-nodal connections are mapped and measured throughout the total supply chain system with a view to understanding flow and constraints within the system and ultimately improving the system (Cohen and Roussel 2005, Long 2014, Georgise 2012, p. 4). Within the Level 2 Metrics, it is expected that organisations would exploit quality management improvement tools such as LEAN (Cozzolino, 2012), Six Sigma (Chiarini, 2011), Theory of Constraints (Naor, 2013) to optimise the total supply chain system for optimum efficiency. It is interesting to note that SCOR takes onboard established principals and tools for continuous improvement and aligns well with these principles. Furthermore it is important to note that SCOR adopts the old adage that “if you can measure it you can improve it” (Yokl, 2007, p. 10) and as noted at this level of SCOR Metrics, to measure it one must first map it.

- **Level 3 Metrics** - These are diagnostic metrics for the Level 2 metrics discussed above.

### 3.7.1 The Six Primary Management Processes of SCOR

SCOR is concerned with the identification of different process types and defines the overall scope of the supply chain. The SCOR standard asks questions about how business processes align with business strategies and network or total supply chain systems strategy both internally and within the wider external supply and customer participants. This is done to enable standard processes to be designed and implemented within the total supply chain (Cohen & Roussel 2005, Li et al 2011, p. 34).

SCOR has six primary management processes, these are:

1. Plan
2. Source
3. Make
4. Deliver

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*8 The application of the metrics onto the case studies described in Chapters 5 and 6 is outside of the scope of this work as the nature of the research is about identifying 6 aspects of SCOR rather than using those metrics to determine the health of the supply chain.*
5. Return
6. Enable

Figure 3.7 provides an illustration of SCOR overlaid into a simplified value creation chain.

![Figure 3.7 - Illustration of the SCOR Definitions Overlaid onto a Simplified Value Creation Chain](source)

*Source Adapted from: Edwards and Styger (2013, p. 5)*

**Figure 3.7 - Illustration of the SCOR Definitions Overlaid onto a Simplified Value Creation Chain**

### 3.7.1.1 Plan

The Plan process of SCOR defines a macro view of all the supply resources to enable an understanding of the capacity needed to deliver a given product or service from the total supply chain system to the end customer. The Plan stage also considers supply chain designs and life cycle management (Long 2014, Lockamy and McCormack 2004).
3.7.1.2 Source

The Source process of SCOR is concerned with measuring the “source function” (i.e. the supply side participants within a classical bow tie construct of supply chain) and if the supply side can meet current and future demands (Persson 2011, p. 289, Siegl 2008, p. 20).

3.7.1.3 Make

The Make process of SCOR is fundamentally focussed on the value creation within all elements of the supply chain system. Traditionally this function would include measures concerning the manufacturing process, testing of products, quality control, packaging, stock control and fulfilment (Long 2014, p. 6904). Importantly, the Make process in a service based industry has a different language. The assumption is that nothing is made in a service industry (Georgise et al 2012, p. 7), however, because there is an output from a service business or indeed government department, NGO or Aid and Development program it is argued that output needs to be planned, designed, improved and indeed dispatched. As such the “Make” function still exists as indeed does the value creation within a service focussed organisation.

3.7.1.4 Deliver

Within the context of planned new, the Deliver process considers if the finished product (i.e. output) of the supply chain system has been transported and distributed to the right end customer (or recipient) (Hwang 2008, Persson 2011, p. 288). Typically associated with the distribution functions of manufacturing or retail for example, deliver has a direct correlation to Aid and Development programs.
3.7.1.5 Return

The Return process is primarily concerned with ongoing maintenance, warranty, lifecycle/end of product life issues alongside the return of surplus, obsolete or expired product or assets (Huang et al 2005, p. 381).

3.7.1.6 Enable

The Enable process of SCOR is described as providing:

“Support the realisation and governance of the planning and execution processes of supply chains”

(Source, APICS, 2017)

This support includes the management of practices of protocols, performance management and reporting, data management, resource management, facilities management, governance and risk, and overall contracts management and compliance (Dweekat et al, 2017, APICS 2017). The Enable process of SCOR can be considered as the quality function of the standard and provides a tangible connection to the ISO 9001:2015 family of standards for example, and it provides the elements that drive continuous improvement within a supply chain system.

There are five categories at the core of the Enable process: reliability, responsiveness and agility are external customer facing categories. In the context of Aid and Development supply chain systems, these categories would focus on how quickly, consistently and, if necessary, how capable the Aid and Development supply chain system was to respond rapidly to external environmental changes. The final two categories: cost and asset management, are internal facing and in the context of Aid and Development supply chain systems have profound implications in terms of value for money (impact) of the program in the eyes of the Principal (i.e. funder), how much
funding is retained within the supply chain system itself and how robust the supply chain system is overall.

Figure 3.8 provides an illustration of the SCOR model and the six primary management processes, present in the focal company (node) and the first tier supplier and first tier customer.

![Figure 3.8 - Illustration of the SCOR Model and Six Primary Management Processes](source)


**3.7.2 SWOT Analysis of SCOR**

The SCOR framework was adopted because of its ability to cross different industries, it is regarded as a best practice standard to benchmark and map processes along a supply chain. To determine SCOR’s “best fit” a review of the literature was conducted to determine the strengths and weaknesses of the SCOR framework. From this information a SWOT analysis (Ojala 2017, p. 61, Gurel and Tat 2017, p. 994) was conducted to determine SCOR’s external and internal strengths and weaknesses. The SWOT analysis is detailed below in Table 3.8.
Table 3.8 - SWOT Analysis of SCOR

<table>
<thead>
<tr>
<th>External Strengths</th>
<th>Internal Strengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry and competitive benchmark data</td>
<td>Macro approach to identify improvement</td>
</tr>
<tr>
<td>sources</td>
<td>opportunities</td>
</tr>
<tr>
<td>Best in class supply chain management</td>
<td>Communication - common language</td>
</tr>
<tr>
<td>practice</td>
<td>Structured methodology to identify</td>
</tr>
<tr>
<td>Cross-functional connectedness for</td>
<td>business improvement opportunities</td>
</tr>
<tr>
<td>purchasing, manufacturing and logistics</td>
<td></td>
</tr>
<tr>
<td>Seller connected to the buyer through</td>
<td>Standardised model and performance</td>
</tr>
<tr>
<td>return process</td>
<td>metrics</td>
</tr>
<tr>
<td>Connects to other members of the Supply</td>
<td>Provides detailed Return on Investment</td>
</tr>
<tr>
<td>Chain by transactional activities</td>
<td>analysis</td>
</tr>
<tr>
<td>Benchmarking tools or best practice</td>
<td>IT capabilities to optimise</td>
</tr>
<tr>
<td>analysis</td>
<td>Supply Chain</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>External Weaknesses</th>
<th>Internal Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited focus on other areas such as</td>
<td>Cannot focus on specific modelling such</td>
</tr>
<tr>
<td>marketing, finance and Research and</td>
<td>as optimisation or simulation</td>
</tr>
<tr>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>Limited focus on other areas such as</td>
<td>Static tool that cannot analyse dynamic</td>
</tr>
<tr>
<td>marketing, finance and Research and</td>
<td>analysis. Unable to manage projects</td>
</tr>
<tr>
<td>Development</td>
<td></td>
</tr>
<tr>
<td>Limited cause and effect analysis</td>
<td></td>
</tr>
<tr>
<td>Limited cause and effect analysis</td>
<td></td>
</tr>
<tr>
<td>Static tool that cannot analyse</td>
<td></td>
</tr>
<tr>
<td>dynamic analysis. Unable to manage</td>
<td></td>
</tr>
<tr>
<td>projects</td>
<td></td>
</tr>
<tr>
<td>Inadequate training and development</td>
<td></td>
</tr>
<tr>
<td>Lack of connection between integration to</td>
<td></td>
</tr>
<tr>
<td>synchronisation</td>
<td></td>
</tr>
</tbody>
</table>


Table 3.8 - SWOT Analysis of SCOR

3.8 The Impact, Measures and Data Relating to the Exploitation of SCOR within Supply Chain Systems

Originating from the manufacturing sector, SCOR has successfully migrated into the service sector, government and NGO’s (Malin 2006, Siegl, 2008, Georgise et al, 2012). Improvements reported by organisations implementing SCOR include:

- “An average of 3% as a percentage to total sales operating portfolio derived from cost reduction and service improvement”. In the context of Aid and Development spend globally, 3% would amount to USD$4.2bn
• “Two to six times return on investment (ROI) within twelve months, often with cost-neutral quick hit projects underway on a six month time frame”
• “Full leverage of capital investment in systems improving return on assets (ROA) for fixed-asset technology investments”. The case studies from the work did not have a list of capital investments (i.e. spend on IT for example) as a percentage of program costs. SCOR would trigger this kind of reporting
• “Reduced information technology (IT) operating expenses through minimised customisation and better use of standard system functions”
• “Ongoing updates to a project portfolio, using continuous supply chain improvements to drive profit improvement to 1% to 1-3% per year” (Bolstorff and Rosenbaum, 2003, Wong and Wong, 2008, Maestrini, 2017). In the area of Aid and Development projects a 1-3% improvement (say 2%) on spend globally would amount to USD$2.85bn

Table 3.8 provides a data set pertaining to a specific literature search on industry benefits of SCOR.
<table>
<thead>
<tr>
<th>Search 1</th>
<th>Keyword 1</th>
<th>Keyword 2</th>
<th>Keyword 3</th>
<th>Limit</th>
<th>Database search system used</th>
<th>How many results</th>
<th>How many of the results were useful?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SCOR</td>
<td>performance</td>
<td>industry</td>
<td>Review Case study</td>
<td>ProQuest</td>
<td>17</td>
<td>3</td>
</tr>
<tr>
<td>Search 2</td>
<td>SCOR</td>
<td>performance</td>
<td>industry</td>
<td>All documents</td>
<td>Scopus</td>
<td>80</td>
<td>17</td>
</tr>
<tr>
<td>Search 3</td>
<td>SCOR</td>
<td>performance</td>
<td>industry</td>
<td>Review Case study</td>
<td>Web of Science</td>
<td>51</td>
<td>7</td>
</tr>
<tr>
<td>Search 4</td>
<td>SCOR</td>
<td>performance</td>
<td>industry</td>
<td>Case study</td>
<td>Abi/Inform</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>Search 4</td>
<td>SCOR</td>
<td>performance</td>
<td>industry</td>
<td>All date range 2010-2019 Subject: SC and SCM</td>
<td>Abi/Inform</td>
<td>210</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>361</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 3.9 - Literature Search of Industry Benefits of SCOR

On reviewing the literature generated by the search noted above, Table 3.10 provides a data set of specific published benefits of implementing SCOR on an industry/author basis.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Sector and Benefit</th>
<th>Key Findings</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Automotive</td>
<td>Measuring inter company supply chains</td>
<td>Simulation studies were conducted. The data showed that there were reductions in the volatility of forecast information by approximately 60% and an increase in the consistent forecast and demand information by as much as 50%. Production and inventory capacities reduced by as much as 15%. Safety stocks reduced by 22% and order points and order up to levels reduced by as much as 17%</td>
<td>Roder &amp; Tibken (2006)</td>
</tr>
<tr>
<td>Industry/Logistics</td>
<td>Supply Chain Performance</td>
<td>SCOR Measurements</td>
<td>Relevance and Methodology</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td>Aerospace, Chemical, Defence, Electronics, Food and Beverage, Industrial Products, Transportation</td>
<td>Supply chain performance measurements</td>
<td>SCOR was able to provide a base to measure Supply Chain performance, to evaluate strategy and the development of a common Supply Chain framework</td>
<td>Jothimani &amp; Sarmah (2014)</td>
</tr>
<tr>
<td>Aerospace, Chemical, Defence, Electronics, Food and Beverage, Industrial Products, Transportation</td>
<td>Measurement and benchmarking SCOR</td>
<td>Preliminary and exploratory study to compare 9 key planning practices was conducted to determine the direct or indirect effect by using SCOR. Supply chain performance was strongest in the planning processes i.e. process integration, collaboration, teaming, process measurement, documentation and ownership in 4 of the SCOR processes (Plan, Source, Make, Deliver)</td>
<td>Lockamy &amp; McCormack (2004)</td>
</tr>
<tr>
<td>Coconut Oil</td>
<td>Supply chain management performance</td>
<td>12 KPI variables were performance measured by using SCOR. The results provided areas for improvement that would increase the level of performance of the entire supply chain</td>
<td>Meilizar et al (2016)</td>
</tr>
<tr>
<td>Construction</td>
<td>Supply chain management performance</td>
<td>The use of SCOR metrics assisted in creating a better decision making process to optimise supply chain performance</td>
<td>Kocaoglu (2013), Pan et al (2010)</td>
</tr>
<tr>
<td>Construction Logistics</td>
<td>SCOR performance measurements</td>
<td>Adapting SCOR framework from the manufacturing to construction industry served as a way to assist with the mapping and measuring of the Supply Chain and define what areas needed improving</td>
<td>Thunberg &amp; Persson (2014)</td>
</tr>
<tr>
<td>Crude palm oil</td>
<td>Analyse business processes</td>
<td>SCOR results show areas for improvement in business performance by analysing upstream and downstream areas of the supply chain</td>
<td>Sembiring &amp; Rambe (2017)</td>
</tr>
<tr>
<td>Egg industry</td>
<td>Supply chain measurement model</td>
<td>The integration of SCOR was not just for the visibility of local or functional management of the supply chain but included participation and visibility of the entire supply chain</td>
<td>Pretorius et al (2013)</td>
</tr>
<tr>
<td>Industry</td>
<td>Research Area</td>
<td>Description</td>
<td>Reference</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Fashion retail</td>
<td>Supply chain optimisation</td>
<td>The study provided “As is” and “To be” results. Using SCOR the “To be” scenario was able to determine that increases in profits were possible. It also revealed that there was the ability to follow demand variations and adjust operational requirements to suit demand</td>
<td>Martino et al (2017)</td>
</tr>
<tr>
<td>Footwear</td>
<td>Supply chain performance assessment</td>
<td>SCOR measured the extent of which portion of the strategy was achieved. It provided information as to which areas of the supply chain needed to be addressed and improved</td>
<td>Sellito et al (2015)</td>
</tr>
</tbody>
</table>
| Hospital          | Inventory tracking, Patient flow      | The results from using SCOR saw:  
• 2% reduction in drug inventory  
• 8-10% reduction in excess and obsolete inventory  
• Improved visibility provided a 21% increase in capacity  
• 8% increase in demand  
• Reduction in preparation time for key procedures by 40% | Malin (2006)                |
| Manufacturing (Pakistan) | Implementation of SCOR model | Implementing SCOR to measure the performance of the Supply Chain and as a result modify specific processes saw one area, the import procurement cycle improve by 10% | Salman et al (2013)       |
| Pharmaceutical    | Developing an agile supply chain model | SCOR was used to define the factors that affected agility within the Supply Chain. Specific areas such as sales feedback, customer requirements and forecasting were modified to create agility within the supply chain | Mehralian (2015)          |
| Steel production  | Supply Chain analysis using SCOR      | Applying SCOR to analyse the supply chain of the steel plant indicated 9 areas for improvement. The metrics showed that improvements in these areas would provide cost, reliability and flexibility improvements | Seifbarghy et al (2010)   |
| Sugar cane        | Supply chain performance              | By using SCOR to measure the performance of the supply chain it provided visibility of areas where the performance was poor and provided strategies for improvement | Asrol & Machfud (2017)    |
Mapping of the system lies at the core of applying SCOR and continuously improving a supply chain system (APICS, 2017). The literature discusses broadly a sub-set of mapping, these are:

- Business Process Modelling
- Process Mapping
- Supply Chain Mapping

In the context of process modelling, Aguilar-Saven (2004) suggest that there are many different business process modelling tools including:

- Flow charting
- Data flow diagram
- Rule activity diagram
- Rule interaction diagram
- Gantt Charts
- Integrated definitions for function modelling
- Coloured Petri-net (i.e. place transition (PT) net)
- Object orientated methods
- Word flow techniques
Ennis’ (1999) work on causal mapping is interesting because it adopts maps more akin to mind maps (Buzan, 2006) or word clouds, than more traditional flow or network diagrams, illustrating perhaps there is no definitive graphical structure for mapping a system.

Business process modelling is typically associated with mathematical approaches to system analyses, whereas process mapping typically involves a more “human” approach and is more focussed on waste identification and open collaboration (Ventura Martins, and Zacarias, 2017, p. 4). Importantly the process mapping activity helps to identify and capture latent knowledge within a system and those persons associated with it (White and Cicmil 2015). There is much literature concerning value stream mapping where either a qualitative or quantitative approach is taken to understand system flow and constraints (Suarez-Barnaza et al 2014, p.397, Suarez-Barnaza et al 2016, p. 520, Kumar et al 2013, Singh and Sharma 2009, p. 59, Seth et al 2017, p. 399), key themes arriving from this literature include:

- Although commentary on the complexity of the system, few authors focus beyond second or third tier ties of supply in their mapping
- Most authors portray through their mapping a linear view of a system often aligning with a classical bow tie array
- Nodal linkages are often missing
- Multiple case studies are typically the most favoured methodology for research concerning supply chain mapping

Multiple case study analysis (discussed in Chapter 4) is claimed by Voss et al (2002) to help in increasing the validity of mapping exercises. This is achieved through comparative analysis and triangulation of data derived from the case studies. Gardner and Cooper (2003) delivered a pivotal work on strategic supply chain mapping and process mapping identifying core differentiates. These are noted in Table 3.8 below:
Gardner and Cooper (2003) also offer a strong argument in favour of supply chain mapping, the main points are:

- A supply chain map is easy to display and understand
- The map catalogues and distributes key information
- A supply chain map can form the basis for redesigning a supply chain or highlight areas for modification
- It is representative of the dynamics of the supply chain such as flow, value creation nodal interaction etc.
- The mapping process has an effect on the strategic outcome (Cooper, Lambert & Pagh 1998)
- Supply chain maps develop a common understanding by supply chain stakeholders of the supply chain
- A supply chain map is a cross functional tool that enables monitoring of the supply chain and eventually lead to supply chain (systems) improvements

Following the work of Gardner and Cooper (2003), Srai and Gregory (2008) note that there is no standard for supply chain mapping and examples could include geographical portrayals, time lapse diagrams to more conventional flows, process or network diagrams. Typically “flow” is traced in some manner in the form of materials through a factory, information flows etc. Wang et al (2010) however, discuss the mapping of a system by investigating policy documents pertaining to that system. This has some application in the context of Aid and Development programs. Where more traditional
“flow” may not always be evident within the system. Likewise Farris (2010) demonstrates the mapping of a system by tracing government funding into the system. Once again this has application within the Aid and Development context. Indeed in the context of this work, the tracking of funding was used as the “flow constant” within the case studies and documentation (public in one case and private in the other) was also used consecutively.

3.10 Summary

This Chapter discussed nine topic areas in relation to this research. Beginning with Aid and Development supply, it was established that although supply and indeed supply chain were constructs within the sector, the majority of focus was typically project based and focussing on humanitarian aid or disaster relief. These areas are typically short on time scales compared to longer term Aid and Development programs where supply chain management principles could have a more significant, sustainable impact. There is typically discourse in the literature pertaining to an accurate definition of supply chain, however in the context of this work the Supply Chain Council definition has been adopted. This has relevance to Aid and Development programs because they have similar flow and functions to that of commercial supply chains (Maon 2009, p. 153, Pettit and Beresford 2009, p. 453). It is argued that systems theory has relevance within the context of supply chain management principles and also the context of the work, because it incorporates the entire ecosystem under investigation and takes into account complexity and variables. Although the basis of supply chain management theory is not new, there is little connection to Aid and Development programs often due to different languages of the sector/disciplines and embedded axioms of “difference” between the commercial sector and that of aid provision. One principle of supply chain management theory is of end-to-end configuration and the measure, management and improvement of the total ecosystem of the supply chain. It is argued that this concept is critical within an Aid and Development context in order to achieve the optimum output and therefore greatest impact for the recipient. Because of the logistics nature of supply chain management, greater competitive advantage is expected because of the total systems approach throughout the entire value chain, as opposed to a more siloed initiatives within bounded organisational structures.
SCOR represents the central improvement framework (i.e. the standard) for supply chain and therefore competitive improvements. It is harmonious with many continuous improvement tools and provides a robust framework based around mapping and benchmarking concepts. It was noted that for a system to be improved, it must first be mapped in order to investigate the dynamics, the nodal links and constraints. Whereas there is no standard for mapping, a protocol must be established and followed. It was identified that typically a multiple case approach is exploited in mapping research. In the context of this work and the objective of establishing if the six primary management processes of SCOR can be identified in Aid and Development programs, two opportunities were offered, the first to map a system using documentation initially pertains to funding and the second to map a system by following the flow of funding.

Chapter 4 moves forward to discuss the research methodology that utilises a multiple case study approach to map three Aid and Development supply chains of the case studies.
CHAPTER 4 - RESEARCH METHODOLOGY
4.0 Introduction to Chapter 4

Chapter 3 presented the literature review, theoretical concepts and principles pertinent to this research. The Chapter discussed the importance of supply chain management, and, by adopting a systems approach, how improvements could be made to that supply chain system. SCOR was offered as a viable framework for managing and improving supply chain performance, and it was argued that the first step towards improvement of a supply chain system was to map that system. The literature review noted that although there had been significant research on commercial supply chain activities, little work had been conducted in the humanitarian support sector. What research had been conducted was typically focussed on disaster relief aid, not longer term Aid and Development programs.

This Chapter presents the methodology exploited to answer the research question of whether the Supply Chain Operation Reference (SCOR) framework represent a valid alternative management framework for Aid and Development Programs and achieve the overall research objective of identifying if the six primary management processes of SCOR (see Section 3.7) is evident in Aid and Development programs by mapping the existing Aid and Development supply chain systems of the case studies. Three sub-questions arise from the main research objective, these are:

1. What does the supply chain systems map of an Aid and Development supply chain look like?
2. What are the main links of an Aid and Development supply chain system?
3. How do you map an Aid and Development supply chain system?

These sub-questions are “what” and “how” questions and as such the research methodology typically leans towards being more exploratory. As such, a qualitative research approach was selected and a suitable subject for study (case) was needed. Preliminary research indicated that there are no standard Aid and Development programs, as such, three cases were selected, one for field investigation, one for investigation by internal records and one for investigation by published records. Although not in any way assumed to be either representative or exclusive, it was
considered that the multiple case study approach using different data sources might offer more insight into the supply chain structures of an Aid and Development program at the exploratory research phase.

The methodological approach and data collection process is discussed in this Chapter under the following sections:

1. Philosophical underpinnings of the research methodology
2. The research design approach
3. Ethical considerations
4. Challenges faced during the research

4.1 Philosophical Underpinnings of the Research Methodology

Initially a fuller literature review was carried out on research methodologies in order to identify the best approach in answering the research question. The “research onion” (Saunders, Lewis and Thornhill, 2012, p.108) (see Figure 4.1) identifies seven necessary stages of the research process, these are:

1. Understanding the research paradigm and philosophical assumption
2. Identifying the interpretive framework
3. Identifying the theoretical approach
4. Determining methodological choices
5. Identifying the appropriate research strategy
6. Understanding data collection and time horizons
7. Selecting a suitable data collection and analysis methodologies
4.1.1 The Research Paradigm and Philosophical Assumption

The research paradigm is a shared framework of a discipline and guides how the research should be conducted (Oral and Kettani, 2015, p.22). The research paradigm has a direct affect on the research process because of the interconnectivity of the research method and research approach (Mangan et al, 2004, p. 566). The paradigm represents the “world view” and since different cultural axioms exist about any given topic it is important to understand the philosophical assumptions being made and as such this represents the starting point and foundation of the research process. Terms such as ontological, epistemological, axiological and methodological are typically used by researchers to describe philosophical assumptions (Cresswell 2013, p. 35). Table 4.1 categorises the philosophical assumptions used in research.
Table 4.1 - Philosophical Assumptions used in Research

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Questions</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontological</td>
<td>Assumptions about what exists and the nature of reality</td>
<td>Realities that are shaped by how things are and how they work and influenced by a value system or worldview</td>
</tr>
<tr>
<td>Epistemological</td>
<td>What is the nature of knowledge and the relationship between the person who knows and the person wanting to know and what is it that can be known</td>
<td>Knowledge is both socially and historically situated</td>
</tr>
<tr>
<td>Axiological</td>
<td>What is the nature of ethics</td>
<td>In research cultural norms are respected, human rights are therefore promoted and social justice increases</td>
</tr>
<tr>
<td>Methodological</td>
<td>How can the researcher go and find answers to what they believe can be known</td>
<td>A method of enquiry that is regulated by a range of holistic factors that explain cause and effect to assist with interpretation that leads to understanding</td>
</tr>
</tbody>
</table>


Table 4.1 - Philosophical Assumptions used in Research

4.1.2 Interpretive Framework

In the context of business research, Cresswell (2013, p. 36) states that: positivism, interpretism, realism and pragmatism are the main interpretive frameworks and it is within these interpretive frameworks that philosophical frameworks are immersed:

- **Positivism** - Use of existing theory to develop hypotheses and exploration of objective methods (i.e. surveys and mathematical methods) to test the hypothesis
- **Interpretism** - Makes the assumption that people view physical and social environments differently (Shepherd, 2006) and exploits mostly qualitative methods (Fraser, 2014)
- **Realism** - Is also an interpretive approach that is similar to a positivist approach that exploits qualitative and quantitative techniques (Fraser, 2014, p. 57, Saunders, Lewis and Thornhill, 2012, p. 115)
- **Pragmatism** - Is an interpretive approach that assumes that there are many ways to interpret a situation rather than adopting a single approach. Pragmatism is
typically used where a single method does not explain fully the scenarios in question

4.1.3 Theoretical Research Approaches

A research project can exploit different approaches to explain the research outcome, these are:

- **Deductive** - The research starts with theories and develops towards empirical evidence
- **Inductive** - The research starts with observation and develops, via analysis, the idea (Fraser, 2014, p. 59)
- **Abductive** - The research is a combination of both deductive and inductive research with the aim of developing a new theory or fine tuning existing theories (Thornberg, 2012, p. 251). The abductive research approach is commonly used in case study research where the data collection and theory development are happening in parallel (Asvoll, 2014)

Table 4.2 provides a comparison of deduction, inductive and adductive research approaches:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory</td>
<td>Facts of reality or data</td>
<td>Observation of facts</td>
</tr>
<tr>
<td>Hypotheses formulation</td>
<td>Data collection and analysis for theory building</td>
<td>Logical theory determined</td>
</tr>
<tr>
<td>Data collection to test hypotheses</td>
<td>Development of theory and testing</td>
<td>Facts determined</td>
</tr>
<tr>
<td>Facts of reality determined</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Gill, Johnson & Clark (2010), Saunders, Lewis and Thorhill (2012)*

*Table 4.2 - A Comparison of Deductive, Inductive and Abductive Research Approaches*
4.1.4 Methodological Choice

Methodological choice focuses on the methods of data collection, data analysis and interpretation (Merriam, 2002, Kumar, 2005, Cresswell, 2013, p. 255). Specific methodological choices include:

- Quantitative
- Qualitative
- Mixed Methods

Johnson, McGowan and Turner (2010, p. 65) state that there are many methodological options and off a “continuum” where pure Qualitative research is at one extremity of the continuum and pure Qualitative is at the other (see Figure 4.2). Quantitative methodologies assume the situation remains constant and examines the relationship between different variables with a focus on numeric or statistical data (Kumar, 2005). Qualitative methodologies examine and test theories using a deductive approach and results is typically generalised (Gill, Johnson and Clark, 2010). Qualitative research takes on a more personal approach where the outcomes are constructed in a social context based on the researchers “real world” experiences and beliefs relevant to the research (Hurt and McLaughlin, 2012, p. 63). Also called exploratory research, Qualitative research can result in “multiple truths” that can change over time and are not measurable in the same manner as Quantitative methodologies. Merriam (2002) states that qualitative methodologies are used when there is a lack of theory or when the theory are not developed to explain a situation. Qualitative research typically uses a deductive approach and systematic interpretation of the data as a means of analysis and is more descriptive (Welch and Piekkari, 2017, p. 716).
Research is often conducted using a combination of Quantitative and Qualitative methodologies that is based on the research question. Both methods can work in parallel or build on each other as the research develops (Johnson McGowan and Turner, 2010, p. 65)

4.1.5 Research Strategy

The research strategy is the plan for how the question will be researched and it is the methodological link between the research philosophy and methodological approach (Denzin and Lincoln 2005). Saunders, Lewis and Thornhill (2012, p. 172) state that the research strategy is bounded by the following elements:

- Research Question
- Research Objective
- Existing knowledge of the subject
- Time constraints

Source: Johnson, McGowan and Turner (2010)

Figure 4.2 The Research Continuum
• Resource constraints
• Access to research participants

Cresswell (2013) provided guidance regarding the alternative research strategies, these are:

• **Quantitative method** - Experimental design and non-experiment design such as surveys
• **Qualitative method** - Narrative research, phenomenology, ethnography, grounded theory and case studies
• **Mixed method** - Sequential, concurrent and transformative

Cresswell (2013) further contributes by offering a comparison of main qualitative research strategies, this is reproduced in Table 4.3 below.
<table>
<thead>
<tr>
<th>Research Category Characteristics</th>
<th>Narrative Research</th>
<th>Phenomonology</th>
<th>Grounded Theory</th>
<th>Ethnography</th>
<th>Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus</strong></td>
<td>Exploring experiences</td>
<td>Understanding experiences</td>
<td>Developing theory</td>
<td>Description and Interprétation</td>
<td>Description and analysis</td>
</tr>
<tr>
<td><strong>Type of problem best suited for design</strong></td>
<td>Telling experiential stories</td>
<td>Describing substance of an event</td>
<td>Theory is grounded from the views of those involved</td>
<td>Describing and interpreting patterns of the culture of a group</td>
<td>In depth understanding of a case</td>
</tr>
<tr>
<td><strong>Discipline background</strong></td>
<td>Humanities background</td>
<td>Philosophy, Psychology and education</td>
<td>Sociology</td>
<td>Anthropology and sociology</td>
<td>Psychology, Law, medicine and Political Science</td>
</tr>
<tr>
<td><strong>Unit of Analysis</strong></td>
<td>One or more individuals</td>
<td>Several individuals with shared experiences</td>
<td>Study of a process, action, interaction of many individuals</td>
<td>Group study involving a shared culture</td>
<td>Study of a program, event, activity that involves more than one person</td>
</tr>
<tr>
<td><strong>Data-collection Method</strong></td>
<td>Interviews and documents</td>
<td>Interviews, May use observation, documents and art</td>
<td>Interviews</td>
<td>Primary use of Observation and interviews</td>
<td>Interviews, documents, observations and artefacts</td>
</tr>
<tr>
<td><strong>Data-analysis strategies</strong></td>
<td>Theme based, Chronological</td>
<td>Analysis of data for significant statements, text and structural description about the substance of the event</td>
<td>Analysed data is coded</td>
<td>Analysis of data through description of culture, themes about the group</td>
<td>Analysis of data by describing the case, themes of case and cross-case themes</td>
</tr>
<tr>
<td><strong>Written report</strong></td>
<td>Narrative in nature</td>
<td>Describing the substance of an event</td>
<td>Generating a theory</td>
<td>Description of how culture sharing groups work</td>
<td>Detailed analysis of one or more cases</td>
</tr>
</tbody>
</table>

Source: Creswell (2013)

Table 4.3 - A Comparison of Main Qualitative Research Strategies

4.2 Research Design Applied

Yin (2009) describes the research design as being the “blue print” of the research and it is fundamental in answering the research question, because it provides the necessary framework for data collection and analysis (Bryman and Bell, 2003, Cresswell (2013). Saunders, Lewis and Thornhill (2013) offer a map for research methodologies that has
been adapted for this research (see Figure 4.3). The research exploits an explorative approach because it was necessary to map the supply chains of each of the case studies.

Qualitative research is more appropriate for this research because if a quantitative research was attempted rich data concerning nodal links, constraints, secondary links and influencing factors on the supply chain would be lost (Creswell, Hanson, Clark and Morales, 2007). As such, an inductive qualitative approach was exploited for analysing the data generated for this work, collected via interviews, primary and secondary documentation and observation. Figure 4.4 maps the research design for the work.

Source: Creswell (2013), Saunders, Lewis and Thornhill (2013)

Figure 4.3 - Map of the Research Methodological Path for this Research

<table>
<thead>
<tr>
<th>Research Purpose</th>
<th>Descriptive</th>
<th>Exploratory</th>
<th>Explantory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case Study</td>
<td>Action Research</td>
<td>Grounded Theory</td>
<td>Experiment</td>
</tr>
<tr>
<td>Survey</td>
<td>Archival Research</td>
<td>Narrative Theory</td>
<td></td>
</tr>
<tr>
<td>Probalistic</td>
<td>Non-Probalistic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-Structured Interviews</td>
<td>Field Work/ Observation</td>
<td>Focus Groups</td>
<td>Survey</td>
</tr>
<tr>
<td>Secondary Data</td>
<td>Audi-Visual Material</td>
<td>Artifacts</td>
<td>Ethnography</td>
</tr>
<tr>
<td>Coding</td>
<td>Content Analysis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Data Collection Method</th>
<th>Coding</th>
<th>Content Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Work/ Observation</td>
<td>Focus Groups</td>
<td>Survey</td>
</tr>
<tr>
<td>Audi-Visual Material</td>
<td>Artifacts</td>
<td>Ethnography</td>
</tr>
<tr>
<td>Secondary Data</td>
<td>Coding</td>
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<td>Ethnography</td>
</tr>
<tr>
<td>Secondary Data</td>
<td>Coding</td>
<td>Content Analysis</td>
</tr>
</tbody>
</table>
4.2.1 Research Strategy Comparative Case Study Analysis

This research adopted a Comparative Case Study Analysis approach because it was necessary to understand the actual networks, nodes and interactions of each case, and map them so that further investigation could be conducted to establish if the six primary management processes of SCOR was present in each. Multiple case studies were chosen because it was determined that a single case might demonstrate SCOR characteristics through luck not design. Also, by adopting alternative primary investigation techniques; interviews, documenting investigation from source,
documenting investigations historical or third party, triangulation of data would be possible providing gravitas to the findings.

Case study research looks at the dynamics of an organisation, either in its entirety or a portion of it. Veal (2005) states that case studies are appropriate for studying one or a limited number of organisations in depth. Case studies are determined to be either geographically or temporarily unique (Veal, 2005). Baxter and Jack (2008) note that there are eight categories of case study analysis, they are:

1. *Explanatory Case Study* - View to answer questions, define the line in real life situations that are typically too complex for alternative experimental analysis. The outcomes from explanatory case studies link program implementation with program effect and might require mapping of processes to answer “how” type of questions (Baxter and Jack 2008, p. 547)

2. *Descriptive Case Study* - Describes an intervention or phenomenon and context of the situation in the real world environment (Ridder, Hoon and McCandless, 2009, p. 141)

3. *Instrumental Case Study* - Provides insight into an issue or is useful in refining a theory. As a “facilitator”, this type of case study improves understanding of a situation. Typically, Instrumental Case Studies are in depth because the case is secondary in nature and often difficult to compare with other cases (Laframboise and Shea 2009, p. 109)

4. *Exploratory Case Study* - Explores interventions undertaken in a situation where there are no clear outcomes (Keinz and Prugl 2010, p. 276)

5. *Intrinsic Case Study* - Isolated in nature and non-representative of other case studies and are focused solely on understanding the specific case under investigation (Blum 2017, p. 2295)

6. *Multiple Case Study* - Allows differences within and between a selection of case studies. The objective is that discovery made in one case study can be replicated in others. By reviewing the results of multiple case studies, researchers are able to make comparisons. It is vital that researchers choose cases that have similar variation in order to observe contrasting results (Yin 2009, Baxter and Jack 2008)
7. **Collective Case Study** - Similar to multiple case study note above (Baxter and Jack 2008)

8. **Comparative Case Study** - A general qualitative research method that evaluates more than one case study (Goodrich 2014). The cases under investigation have been effected by an event or situation that is a focus of the research (Gog 2015, p. 36)

Yin (2009), Baxter and Jack (2008) and Estrada et al (2016) state that if a researcher needs to understand the “how” and the “why” questions of complex events or situations, then the best research method to use is a case study method. A comparative case study method is interested in why did the changes recorded in the case occur (Gale 2015, p. 87). Multiple case studies provide strong and reliable data because it is not possible to manipulate the process or events that occur during the life cycle of the case (Quinlan et al 2013, p. 588).

Case studies are a bounded system that contain interconnected elements that are separated from their environment by a system boundary (Barth and Thomas 2013). The boundaries that do exist are typically case related, but within these boundaries are variables (Goodrich 2014, p. 7). Variables could include descriptions of process, policies or how strategy for example work outside of the boundary. In order to compare cases, good practice could include isolation of particular variable for analysis, for example the flow of money within a system that are constant across all cases.

### 4.2.2 Sampling Technique

Due to the nature of the research, non-probabilistic (Baker et al, 2013) sampling techniques were used. Qualitative research typically exploits judgement sampling techniques where the participants (in this case the case studies) are elected based on the judgemental knowledge of the researcher (Sekaran 1992). Aid and Development supply chain systems are complex and contain many variables. It was decided to enter the supply chain via the Lead Agency (focal node) of each case because the lead agency represented a clear player in each supply chain system.
The programs, key players and rationale for selection are illustrated in Table 4.4.

<table>
<thead>
<tr>
<th>Participant Category</th>
<th>No. of Participants</th>
<th>Reasons for Selection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amos Aid</td>
<td>1</td>
<td>Extensive field work experience Director of a small CSO</td>
</tr>
<tr>
<td>DLA1</td>
<td>1</td>
<td>To provide any further data that may have been available outside of the secondary data</td>
</tr>
<tr>
<td>DLA2</td>
<td>1</td>
<td>Provided access to reports from lead agency</td>
</tr>
<tr>
<td>USAID Togo</td>
<td>1</td>
<td>Provision of secondary data in the form of a final report</td>
</tr>
</tbody>
</table>

Table 4.4 - Sampling of the Programs, Key Players and Rationale for Selection

Participants were selected based on a demonstrable in depth knowledge, accreditation by proven participation in real world Aid and Development programs. To give the richest possible data set to establish if the six primary management processes of SCOR were evident in the participants program, three different lead agencies were selected and three different data sources were used (face-to-face, formal program records, published materials). Sandelowski (1995), Boddy (2016) states that saturation is more important than the number of participants in qualitative research. It is not possible to get all of the necessary data from a single point of contact or source within the case studies. As such multiple data sources were investigated (as recommended by Voss et al, 2002, p. 202) in each of the lead agencies including, where appropriate, face-to-face interviews, primary and secondary recorded data, third party data such as published commentary and field observation.

4.2.3 Data Collection Method

The first step was to identify the lead agencies for the research. Identification was achieved by conducting a literature search and line of enquiry to identify these contrasting lead agencies. Once identified, the lead agencies were contacted via email, phone, letter and formal meeting (see Appendix 2 for a copy) to seek their consent to take part in the research. Once an in “principle” consent had been received, participants were then forwarded official consent forms (see Appendix 3), information sheet (see
Appendix 4) and the research list approved by the University of Wollongong’s Ethics Committee (see Appendix 5).

As noted above, data was collected in a number of ways (face-to-face interviews, primary and secondary recorded data, third party data, field observation) appropriate to the case study under investigation.

The first task was to establish from the participants was a map of the supply chain as they viewed it (this is discussed further in Chapters 4 and 5) as a benchmark and “stake in the ground”, prior to investigation. This research was not focussed on confirming the axiom of supply within each case study, but to map the actual supply chain system using a constant across all three. A major challenge of this work has been establishing a constant within the case studies of supply chain systems that could be tracked, measured and used to identify key nodes within the system. Most mapping methodologies focus on using the product in, and output of the product in the supply chain system as a constant. As such, within a traditional supply network it is reasonably straight forward to trace the product, even in its raw form, from the point of entry into the system to its point of exit to the end customer, and therefore making it possible to measure it. This is not, however, often possible within an Aid and Development supply chain system, where the end customer who injects the funding into that system to initiate the “flow” in that system is not usually the recipient of the end product produced from that system.

To add more complexity, the constant that is to be mapped to the end customer, is not readily obvious. The duality the beneficiaries of the supply network, the Principal (funder) and the recipient of the product or service, do not make obvious the identification of a single constant for the measurement. By adopting Oloruntoba and Gray (2009) and Bohme et al (2013) and following the principles of forensic accounting (Pedneault et al, 2012, Dorrell and Gadawski, 2012) and tracking the flow of money and return value creation within the system, from its first point of entry to its final exit, and thereby use the flow of money to identify touch points (nodes) within the supply chain system. Since money triggers supply (Oloruntoba and Gray, 2009, p. 490), the lead agencies were considered to be the focal point of the supply chain, however, it was necessary to begin the mapping process with the entry of new money into the system.
(Edwards, Ross and Styger 2017). As a result, lead agencies signposted the researcher to the principal funder of the system. Once this had been established and to elicit these responses from the Principal (i.e. provider of new funding in the system) and consecutive stakeholders in the process, questions were posed regarding:

1. Establish if the entity considers itself to be the initiating funder of the system in question
2. Who the Principal (i.e. funder) passed the funding to next in the system
3. What the entity did to add value for the Principal
4. What the entity did to add value into the product (output of the system) for the recipient
5. Why they, the recipient is considered to be the recipient of the output of the system that the Principal has triggered. This latter point provided a cross reference to establish if there was consistency of purpose between nodes (“players”) in the atypical supply chain system
6. What was the instruction to the next in line (i.e. the supplier) and how much was the funding

For this research, the mapping of the supply chain system was designed in a six-step process, however, a number of the steps are undertaken in a cyclic manner until the data is exhausted (i.e. reaches saturation). These steps (listed below) question the participant in the part they play within the system, no matter where they are in the system, using the questions listed above as an appreciative base. Figure 4.5 illustrates the process adopted to map the supply chain systems of the Aid and Development case studies including the flow of funding and flow of value creation within the system.

*Step 1* - Identify the principal (funder). The funder is defined as the person or entity who released the ‘new money’ into the system to trigger flow

*Step 2* - Identify the next player or participant in the system. Who was the funding passed to?

*Step 3* - From the information gained in Step 2, identify the next player or participant in the system. Step 2 and 3 are to be repeated until the end of the process of funding is reached
Step 4 - At the point no further transfer of funding to initiate the supply process to another player. Identify what was produced as the product (output) of the system

Step 5 - Repeat Step 4 until there are no more suppliers to transfer the product to. Identify what was produced as the product (output of the system)

Step 6 - The recipient. Identify what was delivered as the product (output) of the system

The mapping of this process provides a rich data source of the contact points, stakeholders, processes, flow of information, and most importantly, the flow of return in investment (ROI) in the system.
The research methods are discussed below:

interviews were conducted with key players at each stage of the supply chain system in the case of Amos Aid with key players of the lead agency. Notes were taken during all interviews

• **Documents** - Primary and secondary documents were investigated in the case of the USAID/Togo rural water supply and sanitation project (WASH field report No.228) and the WASH program Daadab Region, Kenya was examined. In the case of both WASH programs, third party data was examined. In the context of the work, primary data is determined to be the original records relating directly to the program and third party data is determined to be original records relating directly to the program and secondary data is determined to be material such as, newspaper articles related to the case in question, sector or government reports, website and media reports

• **Field observation** - In the case of Amos Aid, field observations were conducted throughout the supply chain system. In the case of the WASH program in Daadab, Kenya field observations were conducted within the lead agency

### 4.2.4 Data Saturation

Data saturation in qualitative research occurs where there is a redundancy in the information generated during the data collection process (Morse, 1995, p. 147, Cleary, 2014, p. 473). As such, data should be collected until no new information comes forward as a part of the data collection process indicating either saturation or a theoretical saturation (Guest, 2006, p. 61, Boddy, 2016, p. 427). In the context of this work saturation was considered to be after the first full round of investigation, however, a second round was conducted. No further new information was forthcoming from the second round of investigation.

### 4.2.5 Research Triangulation

Triangulation occurs where more than one method of research is conducted (Jick, 1979 Cresswell, 2013, Fusch and Ness, 2015) and helps the researcher view the subject under investigation from different perspectives (Hussey and Hussey 1997, Fusch and Ness, 2015, p. 1411). Importantly data triangulation helps improve the overall reliability of
the information being generated and helps in avoiding research bias (Stiles, 1992, p. 614) or a favoured approach being adopted or single data gathering method is exploited (Dubois and Gadd, 2001, p. 554, Mangan, Lalwani and Gardner 2004, p. 569). As described in Section 4.2.3 this work adopted multiple data collection strategies. Triangulation included the cross checking of the various data sources to determine consistencies and confirming the reliability of the data. The method adopted the 3 case studies included semi structured interviews, field investigation, and a review of secondary data in the form of relevant third party reports, primary data or original records and secondary data from various sources.

4.2.6 Data Analysis

Qualitative research generates considerable volumes of contextual, often subjective data that when meaningful “transformation” occurs is deemed to be data analysis (Byrne, 2001, Liamputtong, 2009). It is vital to be familiar with the data before analysis begins (Anfara, Brown and Mangione, 2002, Strauss and Corbin, 1990 Noble and Smith, 2013). As such all data gathering and transcription in this work were conducted by the researcher. As set out in Section 4.2.3 various steps were created to identify who provided the funds to trigger flow and how often this process was repeated until the transfer of funds was completed and identification of the product to the recipient was determined. The identification of nodal links and the paths was key to the research and as such the principles of root cause analysis (Jabruoni et al, 2011, p. 1423) were exploited in identifying nodes and paths within the system, this is illustrated in Figure 4.6.
An auditing checklist similar to those used on ISO 9001-2008 (Tricker, 2010) was also adopted for data gathering (see Appendix 6).
4.2.7 Data Reliability

Data reliability is concerned with the consistency or efficacy of the information collected during a research program (Neuman, 2003). Both qualitative and quantitative research is susceptible to inherent bias (Flick 1992). Exposure to the research topic in greater depth can reveal a level of bias that is experienced due to perceived understanding from previous practical field experience. Therefore, a fresh revelation can give greater understanding of the wider practical experience within the field of practice that is being researched. As such the temptation of the overall process as noted in Section 4.2.7 and interview guide alongside the recording and documentation of the interviews as well as using an open interview process to gather more exposure to the research topic and then debriefing and gaining consensus through discussion with peers has helped minimise the potential of research bias (Stiles, 1992, Flick, 2002).

4.2.8 Validity

The research outcome is directly dependent on what is measured during the research process. As such, even if data is reliable, it can present an inaccurate view of the actual case and it is therefore critical to focus on data validity (Bryman and Bell, 2003, Gog, 2015).

The recorded data and templating conducted as a process of this research assisted in maintaining the validity of the data because it was possible to cross reference the data back to the original entries. Triangulation is another good way of maintaining validity (Anfara, Brown and Mangione, 2002) and the three cases and data sources within each case also assisted in maintaining the validity of the research.

4.3 Ethical Consideration

Ethical considerations are important in qualitative research because qualitative research involves human interaction, confidentiality and possible risk of identifying the research participants (Houghton et al 2010, p.15). Ethical approval for this work was granted by the Ethics Committee of the University of Wollongong (HE14/359). All participants
were advised that even after consenting to take part in the research, they could still withdraw at any point.

4.4 Challenges Faced During the Research

Four main challenges were present during the research process, these were:

1. *Common language* - The language of commercial supply chain management and principles differ greatly to that of Aid and Development program managers. As such, finding commonality of terms (translation of local enculturated language) was somewhat challenging at times.

2. *Accurate record keeping* - Whereas it might be reasonably assumed that the record keeping within an Aid and Development project would be thorough and accurate. It was found that different objectives and styles of management reporting generated different records that often did not correspond well to the supply chain system under investigation.

3. *Longevity of staff* - There appeared to be consistent “churn” in the staff members of each case. The result was that institutional memory and learning was lacking and with it the wise interpretation of the events at the time.

4. *Selective memory/defensive response* - There was an air of defensive responses by participants at times. Although appearing to want to cooperate, responses were often guarded for fear that continuity of future programs might not be forthcoming if the “wrong words were spoken”.

4.5 Summary

This Chapter discussed the underpinning philosophical construct of the work, the research design and different research strategies. The Chapter provided a justification for why a comparative case study approach was appropriate in answering the research question and how that approach provided triangulation of data to affect more robust validity within the research. A systems audit approach adopting principles for quality management and root cause analysis auditing were discussed and a suitable method of data gathering because the core objective of this investigation was to define the system...
node and nodal links to establish if the six primary management processes of SCOR could be overlaid onto an Aid and Development supply chain system. To achieve this objective, a constant needed to be identified in the Aid and Development supply chain systems and the flow of money into the system and return value creation was identified as a robust construct.

The next Chapter explores and identifies the supply chain systems of the case studies and the following Chapter overlays the six primary management processes of SCOR onto these mapped supply chain systems.
CHAPTER 5 - MAPPING THE SUPPLY CHAIN SYSTEMS OF THE THREE CASE STUDIES
5.0 Introduction to Chapter 5

Chapter 4 presented the methodology pertinent to answering the research question. The focus of this Chapter is how the research methodology, when applied, was able to create a representation (i.e. a map of the supply chain system under investigation) that could assist in achieving the overall research objective of identifying if the six primary management processes of SCOR was applicable in Aid and Development programs. To achieve this objective 3 case studies were identified and used as the focus for this research. The case studies were chosen because of the type of work and the focus of their work. Of the three case studies, two of the case studies work focused on water, sanitation and hygiene. while one focussed on HIV/AIDS and primary education.

The cases studies are:

1. Case Study 1 - Amos Aid
2. Case Study 2 - Dadaab
3. Case Study 3 - USAID

Key observations from the mapping of the case studies supply chain systems are also discussed in this Chapter.

5.1 Case Study 1 - Amos Aid

Case Study 1 - Amos Aid, is a development aid project that provided funds for specific projects. This Case Study is a retrospective view of a 5 year funded program to assist two vulnerable people groups in Vietnam, these were:

1. Children living with HIV/AIDS
2. Providing education for primary age children living in poverty
5.1.1 Background to Amos Aid

Amos Aid is a Civil Society Organisation that began in 2008. Initially it was a specific service that was provided by the Albion Park Baptist Church. This service relied on the goodwill from members of the church and local community. The support provided was in the form of financial assistance from individuals and groups either as a result of coordinating fund raising events, through a newsletter and from the use of media. Approximately AUD$25,000.00 was provided over five years in support of these two projects.

5.1.2 Project Data for Amos Aid

Each year approximately AUD$5,000.00 was donated to the two projects. The breakup of funds saw approximately AUD$4000.00 donated to Mai Tam to support various needs within the organisation. AUD$1,000.00 was donated to St Joseph’s school for educational supplies and an emergency fund for children of the school. These funds were distributed at the discretion of the principal of the school. Primarily the fund was used for medical emergencies as Vietnam’s health service is a user pay system. Other support was provided free by individuals in the form of Intellectual Property (IP) material and corporations such as airlines who waived their excess baggage fees. Data was gathered by conducting semi-structured interviews with the senior officials. This included questions regarding outcomes from the field work conducted and a review of the available documentation (See Appendix 8).

5.1.3 Mapping from Interviews with Amos Aid Directors

Adopting the principles outlined in the research methodology in Section 4.2, two directors of Amos Aid were interviewed about the supply of resources for Mai Tam and the provision of educational supplies and resources for St Joseph’s School, with a view to establishing the flow of money and value creation within the supply chains system (Edwards, Ross and Styger, 2017). Initially, sketches of the supply chain system were developed during the interview process, with feedback from the interviewees being taken into consideration as the sketches were developed. Figure 5.1 is a formalised
illustration of Amos Aid’s first iteration supply chain system map developed from the participants interviews.

Figure 5.1 - The First Iteration Supply Chain Map of Amos Aid

5.1.4 Discussion of the First Iteration Supply Chain System Map of Amos Aid

At the beginning of the interview and mapping process, Amos Aid were placed centrally within the sketch to demonstrate their position as the focal entity and lead agency following the principles illustrated in Figure 4.5. Open ended questions were used to trace the flow of money and value creation within the supply chain system. It became clear rapidly that the interviewees were envisioning the Amos Aid supply chain system as a linear flow, with little consideration to the orientation of players within the system (i.e. customers or suppliers to the system). Seven key observations were made during the mapping process, these are:
1. The concept of “bow tie” thinking in terms of illustrating and mapping the design of Amos Aid’s supply chain system of itself, generated challenges around placing all customers on the customer side of the map (this is discussed further in Section 5.3.3 and 6.0 below). As such the funders (Principals) were placed on the supply side even though it contradicted Oloruntoba and Gray (2009) and as such does not make sense when mapping the flow of money within the system. Likewise suppliers in the form of Rebel Sports and the Vietnamese office suppliers were placed in the customer side along with the recipient agencies, St Joseph’s School and Mai Tam. Furthermore, the bow tie map, if drawn with suppliers in the supply side only, causes the flow of money to be resourced within the map, again, contradicting basic principles of the supply chain system modelling.

2. End-to-end visibility was limited to Tier 1 suppliers and customers in the Amos Aid supply chain system. All other remaining links and nodes were based on assumptions made by the interviewees. Indeed much of the interviews were based around establishing evidential connectivity within the Amos Aid supply system, however, unfortunately much of what was reported was based on personal assurance of third parties. This “shadow side” supply chain system configuration, where the first player has “faith” that the next player is legitimate, competent and performing efficiently in their role, demonstrated significant risk in the Amos Aid supply chain system and potential areas for significant corruption should players be so minded.

3. The mapping process identified that there was no direct feedback from the recipient of the aid (i.e. the end customers) to the lead agency. Any communication that was received was either filtered by one tier of supply, in the case of St Joseph’s School or two tiers of supply, in the case Mai Tam tiers of suppliers. This once again raises questions around validity and indeed authenticity of the recipients. Importantly, however, lack of direct communication introduces a time lapse effect in terms of Amos Aid’s ability to respond in a timely and accurate manner to the direct needs of the end customer (recipients) and not that of various intermediaries.

4. Amos Aid did not know where the funding of the program originated (i.e. past first tier). Whereas this may not be an unusual occurrence in this type of program it does raise issues of sustainability, efficiency and motives of the original source of funding. This introduces risk into the system both institutionally and from an ongoing liquidity stance.
5. There was no evidence that formal, accurate and timely communication in the form of performance measures or targets were ever reported back to the Tier 1 funders (Principles). As such it was not possible to ascertain how the Amos Aid supply chain system was performing and if there was a compelling need for communication and/or variance in the flow of funding. This once again represents a significant risk point in the entire supply chain system of Amos Aid.

6. The first iteration mapping Amos Aid’s supply chain system did illustrate and confirm Styger’s (2011) observation of Tier 1 and Tier 2 suppliers blocking the view the focal node of a supply chain from the rest of the supply chain and so doing introduce latent risk into that supply chain, because the focal company is unable to get an early warning of distress within the supply nodes.

7. The mapping also illustrated that Amos Aid operates in a narrow silo and circle of influence where any ability to improve the overall efficiency of the supply chain system was either blocked due to ineffective communication channels, reporting systems or end-to-end configuration of the supply chain system.

The Amos Aid supply chain system worked in practice, however, paradoxically, it does not fit comfortably with the expectation of supply chain theory and a clear flow of value and reporting through the system. Put simply, how the interviewees described the supply chain system was not in line with the theory, because customers and suppliers were mixed on either side of the central focal node. The theoretical “optimum” layout for a supply chain system is illustrated in Figure 5.2.
In an attempt to achieve the optimum layout for the Amos Aid supply chain system, the first iteration formalised supply chain system map (See Figure 5.1) was reconfigured to place the suppliers on the supply side of the model. The reconfigured supply chain system map of Amos Aid is illustrated in Figure 5.3.
The reconfigured supply chain system map of Amos Aid attempts to make sense of the
convention surrounding supply chain mapping insofar as both the Vietnamese office
suppliers and Rebel Sports have now changed status from Tier 1 customers (see Figure
5.1) to Tier 1 suppliers (i.e. what they do as a function in the Amos Aid supply chain
system).

The reconfiguration provides an accurate position of both suppliers, but, in common
with a board game for example, the flow of money does not now fit because it “moves”
one step forward (to the focal node Amos Aid) to “move” one step back to the suppliers.
Also, the flow of value (goods in both cases) now moves “two steps” forward.

The re-configured supply chain system map is in fact more conceptually complex and
involves negative flow. The problem still remains that the new money into the system

Figure 5.3 - The Re-configured Supply Chain System Map of Amos Aid
from the “customer” (Principal/funder) should be sited on the customer side along with
the recipient and against more common wisdom.

A second problem exists in the re-configured supply chain system map insofar as both
Mai Tam and St Joseph’s school are not “customers” of Amos Aid but rather “value
added” suppliers. Both of these players are in effect being paid by Amos Aid to connect
in one way or another to the recipient. In many ways it could be argued that they are
suppliers sharing common inputs as the Vietnamese office suppliers and Rebel Sports
and would as such be classified as first tier suppliers. Overall, the issue boils down to
who does what for whom at each stage of the transfer of money into the system and on
the return of value creation out of the system, as opposed to trying to fit the roles of
each player within a map of convenience.

A third iteration of Amos Aid supply chain system was developed by mapping the actual
nodal exchange based on a duality customer (on the customer side) being the Principal
(traditional end customer), who inputs new money into the system and recipient who
receives the output or product of the system and all players noted above who, have
either received money and/or tangibly added value into the supply chain system. The
third iteration (resolved model) of Amos Aid supply chain system is illustrated in Figure
5.4.
The third iteration of the Amos Aid supply chain system map illustrated a more logical and clear path for the flow of money and value through the system. Two key observations are noted as a result of the mapping process, these are:

1. The level of tangible transparency within the Amos Aid supply chain system map is limited to one tier each side of the focal node (Amos Aid)
2. There is no evidence to identify three key groups of players within the supply system, these are:
i. Original sources of the funding, as such the Principal is considered to be the entity who were recorded as transferring funds into Amos Aid, not where the funds originated from

ii. With the exception of two commercial suppliers (the Vietnamese office suppliers and Rebel Sports Australia) there was no evidence of any value providers within the system

iii. The two commercial suppliers did provide evidence that “value” in the form of tangible goods were delivered to St Joseph’s school at the point of homologation. No goods from these suppliers passed through any other players within the system. Importantly, the fact that goods were delivered directly to homologation (i.e. St Joseph’s School), does not result in the ability to determine via this node; if any third tier suppliers did indeed exist

iv. Somewhat alarmingly, there was no direct communication back to the lead agency from the recipient of either Mai Tam or St. Joseph’s School. As such, Amos Aid relied on the “good word” and trust of both Mai Tam and St Joseph’s school that:

   a. The recipients were real and present within the supply chain system
   b. Value was actually being delivered to the recipient

The mapping exercise raised some interesting questions regarding the validity and governance of the Amos Aid supply chain system. This is discussed further in Chapter 6, where it is argued that the application of the six primary management processes of SCOR and basic supply chain management principles would have eliminated much of the transparency issues and provided evidence of efficacy and validity within the Amos Aid supply chain system.

5.2 Case Study 2 - Dadaab

Case study 2 - Dadaab is a humanitarian aid Water and Sanitation Hygiene (WASH) project (UNHCR 2012). The UNHCR responded to the humanitarian crisis in the Horn of Africa that saw approximately 900,000 Somalians seek asylum and refugees leaving their country due to drought and famine and insecurity. There was an influx of Somali refugees located in camps in both northern and southern parts of Kenya.
These camps experienced over-crowding and this meant that resources and facilities were stretched beyond their capacity and health issues increased. It was necessary to create new camps and provide basic needs to residents of these camps.

5.2.1 Background to Dadaab

The Dadaab lead agency (DLA) was created during World War II and provided support to European survivors of the conflict. Today this agency is internationally recognised and has regional support groups that operate with the goal of providing assistance to disadvantaged and impoverished people groups.

5.2.2 Project Data for Dadaab

The project included the development of a camp in the Dadaab region for approximately 40,000 residents. The project was funded by multiple international agencies and a private donor. The budget for this project was approximately USD$8.9M. The goal was to provide latrines, showers and hand washing facilities, waste management and drainage to low lying areas and to provide hygiene training to residents of the camp. Data sources included third party documentation that included quarterly and yearly updates. These updates included financial and project progress reports. Other sources of data included secondary data from UN reports, government reports and various website and media releases. There were several semi-conducted interviews with staff from the country specific lead agency and from the United Nations (See Appendix 8).

5.2.3 Mapping from Project Data of Dadaab

The research methodology discussed in Section 4.2 was used to analyse the records for the work conducted for Dadaab. As part of the ethics process it was approved that the names of the organisations involved in the project work were to be kept confidential. Abbreviations have been created to define their position in the supply chain system map.

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9 The names and details of location for this case study was kept confidential at the request of the third party providers. This request was submitted and approved by the University of Wollongong Ethics committee, approval number HE14/359
from the data. Initial investigations of the records for the Dadaab project indicated that DLA1 was indeed the focal node of the supply chain system. The mapping process conducted by using the documents from the work conducted at the Dadaab site and tracing the funding from the original source (Principal) to the recipient demonstrates a linear supply chain system that actually places a third party donor number one (DLA2) as the focal node (not the DLA1). Since the DLA2 received funding from the Australian Government for the project and distributed it further to the DLA1.

The documents did however indicate that further funding was delivered directly into the DLA1, although no evidence of where the funding originated from was found. Interestingly, and in common with Amos Aid, there was no evidence from within the Dadaab project documents, concerning additional players in either the supplier side or customer side of the supply chain system. Also, there was no record of direct communication back from the recipient to DLA1. Figure 5.5 is a formalised illustration of the DLA1’s first iteration supply chain system map developed from available documentation.
Deeper investigation with the DLA1 documentation revealed some mention of two further players on both supply side and customer side within the supply chain system. Discovery of the players was significant because it opened up the model of supply considerably. The two players were:

1. Third party donor number two (DTP1) - This donor was an additional NGO who (records suggest) received funding from third party sources and the Australian Government. Although no evidence was found in the records to direct transfer of funds (i.e. value and bank transfer), documentary evidence was present stating sources. As such, it would suggest that the Australian Government paid twice for the same project (once directly into DLA2 and once via DTP1 into DLA2). This raised some questions concerning so called “double bubble” funding and, if, matched funding was for example a requirement within the project then, quite
simply this could have shown as coming from DLP1, when in fact the origin was solely the Australian Government

2. Dadaab Lead Agency - Kenya - DLA3 was documented (but no evidence found) as receiving funding for the work. DLA3 was part of the same “group” as Dadaab Lead Agency - Australia (DLA1) whose role locally was to mobilise local value added suppliers to deliver to the recipient. On face value, this would appear to be a logical and necessary function. However, there is a grey area insofar as no evidence was found concerning management, communication or funding arrangements between either party, again, suggesting a “trust or faith” approval was adopted in favour of more formal supply chain management principles. Because there is no evidence of formal transfer such as bills, invoices, receipts, meeting records etc., there is also no evidence of the level of complexity of the remaining supply chain system. Whereas it was possible to distinguish three ‘local’ suppliers, who they were and if they in turn supplied to others, before the end recipient, was not evident within the documents.

Figure 5.6 provides an illustration of the developed supply chain system map of DLA1. In common with Amos Aid this map is once again a linear process where customers and suppliers mix together adding confusion and in some cases existence of a player is not evidenced from the research materials. Importantly, the tangible evidence of DTP1 does demonstrate multiple funding sources although one, the Australian Government, could have funded the same project twice. It should also be noted that DLA1 also received funds from an unidentified source. Also, the identification of DLA2 demonstrates a duality of players taking up roles in the supply chain system, where formal records are not evident between these “entities under one roof”.
The developed supply chain system map of DLA1 illustrated in Figure 5.6 was then reconfigured to place customers and recipients on the customer side of the map and suppliers on the supply side of the map. By creating the ‘U’ shaped map, further clarity emerges concerning the dynamics of the system. The reconfigured supply chain systems map of DLA1 is illustrated in Figure 5.7.
Figure 5.7 Dadaab the Resolved Model

The reconfigured supply chain system map of DLA1 illustrates a duality of focal nodes (DLA1 and DLA2). Initially it may be argued that DLA1 is a first tier supplier, however, new funding was recorded from an unidentified source into DLA1 and so places them as a focal player before distributing the funds further. DLA2 also receives new funding form the Australian Government and DTP1 before distributing to DLA1. It was not possible to establish if DLA3 was chosen by DLA2 because of its access to market i.e. Kenya via DLA3 or because DLA1 also had funding that could be matched to that of DLA2. However, DLA1 then further distributes funds (value unidentified) to itself, DLA3, for further distribution. Once the funds leave DLA1 (value unidentified) there is no evidence of further transfers throughout the supply chain system (i.e. bills, receipts, invoices etc.) and efficacy of supply and reporting appears to be left to local management. This “over the wall” approach raised concerns regarding the impact of
the funding in the local area and indeed possible wastage within the supply chain system.

The funding does not reappear evidentially, nor is there any feedback for the recipients into the focal nodes. Interestingly both local distribution of funds and homologation are conducted by the same organisation (DLA3). Which raises concerns around efficacy, possible leakage and overall governance. As such, the measure of success of the program in Australia is down to the input value (i.e. “we raised $ x”) and not on output value to the recipient that was in any way accurately measured and documented across the supply chain system as a whole.

5.3 Case Study 3 - USAID

Case study 3 - USAID is a development aid WASH project (Roark et al 1988). The Togo Water Supply and Sanitation project involved four international donors and three agencies of the Government of Togo. The goal of the project was to improve the health of residents of rural villages in two rural regions of Togo affected by a water born parasite that had contaminated the local water supply.

5.3.1 Background to USAID

USAID is a government agency (NGO) that was created in 1961. The goal of USAID is to work towards ending extreme poverty globally, and about enabling both a resilient, potential and democratic society (USAID, 2017).

5.3.2 Project Data for USAID

In 1980 the project began with the goal of providing drinkable water by constructing 400 wells for 350 villages with a combined population of 128,000. An extension to the program commenced in 1983 and concluded in 1987. This extension provided a total of 1048 drilled wells with pumps, the construction of latrines, the training of local villagers to maintain the pumps and the creation of village committees. The extension to the program assisted the needs of 864 villages with a population of approximately 600,000.
rural residents (Roark et al, 1988). The main source of information came from the final report into the WASH program and from various media resources (See Appendix 8).

5.3.3 Mapping from Publicly Available Documents of USAID

Using the research methodology described in Chapter 4.2 publicly available documents and publications of the USAID program were analysed. The initial investigation demonstrated a significantly larger program than represented in the previous two case studies and almost classical bow tie, depiction of the USAID supply chain system. Although it is important to note that in common with both the Amos Aid and Dadaab cases, customers and suppliers were mixed along the flow path. In this case, USAID provided an almost continual backbone of continuity throughout the supply chain system drawing other players to it. Figure 5.8 provides an illustration of the initial bow tie supply chain system map of USAID.

![Figure 5.8 - The Configured Supply Chain of USAID](image-url)
Although one of the best published case studies of an aid program in the public domain, there were significant areas of missing evidence concerning players at all levels within the supply chain system. This fact and the mixing of suppliers and customers within the flow of the system necessitated a reconfiguration of the supply chain systems map to position all customers on the customer side of the map and all suppliers on the suppliers side of the map that once again generated a ‘U’ shape supply chain system as illustrated in Figure 5.9.

![Figure 5.9 - USAID The Resolved Model]

* TIER 1 SUPPLIERS AND HOMOLOGATION CONSIDERED TO BE ONE ENTITY LOCATED IN ONE UNIT

The reconfigured supply chain system model demonstrates the limited evidential view of the USAID system. In common with both Amos Aid and DLA only immediate touch
points are evident with significant sections of the supply chain system lacking evidential support in terms of the existence of players.

Importantly both homologation and feedback from the recipients to the focal node and Principal is evident and demonstrates the critical roles of each action within the supply chain system and the closed loop nature of the supply chain system. USAID played a role in almost every level of supply. This might explain, but not excuse, why communication between USAID homologation and first tier for example was not evident (i.e. all under one roof). This does however, once again pose an interesting question in terms of efficacy and governance of this supply chain system and if the system was itself set up to serve the key player, USAID (i.e. self licking ice cream\(^{10}\)) and the recipient was only necessary to trigger the flow of funding.

5.4 Key Observations from the Supply Chain System Mapping

The supply chain system mapping of these three case studies highlighted ten key observations, these are:

1. Linear process thinking
2. Over the wall handling
3. Lack of evidential players
4. Multi participation
5. Dual funding from a single source
6. Limited end-to-end visibility
7. Limited end-to-end communication
8. Trust based system
9. Funding and tangible value imbalance
10. Classical models of supply do not align with Aid and Development supply chain systems

\(^{10}\) In popular culture, the concept of a “self licking ice cream” is an entity, that on face value, appears to have value to the recipient, but on investigation has no benefit to the user/recipient because it has no need to interact with the user/recipient to achieve the fundamental objective of its existence.
5.4.1 Linear Process Thinking

All three cases studies, when first investigated, either demonstrated or recorded a linear process stream where one action by a player was passed onto the next player for further attention. The linear process mapping did not reflect the complexity of any of the case study supply chain systems, but all of the process maps were used to report outcomes of the programs.

5.4.2 Over the Wall Handling

All of the case studies demonstrated a system of “passing down the line” or “over the wall handling” whereby a player in the supply chain system would move the funding or value forward with little evidence of quality assurance or governance happening post the handover.

5.4.3 Lack of Evidential Players

All of the case studies demonstrated gaps in the evidence regarding, often significant elements of the supply chain system. The lack of evidence also, in the cases of Amos Aid and DLA1 included no direct feed back to the focal node from the recipients. This once again raises quality assurance and governance issues.

5.4.4 Multi Participation

DLA and USAID demonstrate multi-participation in their supply chain networks. In effect the same players turned up in multiple places within the system. On one hand it may be argued that this multi-participation could improve the efficiency of the system, it does however raise questions regarding and the overriding rationale for the system. For example, is the system there to serve the recipient or is it there to serve the key players? Whatever rationale is correct, it does raise questions regarding governance, value and efficacy of the system and as the system gets larger forcing more bureaucracy to manage it, ultimately leading to a ‘self licking ice cream’ where the recipient becomes less and less central to the system and the system exists to serve itself.
5.4.5 Duel Funding From a Single Source

The DLA1 mapping highlighted that it was likely that the Australian Government funded the same project via two different “Principals”. Although no evidence exists there is a possibility that the same funding source could also have funded DTP2 directly. This double funding does raise issues around governance and legitimacy of the supply chain system. Moreover efficacy and value for the principle must be questionable, because of the number of times the funding changes hands within the system.

5.4.6 Limited End-To-End Visibility

All of the focal nodes, from each of the cases studies, demonstrated limited end-to-end visibility within their supply chain systems. Typically visibility was limited to the next player in the flow. This low level of visibility is contrary to best supply chain management principles (Busse et al, 2015) and of itself involves risk within the system.

5.4.7 Limited End-to-End Communication

There was no evidence that any of the focal nodes demonstrated end-to-end communication within their supply chain systems. Typically communication was based on point-to-point with the next player in the flow. This principal of communication is contrary to best supply chain management principles (APICS, 2017) and of itself represents a risk propagator in the supply chain system.

5.4.8 Trust Based System

All of the case studies appeared to rely on trust or faith that the next player in the system was present, legitimate, operational and capable of delivering. There was no evidence of auditing, quality assurance or end-to-end communication within theses supply chain systems and is once again contrary to the APICS SCOR standard.
5.4.9 Funding and Tangible Value Imbalance

Each of the systems demonstrated an imbalance within the number of players forwarding funds and those forwarding tangible value. The larger the supply chain system the more imbalance there appeared to be, as the focal node became further removed from the recipient (end customer). This calls into question the optimum design or planning of the supply chain system, its efficiency and latent risk profile.

5.4.10 Classical Models of the Supply Chain Do Not Align with Aid and Development Supply Chain Systems

As originally described and documented, all of the case studies demonstrated a mix of suppliers and customers along the value flow. This is contrary to supply chain theory that places customers on the customer side of the supply chain map and suppliers on the supply side of the supply chain map. Since Aid and Development maps do not appear to follow this convention, it might well be argued that they are indeed not supply chains at all and as such SCOR would not apply. However, by reconfiguring the maps to have both suppliers and customers positioned on their correct sides of the focal node, it was still possible to follow the flow of funding and return flow of tangible value within each program. Furthermore, the “U” shaped map also illustrated clearly duplication of players, lack of evidential players, lack of feedback etc. as discussed above. As such the exercise has demonstrated positively that Aid and Development supply chain systems do indeed follow similar characteristics as commercial supply chain systems, especially in the critical area of customer and supplier concepts around a focal node.

5.5 Summary of Chapter 5

This Chapter discussed the supply chain mapping and findings from the mapping of the three Aid and Development case studies. It was noted that initially all of the case studies were described as a linear process. Upon investigation, each case study expanded to illustrate more complexity, however, there was a mix of suppliers and customers along the flow of the system that is contrary to supply chain theory. By reconfiguring the maps and placing the suppliers on the supply side and customers on
the customers side it was possible to demonstrate a flow of value and funding, albeit in a “U”shape model. Each of the mapping exercises demonstrated significant “grey areas” where there was no evidence of suppliers or customers and as such tangible transfer of funds or value. Furthermore all of the maps stopped short of end-to-end visibility and were based on next touch point or “over the wall” handling. By focussing on an immediate circle of influence or touch point efficacy, governance and efficiency issues could be expected.

Ultimately, all of the supply chain system maps from the case studies demonstrated flow and had clear customer and supplier sides. As such it can be concluded that these supply chain systems do follow supply chain management theory and also demonstrated the necessary characteristics (albeit unconventional graphically) as a commercial supply chain system and as such SCOR could be applied.

Chapter 6 discusses the application of the six primary management processes of SCOR to Aid and Development supply chain systems, where a conceptual model of an Aid and Development supply chain system is presented and then zoned inline with the six primary management processes of SCOR. Further mapping is conducted with each evidential node from the case studies against each of the six primary management processes of SCOR. An analysis of the mapping is then offered and the six primary management processes of SCOR identified. Responses to the research questions are then provided.
CHAPTER SIX - THE OVERLAYING OF THE SIX PRIMARY MANAGEMENT PROCESSES OF SCOR ONTO THE CASE STUDIES AID AND DEVELOPMENT SUPPLY CHAIN SYSTEMS
6.0 Introduction to Chapter 6

The focus of this work is to establish if the six primary management processes of SCOR can be overlaid onto Aid and Development supply chain systems with a view to establish if SCOR could be used as an operation tool within Aid and Development programs. To establish the characteristics of SCOR within an Aid and Development program(s), it was first necessary to map the supply chain systems of the case studies of Aid and Development programs in order to establish if Aid and Development programs fundamentally perform in a recognisable manner to commercial supply chains, and if indeed these systems follow fundamental supply chain theory. The mapping was reported in Chapter 5, where it was reasoned that the Aid and Development case study supply chains systems did follow fundamental supply chain theory.

The mapping exercise in Chapter 5 delivered a series of unorthodox (in the graphical sense), supply chain systems maps for three Aid and Development programs. These maps follow the fundamental principles of a “bow tie” model and placed suppliers on the supply side of the map, customers on the customer side of the map and a focal node central to the mapping. The results were not a “fit of convenience” depicting classical bow tie configuration, but rather resulted in a “U” shape depiction where the inward flow of money into the system and the outward flow of added value could be traced (where there was evidence from the case study data).

This Chapter discusses the observations of the mapping with a view to identifying the six primary management processes of SCOR within the supply chain systems of the case studies. To establish this objective, this Chapter discusses:

1. A conceptual model Aid and Development supply chain map
2. SCOR zoning of the conceptual model Aid and Development supply chain system map
3. Mapping the case study evidence within the framework of SCOR
4. Analysis of the evidence mapping
5. Identification of the six primary management processes of SCOR being existent in an Aid and Development supply chain system
6. Responses to the research question and hypothesis
7. Implications of the research findings

6.1 A Theoretical Model Aid and Development Supply Chain System Map

Once the convention for mapping the supply chain systems of the case studies had been established, the actual final maps generated from the analysis illustrated some similar nodes and players in each of the supply chain systems. The similarity found in the case studies is encouraging because:

1. Key nodes are present within the case studies
2. Key nodal links connect the nodes in similar pattern
3. It confirms a logical and consistent flow mapped against theoretical principles of supply chain management

As such, it is possible to establish a conceptual model of an Aid and Development supply chain system based on an aggregation of the case study maps. The conceptual supply chain system map is illustrated in Figure 6.1.
6.2 SCOR Zoning of the Conceptual Aid and Development Supply Chain Systems Map

The development of the conceptual supply chain systems map illustrated in Figure 6.1 offers a reference point to establish if the six primary management processes of SCOR (i.e. Plan, Source, Make, Deliver, Return and Enable) are present within Aid and Development supply chain systems. Figure 6.2 provides an illustration and narrative, where the theoretical Aid and Development supply chain systems map has been zoned based on the dominant elements of the six primary management processes of SCOR.
applicable to the functions within the map. This zoning exercise aligns with the principles discussed in Section 3.7 and Figure 3.8, and offers the first indication that SCOR can be identified within Aid and Development supply chain systems.

Figure - 6.2 SCOR Zoning of the Conceptual Aid and Development Supply Chain Systems Map

The presence of SCOR identified within the zoning exercise has a plural implication, this is:

1. The essence of SCOR can be tentatively established within a theoretical framework
2. The tentative establishment of SCOR across the entire theoretical framework does not establish the presence of SCOR within each node and consistent with the principles laid out in Section 3.7 and Figure 3.8
6.3 Mapping the Case Study Evidence Within the Framework of SCOR

As noted above, the zoning of the theoretical Aid and Development supply chain systems map offered an indication that SCOR principles were present within the case studies. Whereas this fits with the concept of SCOR and the value chain, it does not align well with the broader concept of the six primary management processes of SCOR being existent in each node of a supply chain system. As such a more detailed mapping of each evidential node of each of the supply chain systems is necessary to establish if the six primary management processes of SCOR was indeed present and consistent.

To achieve this goal the research was re-investigated on a node by node basis (established through the mapping process) with a view to identifying the presence of the six primary management processes of SCOR within each node. Table 6.2 provides a map of the alignment of SCOR within the evidential nodes of Amos Aid. Table 6.3 provides a map of the alignment of SCOR within the evidential nodes of Dadaab and Table 6.4 provides a map of the alignment of SCOR within the evidential nodes of USAID. Prior to these tables of data being established, a measure of presence (Unit of Standard) has been defined (See Table 6.1) following the principles laid out in the Australian & New Zealand Risk Management Standard AS/NZS ISO 31000:2009 for Risk Management and ISO 27001: for Risk Assessment and Treatment where ranking is apportioned to each occurrence (in this case the evidence of the principle of SCOR in the node).
<table>
<thead>
<tr>
<th>SCOR Element</th>
<th>Level of Assurance</th>
<th>Definition</th>
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| Plan         | High               | Evidence of project planning  
Tangible evidence of planning from secondary data, interviews and field observation |
|              | Medium             | Some level of visibility of project planning from secondary data, interviews and field observation |
|              | Low                | Limited or unsubstantiated visibility of project planning from secondary data |
|              | No                 | No visibility of sourcing from secondary data, interviews and field observation |
| Source       | High               | Evidence of procurement and funding sources  
Tangible evidence of sourcing from secondary data, interviews and field observation |
|              | Medium             | Some level of visibility of sourcing from secondary data, interviews and field observation |
|              | Low                | Limited or unsubstantiated visibility of sourcing from secondary data, interviews and field observation |
|              | No                 | No visibility of sourcing from secondary data, interviews and field observation |
| Make         | High               | Evidence of products or services provided  
Tangible evidence of products or services from secondary data, interviews and field observation |
<p>|              | Medium             | Some level of visibility of products or services provided from secondary data, interviews and field observation |
|              | Low                | Limited or unsubstantiated visibility of products or services provided from secondary data, interviews and field observation |
|              | No                 | No visibility of products or services provided from secondary data, interviews and field observation |</p>
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<tr>
<th>SCOR Element</th>
<th>Level of Assurance</th>
<th>Definition</th>
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<tr>
<td>Deliver</td>
<td>High</td>
<td>Evidence of project value add delivery to project from secondary data, interviews and field observation</td>
</tr>
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<td></td>
<td>Medium</td>
<td>Some level of visibility of project value add delivery from secondary data, interviews and field observation</td>
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<tr>
<td></td>
<td>Low</td>
<td>Limited or unsubstantiated visibility of project value add delivery from secondary data, interviews and field observation</td>
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<tr>
<td></td>
<td>No</td>
<td>No visibility of project value add delivery from secondary data, interviews and field observation</td>
</tr>
<tr>
<td>Return</td>
<td>High</td>
<td>Evidence of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Some level of visibility of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Limited or unsubstantiated visibility of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No visibility of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td>Enable</td>
<td>High</td>
<td>Evidence of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>Some level of visibility of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>Limited or no visibility of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>No visibility of ongoing value addition to project from secondary data, interviews and field observation</td>
</tr>
</tbody>
</table>

*Table 6.1 - The Unit of Standard for Mapping the Nodes of the Case Study Supply Chain Systems*
Tables that make up 6.2 illustrate the distribution of the level of occurrence by the instance number for Amos Aid.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead agency Amos Aid</td>
<td>Plan</td>
<td>Yes</td>
<td>From interviews and secondary data. Itinerary/timeline of service delivery</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From interviews and secondary data. Source funding and supplies from Tier 1 Customers and Tier 1 Supplier Rebel Sports</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From interviews and secondary data. Evidence of funding and personnel to provide services for tier one customers</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From interviews. Evidence of funds and services delivered to Tier 1 Customer</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From interviews. Post project reflection led to pre-planning process</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From interviews. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>

A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by Amos Aid was high. Amos Aid provided evidence of a project plan in the form of a detailed itinerary for the delivery of funds and other services to Tier 1 suppliers. Secondary data in the form of receipts, newsletters and interview notes provided information on the Source function. The final report and interviews provided confirmation on the Make and Delivery process for Tier 1 suppliers. Interview notes provided details of an ongoing commitment by Amos Aid in continuing to source and deliver funds and practical services for ongoing projects specified by Tier 1 suppliers. The final report provided tangible evidence of how value was added to the project for the recipients of aid being provided by both Amos Aid and two of the Tier 1 suppliers.
A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by Tier 1 supplier - Mai Tam was high. From the interview notes, secondary data and from field investigation there was confirmation that this Tier 1 supplier had a plan to provide aid support. Tangible evidence of the Make and Deliver process was evident from interviews and secondary data and field observation. The Return process was confirmed by ongoing communication between the lead agency and Mai Tam in the form of regular newsletters and updates. There was tangible evidence of value addition through formal government recognition and the increase in well being for recipients of Mai Tam’s.
A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by St Joseph’s School was high. Like the Tier 1 provider, Mai Tam, there was a similar type of cooperation between the Lead Agency and St Joseph’s School. Interviews and secondary data provided evidence of a project plan and how funds were sourced and provided for the Make process for the project. The Delivery of the process was in the form of both funds and tangible goods and services and this was documented from interviews and other forms of secondary data. The Return process was identified in the form of a monthly report sent to the Lead Agency and from interviews and also field observation occurrences of value addition was confirmed.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Supplier St Joseph’s School</td>
<td>Plan</td>
<td>Yes</td>
<td>From interviews and secondary data. Planning process developed with School Principal</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From interviews. From planning process, sourcing of goods to be supplied for project locally and in Vietnam</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From interviews. Raw materials provided as value add for project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From interviews. All goods were delivered at cost and on time</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From interviews. Post project reflection led to pre planning process</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From interviews. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>
There was a high level of occurrences to confirm that all 6 elements of SCOR existed. From interviews and documentation there were several occurrences to confirm that the use of this supplier was in the Plan, Source, Make and Deliver process for the project. There was only a medium level of occurrences where the Return process was apparent. It was not clear whether use of this specific supplier featured in the ongoing planning for future projects. Data from the interviews showed that there was a high occurrence of assurance in confirming that the Enable process existed and that value was added and this value was quality managed by both the lead Agency and Tier 1 supplier.
A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by Tier 1 supplier - Rebel Sports was high. Interviews and secondary data provided evidence of a high occurrence of the Plan, Source, Make and Deliver functions. However, there was only a medium level occurrence that showed that there was a Return function of SCOR in place. There was evidence from interviews that the Enable process had a high of assurance that it existed within the project.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Supplier Rebel Sports Australia</td>
<td>Plan</td>
<td>Yes</td>
<td>From interviews. Lead agency selection of suppliers for St Joseph’s school project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From interviews. Meeting with supplier by lead agency to supply resources</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From interviews. Resources provided at cost price</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From interviews. Resources delivered to Tier 1 customer</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From interviews. No further contribution required from Tier 1 supplier</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From interviews. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Customer Community Provider</td>
<td>Plan</td>
<td>Yes</td>
<td>From interviews and secondary data. Lead agency contacted Community provider with project plan to source funding</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From interviews. Meeting to endorse project and to assist with funding</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From interviews. Agreement to participate and contribute to Lead Agency marketing strategy</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From interviews. Provision of funds provided</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From interviews. Details of project results supplied by lead agency</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From interviews. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>
A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by the Tier 1 Customer Community Provider. There was evidence that both the Plan, Source, Return and Enable level of Assurance was High. This was confirmed from interviews that an ongoing plan had been developed to source the local community and that through a newsletter provided updates to confirm results of funds raised and how value was provided therefore confirming a High level of assurance of the Return and Enable function

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1 Customer Independent Provider</td>
<td>Plan</td>
<td>Yes</td>
<td>From interviews. Develop a contact list of people through marketing and email strategy to source funding</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From interviews. Confirm participation in lead agency marketing strategy</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>No</td>
<td>From interviews and secondary data. Provide a method to submit funds for independent providers</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From interviews. Provision of funds for project</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From interviews and secondary data. Details of project results supplied by lead agency</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From interviews. Evidence of value addition and quality management systems</td>
<td>Medium</td>
</tr>
</tbody>
</table>

A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by the Tier 1 Customer Independent Provider. There was evidence that both the Plan, Source, Make and Enable level of Assurance was Medium. A newsletter provided updates to confirm that the funds raised provided results and this confirmed that a High level of assurance of the Return function occurred.
Table 6.2 - Mapping of the Alignment of Six Primary Management Processes of SCOR with the Evidential Nodes of Amos Aid

A review of the data recorded from interviews and discoverable documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by the Tier 1 Customer Corporate Provider. There was evidence that the Plan, Source, Make, Deliver and Enable level of Assurance was Medium. A newsletter and formal discussions provided ongoing updates and confirmed that a High level of assurance of the Return function occurred.
Tables that make up 6.3 illustrate the distribution of the level of occurrence by the instance number for Dadaab.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DLA1</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data, Funding and reciprocal arrangement made with DTP2</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Funds assisted with specific value add for project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Funds transferred to assist with project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Ongoing updates as agreed in memorandum of understanding between DPT2 and DLA</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>

A review of third party documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by USAID was both medium and Low. The third party documents provided in the form of quarterly and annual progress and financial reports showed only a Medium level assurance of the Plan, Source, Make and Deliver functions. There was a low level assurance for both the Return and Enable functions.
A review of the third party documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by DTP1 was both high and medium. The third party documents provided in the form of quarterly and annual progress and financial reports showed only high level assurance of the Plan, Source, Make, Deliver and Enable functions. There was a Medium level assurance for the Return function.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTP1</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data, plan to support funding for project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data, funds provided from various sources</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data, Agreement arranged with DLA to contribute to project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Funds transferred to assist with project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Ongoing updates as agreed in memorandum of understanding between DPT1 and DLA</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTP2</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data. Evidence of project planning</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Evidence of funding sources</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Evidence of suppliers to provide funding for planned projects</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Evidence of funds delivered</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Evidence of reports relating to project performance</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>
A review of the third party documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by DTP1 was both high and medium. The third party documents provided in the form of quarterly and annual progress and financial reports showed only high level assurance of the Plan, Source, Make, Deliver and Enable functions. There was a Medium level assurance for the Return function.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTP3</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data. Limited visibility of planning</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Limited information available. Limited visibility of funding sources</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Limited evidence of what was provided</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Little evidence to what funds or services was delivered</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Little evidence as to the value that was added to the project</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>Low</td>
</tr>
</tbody>
</table>

*Table 6.3 - Mapping of the Alignment of Six Primary Management Processes of SCOR with the Evidential Nodes of Dadaab*

A review of third party documentation showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by DTP3 was low. A review of third party documentation revealed that there was limited information available to provide a level of assurance existed for the 6 SCOR functions.
Tables that make up 6.4 illustrate the distribution of the level of occurrence by the instance number for USAID.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>USAID</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data. Lead agency coordinated planning process with Tier 1 customer and suppliers</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Funding sourced from Tier 1 Suppliers and Tier 1 customers</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Supervision role only. Value add provided from supervision. Make process was conducted by Tier 2 suppliers</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Management, supervision and oversight of entire project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Ongoing role as lead agency for extension program</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>

A review of the data from a final report and recorded images showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by USAID was high.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Togo Government</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data. In consultation with lead agency, funding partners and recipients to provide safe drinking water</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Funding agencies to supervise the project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Provision of funding and personnel to support project</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Provision of Administrative and finance staff</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Issues related to financial management procedures, interactions with recipients, high staff turnover and staff levels, administrative and reporting issues</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
</tr>
</tbody>
</table>
A review of the USAID final report and recorded images showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by the Togo Government was high. Secondary data was provided in the form of a detailed final report and other UN reports that provided tangible evidence of the Plan, Source, Make, Deliver, Return and Enable functions.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peace Corps</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data</td>
<td>Medium</td>
</tr>
<tr>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Peace Corps provided 20 volunteers</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Services for various technical and maintenance activities</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Provision of volunteers technical assistants</td>
<td>Medium</td>
<td></td>
</tr>
<tr>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data</td>
<td>Low</td>
<td></td>
</tr>
<tr>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>Low</td>
<td></td>
</tr>
</tbody>
</table>

A review of the USAID final report showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by USAID was both medium and Low. Secondary data provided in the form of a detailed final report showed only a Medium level assurance of the Plan, Source, Make and Deliver functions. There was a low level assurance for both the Return and Enable functions.
<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAC</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data. Provision of pump and concrete apron around pumps</td>
<td>High</td>
</tr>
<tr>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Field research for pumps</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Funding and sourcing role of suitable pumps for recipients</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Provision of funds for pumps and apron</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Pumps may not have been suitable for some sites. Major delays in pumps arriving. Re-training on new model pumps not considered efficient due to reliability issues both with pumps and supplies for pumps</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

A review of the data recorded from the USAID final report provided tangible evidence that the 6 elements of SCOR existed within the project work undertaken by the FAC was high.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Togo Villagers</td>
<td>Plan</td>
<td>Yes</td>
<td>From secondary data. Planning occurs with assistance from Togo Government and the development of Pump committee/Recipients</td>
<td>High</td>
</tr>
<tr>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Members for committee/Recipients and pump mechanics</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Training of Recipients in pump repairs and for pump mechanic as well as supply chain specifics</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Repairs to pump carried out with minimal delays. Provision of safe drinking water</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Increased health and well being for Recipients. Provision for community funding programs to provide more resources for the recipients</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>
A review of the data from the USAID final report and recorded images showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by the Togo Government was high.

<table>
<thead>
<tr>
<th>Node</th>
<th>SCOR Element</th>
<th>Yes / No</th>
<th>Source of Evidence / Rationale</th>
<th>Level of Assurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>FED</td>
<td>Plan</td>
<td>Yes</td>
<td>From Secondary Data. In consultation with Government of Togo for pump maintenance team</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Source</td>
<td>Yes</td>
<td>From Secondary Data. Funding</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Make</td>
<td>Yes</td>
<td>From Secondary Data. Funds provided for a Repair Crews and operating costs</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Deliver</td>
<td>Yes</td>
<td>From Secondary Data. Operational Repair crews and pump installation work conducted. Issues with funding arrangements with FED and the Government of Togo</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>Return</td>
<td>Yes</td>
<td>From Secondary Data. Planning issues may contribute to ongoing issues relating to pump maintenance and performance</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Enable</td>
<td>Yes</td>
<td>From secondary data. Evidence of value addition and quality management systems</td>
<td>Low</td>
</tr>
</tbody>
</table>

Table 6.4 - Mapping of Alignment of Six Primary Management Processes of SCOR with the Evidential Nodes of USAID

A review of the data from the USAID final report showed tangible evidence that the 6 elements of SCOR existed within the project work undertaken by USAID was both high and Low. The USAID final report showed a High level assurance of the Plan, Source, Make and Deliver functions. There was a low level assurance for both the Return and Enable functions.

6.4 Analysis of the Evidence Mapping

The mapping of the evidence for each of the case study nodes resulted in some positive data. For example, each node contained aspects of the six primary management processes of SCOR (i.e. Plan, Source, Make, Deliver, Return and Enable). Each node was assessed with a level of assurance grade of either High, Medium, Low or No. Each level was graded by the evidence found from the interviews and secondary data. The
three case studies consisted of 108 instances where aspects of the six primary management processes of SCOR were identified and were graded using the Unit of Standard in Table 6.1.

Table 6.5 illustrates a comparison of the combined total number of instances across all case studies (Amos Aid, Dadaab, USAID) and the total percentage of assurance for the case studies. The “High” classification has the highest occurrence overall (69%). This is because there was a high level of data available to determine aspects of SCOR after it was overlaid over each of the 3 case studies. The Medium classification had a 21% occurrence rate supporting the High classification. Whereas Low achieved only 10% classification and No had a zero rating which suggests that within the data provided the essentials for identifying the six key elements of SCOR are being acknowledged.

<table>
<thead>
<tr>
<th>Level of Assurance</th>
<th>Total Number of Instances</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>75</td>
<td>69</td>
</tr>
<tr>
<td>Medium</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>Low</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>108</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 6.5 - Comparison of the Combined Number of Instances Across the Three Case Studies and the Total Percentages
6.5 Identification of the Six Primary Management Processes of SCOR being Existent in an Aid and Development Supply Chain System

It is important not to confuse the evidential nodes with the non-evidential nodes in the supply chain mapping conducted in Chapter 5. Whereas it is noted that all these case studies had a limited view of their entire supply chain system, there was sufficient evidence around the focal nodes, 1st Tier suppliers and customers to gain confidence. On the body of evidence from the evidential nodes of the case studies, it has been established positively that the six primary management processes of SCOR can be overlaid into Aid and Development supply chain systems.

6.6 Responses to the Research Question

Section 1.4 presented the research question for this work as:

“Does the Supply Chain Operation Reference (SCOR) framework represent a valid alternative management framework for Aid and Development Programs”.
On the balance of evidence and within the limitations of the work noted in Section 1.8, it is determined that the SCOR framework does represent a valid alternative management framework for Aid and Development programs. This determination is made because the core elements of the six primary management processes of SCOR were identified from both a system and nodal level.

The supply chain systems of the three case studies function in a similar manner to commercial supply chain systems demonstrating a flow of funding, goods and services. The case studies also demonstrated a clearly defined customer (Principal) and recipient, and a focal node. Importantly it was possible to identify a clear customer side and supplier side around the focal node of the operational supply chain system map of the case studies of this work.

There was no evidence that any of the case studies considered end-to-end configuration of their supply chain systems, and there is no evidence that these NGO’s had adopted end-to-end communication protocols. This is interesting because these end-to-end considerations are embedded in SCOR and represent the first step in improving overall system performance and break down some of the “faith based” approaches to internodal management demonstrated in the case studies on a player-by-player basis.

None of the case studies offered evidence of formal quality management systems within their operations. What was evident was a series of disconnected nodal centric quality management systems that were either adopted in an ad hoc or enculturated manner and evolved from legacy protocols or policies. Alternatively, SCOR is a “living” standard that could represent a valid management framework for Aid and Development programs because all of the case studies positively demonstrated core function of the six primary management processes of SCOR within both their systems and nodal levels.
6.7 Responses to the Hypotheses

Section 1.5 presented three hypotheses for testing, these are discussed below.

6.7.1 Testing of Hypotheses 1

Hypotheses 1 was framed as:

“By adopting a method of tracking funding from the funding provider (Principal) and returning value to the recipient of services, it is possible to map the supply chain system of an Aid and Development program”

Hypotheses 1 has been confirmed positively and is discussed in Chapter 5. Interestingly, a novel, “U” shaped supply chain systems map was identified from the evidence by applying supply chain theory. This diagrammatic representation was not a “fit of convenience” but rather a result of ordering suppliers and customers to their designated sides around the focal node.

6.7.2 Testing of Hypothesis 2

Hypotheses 2 was framed as:

“Aid and Development supply chain systems demonstrate similar common characteristics of commercial supply chains”

Hypotheses 2 has been confirmed positively. As noted in Section 6.6, the case studies demonstrated flow of funding, goods and services similar to that of commercial supply chain systems including internal linkages via logistics activities and defined value creation throughout the system to the end recipient. The identification of common characteristics between Aid and Development and commercial supply chains is encouraging from a perspective of answering the research question. The practical challenge in adopting SCOR for example appears to orbit around two issues. The first
challenge is that of overcoming enculturation and legacy protocols and policies noted in Section 6.6. The second challenge is that the case studies did not “speak the language of supply”. Put simply, Aid and Development agencies have evolved their own common technical vernacular that presents an often convenient barrier to systematic change.

6.7.3 Testing of Hypotheses 3

Hypotheses 3 was framed as:

“If an Aid and Development supply chain system can be mapped and subsequently demonstrate common characteristics to a commercial supply chain system, then it should be possible to adopt commercial principles of supply chain management to improve the efficiency and efficacy of an Aid and Development program. This should be demonstrable in the overlaying of the six primary management processes of SCOR into the systems map of the Aid and Development agency under investigation”

Hypotheses 3 has been confirmed positively. As noted in Section 3.8, the impact, measures and data relating to the exploitation of SCOR with supply chain systems, the literature supports the case that SCOR, as the standard for supply chain management and improvement, has potential benefit when adopted by organisations. Section 6.1 introduced a theoretical model for Aid and Development supply chain systems and Section 6.2 “zoned” that model to demonstrate a high level (i.e. systems level) presence of SCOR with the case study supply chain systems. Section 6.3 mapped the presence the six primary management processes of SCOR in the evidential nodes of each of the case studies thereby confirming relevance at an operations level. The positive confirmation of Hypotheses 2 affirming common characteristics of Aid and Development supply chain systems to commercial supply chain systems indicate that the adoption of commercial principles of supply chain management (i.e. adoption of SCOR) by an Aid and Development agency, should result in improvements in the efficiency and efficacy of an Aid and Development program.
6.8 Responses to the Three Sub-Questions Arising

Section 4.0 presented three Sub-questions arising from the work, these are discussed below.

6.8.1 Response to Sub-Question 1

Sub-question 1 was framed as:

“What does the supply chain systems map of an Aid and Development supply chain look like?”

As noted in Section 6.6 and Section 7.1 the Aid and Development supply chain system demonstrates similar characteristics in terms of flow of funding, goods and services. It has a focal node and customer and supply nodes. Because of the duality of “customer”, the Principal and the recipient, the traditional bow tie model is “bent” to become a “U” shaped graphical representation referred to as an atypical supply chain system (see Figure 6.1 for a theoretical model based on the actual maps of the case studies illustrated in Figures 5.4, 5.7 and 5.9).

6.8.2 Response to Sub-Question 2

Sub-question 2 was framed as:

“What are the main links of an Aid and Development supply chain system?”

In common with commercial supply chain systems, the main linkages of an Aid and Development supply chain system are typically the hand over points of funding, value and goods.
Logistics or geographical constraints make logical linkage and hand over points between one player and the next. As noted in Section 6.6, end-to-end configuration and end-to-end communication were not evident in the case studies.

6.8.3 Response to Sub-Question 3

Sub-question 3 was framed as:

“How do you map an Aid and Development supply chain system?”

Figure 4.5 provides a flow diagram of the mapping process used for the work. The key actions are listed below:

1. Identify and authenticate the lead agency
2. Identify the Principal
3. Using all evidence available, follow the paths of funding into the supply chain system until it “disappears” in the system
4. Follow the path of value (or goods) as it re-appears into the system
5. When no further “movement” (i.e. passing on of value) is established, then the end recipient has been identified

6.9 Implications of the Research Findings and Summary

By ranking the evidential supply chain nodes, identified during the supply chain mapping of the case studies in Chapter 5, the work discussed in this Chapter first offered a conceptual Aid and Development supply chain system model based on an amalgamation of the nodes from all of the case studies. The conceptual Aid and Development supply chain system model was “zoned” to illustrate positively a high level application of the six primary management processes of SCOR within the model. This identification was not however sufficient to offer confidence that the six primary management processes of SCOR was present within all nodes as required by the standard.
By focussing in on each evidential node within each case study, it was possible within most nodes and to a high percentage of assurance, to identify the presence of the six primary management processes of SCOR within these nodes. This “operational” level of identification, combined with the high level identification noted above offered a body of evidence within the noted limitations of this work to conclude positively that the six primary management processes of SCOR can be overlaid onto Aid and Development supply chain systems.

6.9.1 Implications of the Findings

The implications of the findings for this work are far reaching, and because they are bounded within a system, typically interconnected and dependent. The implications include:

- **Changes in Supply Chain Systems Throughput** - As noted in Chapter 3, the prima facie reason for SCOR is to improve the total performance of a supply chain system. As such the adoption of SCOR within an Aid and Development Supply Chain System should result in positive changes in that systems performance, efficiency and value for money

- **Changes in Supply Chain Configuration** - Any changes in throughput or performance with a supply chain system will affect change in that supply chain systems configuration. It is possible that typical closed loop/shop practises will reduce as agencies move away from a “self licking ice cream” scenario (see Section 5.3.3 and Section 5.4.4) into high performance channel management principles witnessed in commercial supply chain management. This migration would change the face of Aid and Development management and typically the skills set needed to manage it

- **Closer Collaboration** - Moving into a SCOR centric management regime would necessitate closer collaboration between channel partners (nodes). This would increase the level and speed of change, whilst aligning the entire supply chain system to a common goal (hopefully increase output to the recipient)

- **Tighter Governance and Transparency** - Closer collaboration within the principles of SCOR centric supply chain system would trigger tighter governance structures
and more open (for collaborative purposes) transparency, driving further changes in terms of open supplier selection for example

- **Improvements in Supply Chain Systems Measures and Tangible Outputs** - Improvements brought about by channel configuration, supplier selection, governance etc. would result in improvements in systems measures and this would, as a product of continuous improvement, improve the outputs of the system in areas such as; quality, volume, throughput, accuracy, value for money etc.

- **Competition Based on Free Market Principles** - SCOR brings a clear blueprint and operating framework for a supply chain system. Because of this clarity, it is reasonable to expect competition within this sector to move to more free market principles where external players or previously excluded partners could now enter the Aid and Development supply chain system offering terms best suited to that system. This could have the nett effect of breaking down institutionalisation within the Sector

- **Greater Impact to the Recipient** - Based on the documented evidence of the benefits in terms of cost and performance for businesses adopting commercial supply chain systems based on the SCOR standard, it is difficult not to conclude that in the case of Aid and Development where the object is to provide the best possible impact and benefit to the recipient (Aid agencies are in fact either NGO’s or NFP’s and their prima facie is to maximise benefit to the recipient), that the ruthless adoption of SCOR would increase the impact positively to recipients of Aid and Development initiatives

Chapter 7 provides a conclusion for this work and offers some of recommendations for further work.
CHAPTER 7 - CONCLUSION AND RECOMMENDATIONS FOR FURTHER WORK
7.0 Conclusion

The fundamental premise for this work has been that, typically, Aid and Development supply chain systems are often inefficient or, on occasion, rife with corruption, that reduces significantly the output and impact to the recipients (end customer). This premise is supported in the literature. It is argued that design and management principles successfully exploited in commercial supply chain systems could be adopted to be used in Aid and Development supply chain systems with a view to improving the efficiency, transparency and governance of these supply chain systems in a similar manner to the improvements made in commercial supply chains systems.

The Supply Chain Operations Reference (SCOR) model is the international “gold standard” for commercial supply chain management that promotes best practice and delivers significant operational improvements when applied into a commercial supply chain system, and if SCOR was applied in a similar manner into an Aid and Development supply chain system, then it should be possible to expect similar improvements to that system. To do this, it has been necessary, in the first instance, to establish if the six primary management processes of SCOR exists within Aid and Development supply chain systems, because both the literature and common axioms suggest that because the objectives, outputs and end customer are different between commercial and Aid and Development supply chains, then these differences bar the transfer of operating principles from one to the other. However, by using supply chain system mapping techniques, positive identification of SCOR was achieved within three case studies used in this work, where it was identified that although atypical in terms of graphical and narrative interpretations, the mapping exercise on the case studies demonstrated all of the “DNA” of a more commercial supply system (and indeed the theory of supply chain management) was indeed present within the supply chain systems of these case studies. As such, the research question:

“Does the Supply Chain Operation Reference (SCOR) framework represent a valid alternative management framework for Aid and Development Programs”
was, on the balance of evidence and within the limitations of this research noted in Section 1.8, determined to be positive and as such open the way for further research into methods of applying SCOR into Aid and Development supply chain systems.

On reflection, this work has in many ways been a “first pass” at conducting a “forensic supply chain audit” where the flow and exchange of money and tangible goods (value) is traced on a node-by-node basis. In so doing, many anomalies and gaps were discovered in each of the case studies, each potentially offering much opportunity for further research, for example, the non-evidential areas of participation in each of the maps, incomplete records pertaining to the Aid and Development programs under investigation, acts of commercial faith. Of particular note is the suggestion that many Aid and Development supply chain systems are, or have become over time, “self-licking ice creams”, specifically self contained complex adaptive supply ecosystems where the external environment is less critical after program initiation (injection of funding) compared to the ongoing self sustainability and regeneration around the concept of selling a “worthy cause”. The implication and benefits (for legitimate Aid agencies) is significant, however, there is a possible “pass back” with forensic supply chain auditing into commercial supply chain systems to combat, for example, counterfeit or dangerous goods entering the system from rogue suppliers and/or the eradication of the exploitation of child/slave labour from shadow suppliers accessing highly complex global supply chains.

Along with the identification of the six primary management processes of SCOR within Aid and Development supply chain systems and the determination that SCOR could represent a valid alternative management framework for Aid and Development programs, this work has also contributed by identifying the atypical nature of Aid and Development supply chain systems and the Unit of Standard in which to measure SCOR within these supply chain systems. Furthermore, the mapping process for an Aid and Development supply chain system has also been established, along with the foundation principle of forensic supply chain accounting.

Tact time was not included in the original research plan, however, this was identified as the research progressed. It became clear that, moving forward, understanding the
dynamics of Aid and Development supply chain systems (i.e. not just the “x, y, z” coordinates of the map but also their position in time) could become a critical factor in improving the system. Further questions to establish the dynamics of an Aid and Development supply chain system could include data concerning the total program value, how much funding was retained by each node, how long from receiving the funds did each node take to transfer funding or value to the next node and how much value, in market terms, did the recipient accrue.

Initially one of the challenges, and then a key finding of the work has been that the significant node of an atypical supply chains (i.e. the original provider of the funds) cannot be negated from the mapping process of that system for an easy, or indeed, a “fit of convenience” for a more standard mapping concept such as a linear bow tie path.

This work established that the language of supply for Aid and Development agencies is different to commercial supply chains and this can present barriers in the mapping process. Importantly, there was no evidence that Aid and Development agencies were viewing their supply chains from an end-to-end configuration point of view. Furthermore, there was no evidence of end-to-end communication within Aid and Development supply chain systems, suggesting a hand-to-hand dynamic.

Where it has been possible to establish that the six primary management processes of SCOR can be overlaid into Aid and Development supply chain systems, it is important to note that for tangible improvements to result out of the application of SCOR, any Aid and Development supply chain system would need to be designed with the outcome (i.e. SCOR architecture) in mind. The quality management system of the Aid agency would also need to be designed and aligned accordingly. These basic systems design requirement would require significant change and institutional disruption, but if it could be achieved, it is not unreasonable to suggest that it should be possible to expect operational efficiency and optimisation found in commercial supply chain systems to transfer into the supply chain system of an Aid agency adopting SCOR within the correctly configured system. The nett gain of such action would be overall cost improvement (i.e. financial savings) or the same volume of funding delivering a greater impact per-dollar for the recipient (i.e. operational efficiency creating a greater flow).
There is however, an undercurrent demonstrated within the case studies that the system exists to serve itself. To do that, the system needs only an input of funding and a final, not necessarily large, recipient that is not itself. The rest of the system can be largely contained within its own boundaries and retain the majority of the funding and value creation. This would unlikely be the case should SCOR be applied, because of the metrics and governance structures necessary in the implementation and ongoing adherence to the standard. As such, an intriguing scenario is presented where a break by one Aid agency to implement SCOR and the optimum quality management framework could trigger structural change in the sector on a global scale. Indeed SCOR could become the disruption of the Aid and Development sector in a similar way for example that the internet has been a significant and almost terminal disruption to the traditional entrenched retail sector globally.

7.1 Recommendations for Further Work

This work has resulted in an interesting and somewhat encouraging first step into auditing, mapping and understanding the interactions and value creation of Aid and Development supply chain systems. In order to progress this research, further work is necessary, specifically:

1. Conduct more case study analysis using the mapping protocols discussed in this work to establish if there were wider trends in Aid and Development supply chain systems or if this work was an anomalous study
2. Develop data on the dynamics of Aid and Development supply chains including, not solely the mapping of the system, but also incorporating the tach time of nodes throughout the system
3. Develop a SCOR centric framework for Aid and Development Agencies to ease the implementation of SCOR into their supply chain systems with a view to overall system improvement
4. Develop standards for forensic supply chain auditing and reporting
5. Further study into the governance of Aid and Development and Not for Profit organisations.
6. A detailed study into the end to end communication of Aid and Development project management.

7. The development of change management for the implementation of Project Management protocols for specific Aid and Development projects as opposed to the current method of using LFA.


Blum, D 2017, ‘Nine potential solution to abate grade inflation at regionally accredited online U.S. universities: an intrinsic case study’, *The Qualitative Report*, vol. 22, no. 9, pp. 2288-2311.


Byrne, M 2001, ‘Data analysis strategies for qualitative research’, Association of Operating Room Nurses, vol. 74, no. 6, pp. 904-905.


Childerhouse, P and Towill, DR 2011, ‘Effective supply chain research via the quick scan audit methodology’, *Supply Chain Management: An International Journal*, vol. 16, no. 1, pp. 5-10.


Montazemi, AR, Pittaway, JJ, Saremi, HQ and Wei, Y 2012, ‘Factors of stickiness in transfers of know-how between MNC units’, *Journal of Strategic Information Systems*, vol. 21, pp. 31-57.


Morse, JM 1995, ‘The Significance of Saturation’, *Qualitative Health Research*, vol. 5, no. 2, pp. 147-149.


Noble, H and Smith, J 2014, ‘Qualitative data analysis: a practical example’, *Evidence Based Nursing*, vol. 17, no. 1, pp. 2-3.


Salman M, Iqbal SA and Khalid R 2013, ‘Implementing supply chain operation reference (SCOR) model in manufacturing firm of a developing country’ in Qi E., Shen J., Dou R. (eds.) International Asia Conference on Industrial Engineering and


Seuring, S and Muller, M 2008, ‘From a literature review to a conceptual framework for sustainable supply chain management’, *Journal of Cleaner Production*, vol. 16, pp. 1699-1710.


Styger, LEJ 2011, Risk within the foundation of Australian supply : a cross-sectoral, cross-regional perspective, *BESA2011 Sustainable Concepts of Supply*, Sydney,


198 of 221


Welch, C and Piekkari, R 2017, ‘How should we (not) judge the ‘quality’ of qualitative research: a re-assessment of current evaluative criteria in international business’, *Journal of World Business*, vol. 52, pp. 714-725.


Yokl, RT 2007, ‘If you can measure it, then you can improve it’, *Hospital Material Management*, vol. 32, no. 12, pp. 10-11.
APPENDICES
<table>
<thead>
<tr>
<th><strong>Millennium Development Goals (MDG)</strong></th>
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<tbody>
<tr>
<td><strong>Goal 1: Eradicate Extreme Poverty</strong></td>
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<tr>
<td><strong>Goal 2: Achieve Universal Primary Education</strong></td>
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<td><strong>Goal 3: Promote Gender Equality and Empower Women</strong></td>
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<td><strong>Goal 4: Reduce Child Mortality</strong></td>
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<td><strong>Goal 5: Improve maternal Health</strong></td>
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<td><strong>Goal 6: Combat HIV/AIDS, Malaria and Other Diseases</strong></td>
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<td><strong>Goal 7: Ensure Environmental Sustainability</strong></td>
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<td><strong>Goal 8: Develop a Global Partnership for Development</strong></td>
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<tr>
<td>Target 8.E: In cooperation with pharmaceutical companies, provide access to affordable essential drugs in developing countries</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Target 8.F: In cooperation with the private sector, make available benefits of new technologies, especially information and communications</td>
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APPENDIX 2 - INVITATION LETTER
CONSENT FORM FOR:

RESEARCH TITLE: An investigation into establishing the validity of SCOR within a humanitarian aid initiative.

RESEARCHER(S): Dr Lee Styger, Mark Edwards

I have been given information about an investigation into establishing the validity of SCOR within a humanitarian aid initiative and discussed the research project with Mark Edwards who is conducting this research as part of a Masters of Business Research supervised by Dr Lee Styger in the Sydney Business School at the University of Wollongong.

I have been advised of the potential risks and burdens associated with this research, and have had an opportunity to ask Mark Edwards any questions I may have about the research and my participation.

I understand that my participation in this research is voluntary, I have been invited to participate and I am free to withdraw from the research at any time. My non-participation or withdrawal of consent to my relationship with the Sydney Business School or my relationship with the University of Wollongong.

If I have any enquiries about the research, I can contact Dr Lee Styger - 02 4221 3751 and Mark Edwards - 0447326488 or if I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Officer, Human Research Ethics Committee, Office of Research, University of Wollongong on 4221 3388 or email reo.ethics@uwu.edu.au

By signing below I am indicating my consent to (please tick):

* provide secondary data relating to a specific humanitarian aid initiative
* be available to participate in an informal interview

I understand that the data collected from my participation will be used for a thesis and I consent for it to be used in that manner.

Signed Date

Name (please print)
PARTICIPANT INFORMATION SHEET

TITLE: An investigation into establishing the validity of SCOR within a humanitarian aid initiative.

PURPOSE: This is an invitation to participate in a study conducted by researchers at the University of Wollongong. The purpose of this research is to identify whether Supply Chain Management (SCM) principles apply to a humanitarian aid initiative. This research will explore the principles developed to improve supply chain performance such as the Supply Chain Operating Reference (SCOR) framework. Through a single case study analysis and semi structured interviews the research will identify whether SCOR applies within an Aid and Development initiative and if so can SCOR assist in providing sustainable outcomes. The research will identify the five specific SCOR processes of Plan, Source, Make, Deliver and Return to map how the integrated supply of funds allocated towards Aid and Development initiatives can be improved and how tangible performance measures can help evaluate the effectiveness of the use of donor funds.

INVESTIGATORS

Dr Lee Styger (Team Leader). Mark Edwards
Sydney Business School Sydney Business School
02 4221 3751

METHODS AND DEMANDS ON PARTICIPANTS

If you choose to be included, you will be asked to participate in a visit by a member of the research team. During this visit the researcher will need access to the secondary data that relates to the specific case study. It may be necessary to conduct an interview no longer than 60 minutes. This interview will be recorded by audio to ascertain the work involved, the funds you receive and the network that you use to facilitate the initiative that you are involved in. This information will help identify SCOR in your supply chain network.

POSSIBLE RISKS, INCONVENIENCES AND DISCOMFORTS

Apart from the time spent interviewing you and the discovery process to assist with the purpose of this research, we can see no risks to you, your organisation or organisations that are part of your supply chain network. Your involvement in this study is voluntary and you may withdraw from participation from the study at any time and withdraw any data that you have provided to that point. Refusal to participate in the study will not affect your relationship with the University of Wollongong.

FUNDING AND BENEFITS OF THE RESEARCH

The outcome will confirm that there is supply within an Aid and Development initiative:

1. To identify the main areas of supply and to assess the sustainability of the vital supply nodes necessary to ensure the viability of that initiative.
2. To assess a specific initiative to analyse the shortfall in its funding, resources and personnel to ensure sustainability of that initiative.

ETHICS REVIEW AND COMPLAINTS

This study has been reviewed by the Human Research Ethics Committee (Social Science, Humanities and Behavioural Science) of the University of Wollongong. If you have any concerns or complaints regarding the way this research has been conducted, you can contact the UoW Ethics Officer on 61 2 4221 3386 or email rso-ethics@uow.edu.au.

Thank you for your interest in this study.
APPENDIX 5 - ETHICS APPROVAL
25 September 2014

Mr Mark Edwards

Dear Mr Edwards

Thank you for your response dated 22nd September 2014 to the HREC review of the application detailed below. I am pleased to advise that the application has been approved.

Ethics Number: HE14/359
Project Title: An investigation into establishing the validity of SCOR within a humanitarian aid initiative
Researchers: Mr Mark Edwards, Dr Lee Styger

Documents Noted/Approved:
- Initial Ethics Application (dated 26/8/14)
- Participant Information Sheet (Version 1.3; 24/8/14)
- Consent Form (Version 1.3; 24/8/14)
- Skype Interview Script (Version 1.0; 15/9/14)
- Letters/emails of support from Caritas, CRS and Baptist World/Transform Aid.
- Letter of response to HREC Review (Received 22/9/14)

Approval Date: 24 September 2014
Expiry Date: 23 September 2015

The University of Wollongong/Illawarra Shoalhaven Local Health District Social Sciences HREC is constituted and functions in accordance with the NHMRC National Statement on Ethical Conduct in Human Research. The HREC has reviewed the research proposal for compliance with the National Statement and approval of this project is conditional upon your continuing compliance with this document.

Approval by the HREC is for a twelve month period. Further extension will be considered on receipt of a progress report prior to expiry date. Continuing approval requires:

- The submission of a progress report annually and on completion of your project. The progress report template is available at http://www.uow.edu.au/research/ethics/human/index.html. This report must be completed, signed by the researchers and the appropriate Head of Unit, and returned to the Research Services Office prior to the expiry date.
- Approval by the HREC of any proposed changes to the protocol including changes to investigators involved
- Immediate report of serious or unexpected adverse effects on participants
- Immediate report of unforeseen events that might affect continued ethical acceptability of the project.
APPENDIX 6 - SCOR LEVEL 2 METRICS
<table>
<thead>
<tr>
<th>Notation</th>
<th>Process Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Plan Supply Chain</td>
</tr>
<tr>
<td>P2</td>
<td>Plan Source</td>
</tr>
<tr>
<td>P3</td>
<td>Plan Make</td>
</tr>
<tr>
<td>P4</td>
<td>Plan Deliver</td>
</tr>
<tr>
<td>P5</td>
<td>Plan Return</td>
</tr>
<tr>
<td>S1</td>
<td>Source Stocked Products</td>
</tr>
<tr>
<td>S2</td>
<td>Source Make-to-Order Products</td>
</tr>
<tr>
<td>S3</td>
<td>Source Engineer-to-Order Products</td>
</tr>
<tr>
<td>M1</td>
<td>Make-to-Stock</td>
</tr>
<tr>
<td>M2</td>
<td>Make-to-Order</td>
</tr>
<tr>
<td>M3</td>
<td>Engineer-to-Order</td>
</tr>
<tr>
<td>D1</td>
<td>Deliver Stocked Products</td>
</tr>
<tr>
<td>D2</td>
<td>Make Deliver Make-to-Order Product</td>
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<tr>
<td>D3</td>
<td>Deliver Engineered-to-Order Products</td>
</tr>
<tr>
<td>SR1</td>
<td>Source Return Defective Products</td>
</tr>
<tr>
<td>SR2</td>
<td>Source Return MRO Product</td>
</tr>
<tr>
<td>SR3</td>
<td>Source Return Excess Product</td>
</tr>
<tr>
<td>DR1</td>
<td>Deliver Return Defective Products</td>
</tr>
<tr>
<td>DR2</td>
<td>Deliver Return MRO product</td>
</tr>
<tr>
<td>DR3</td>
<td>Deliver Return Excess Product</td>
</tr>
<tr>
<td>E1</td>
<td>Manage Supply Chain Business Rules</td>
</tr>
<tr>
<td>E2</td>
<td>Manage Supply Chain Performance</td>
</tr>
<tr>
<td>E3</td>
<td>Manage Supply Chain Data and Information</td>
</tr>
<tr>
<td>E4</td>
<td>Manage Supply Chain Human Resources</td>
</tr>
<tr>
<td>E5</td>
<td>Manage Supply Chain Assets</td>
</tr>
<tr>
<td>E6</td>
<td>Manage Supply Chain Contracts</td>
</tr>
<tr>
<td>E7</td>
<td>Manage Supply Chain Network</td>
</tr>
<tr>
<td>E8</td>
<td>Manage Supply Chain Regulatory Compliance</td>
</tr>
<tr>
<td>E9</td>
<td>Manage Supply Chain Risk</td>
</tr>
<tr>
<td>E10</td>
<td>Manage Supply Chain Procurement</td>
</tr>
<tr>
<td>E11</td>
<td>Manage Supply Chain Technology</td>
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</table>
APPENDIX 7 - CALCULATION AND COMPARISON OF
RETAINED FUNDING IN AID AND DEVELOPMENT PROGRAMS,
OBSERVATION AND HYPOTHESIS FORMED FROM THE DATA
In the context of Aid and Development programs, and within the assumption that they exist to provide the maximum benefit to the recipient, Chapter 1, Section 1.0, proposed a somewhat confronting statement that:

“A law of diminishing impact exists regarding actual recipient value as a percentage of program value, compared to the size of the Aid and Development supply chain system that exists to serve the program”

(Author)

Based on the data quoted in the literature, although outside the scope of the work, it is important to consider what the result of this law of diminishing impact could be to the recipient of an Aid and Development program. Table A1.1 provides a calculation and comparison of retained funding in Aid and Development programs based on 100 units of input at Node 1.

<table>
<thead>
<tr>
<th>Number of Nodes in the Supply Chain System</th>
<th>Retention at 10% Australian Government Preference</th>
<th>Retention at 22.85% Average from Published Works</th>
<th>Retention at 22.85 with 30% Wastage Taken from the Final Sum Delivered</th>
<th>Retention at 22.85% with 30% Wastage Taken from the Initial Total</th>
<th>Retention at 55.85% Comprising Average + Wastage Compounded</th>
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<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>70</td>
<td>100</td>
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<tr>
<td>2</td>
<td>90</td>
<td>77.15</td>
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<td>47.15</td>
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<td>3</td>
<td>81</td>
<td>59.52</td>
<td>59.52</td>
<td>41.67</td>
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<td>4</td>
<td>72.90</td>
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<td>45.92</td>
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<td>7</td>
<td>53.15</td>
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<td>1.14</td>
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<td>8</td>
<td>47.83</td>
<td>16.26</td>
<td>16.26</td>
<td>11.39</td>
<td>0.54</td>
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<td>43.05</td>
<td>12.54</td>
<td>12.54</td>
<td>8.79</td>
<td>0.25</td>
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<tr>
<td>10</td>
<td>38.74</td>
<td>9.67</td>
<td>9.67</td>
<td>6.19</td>
<td>0.12</td>
</tr>
<tr>
<td>Total Value Delivered to Recipient</td>
<td>34.87</td>
<td>7.46</td>
<td>6.47</td>
<td>4.78</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*Table A1.1 - Calculation and Comparison of Retained Funding in Aid and Development Programs Based on 100 units of Input at Node 1*
Three key observations are made from this data, these are:

1. The smaller the number of nodes in an Aid and Development supply chain system, the more that is outputted to the recipient. For example, if a five node supply chain system is assumed then approximately double the amount of output is indicated if a 10% (best case and as preferred by the Australian government) retention is present in the supply chain system. If the worst case option is taken, then an order of magnitude improvement is made to the output to the recipient based on a five node supply chain system compared to a 10 node supply chain system.

2. Aid and Development supply chain systems can be configured to best serve themselves by extending the number of nodes within the supply chain system and ensuring that as many nodes as possible are under the ownership of the focal node. In other words, it can be financially beneficial for an Aid agency to have a supply chain system that is a “self licking ice cream” or closed loop system requiring only an input of funding and a minimal output of Aid to ensure sustainability of the system.

3. More efficient, transparent and standard operating methodologies would, if implemented into the supply chain systems of Aid and Development programs, increase the output of the program to provide more or maximum benefit to the recipient as (is assumed) to be the intent of the Principal or funding body.

The implications and dynamics of these observations are not without precedent within academic theory concerning supply and logistics and indeed Aid and Development. However, one of the more intriguing aspects of these observations could be in connection to Cost Stickiness Theory (Anderson, Jaimovich and Simester 2015, p. 813). For example, Dutta, Yaprak and Grewal (2017, p. 38), discuss “profit stickiness” and how it can negatively impact customer satisfaction and retention. An interesting hypothesis emerges in the case of Aid and Development programs, where, as noted in Chapter 2, giving in actual terms has reduced globally at the same time operating costs have risen, suggesting that a “price increase” in the cost of Aid and Development programs is needed by Aid agencies (i.e. almost an inverse profit stickiness). However,
an increase in price (i.e. retention of monies within the Aid and Development supply chain system) could lead to the perception of an unfair operating regime (i.e. corruption or waste) within the eyes of the customer (Principal or community) that of itself drives “aid fatigue” (White 2007 p. 1) resulting in less giving in real terms and the need to increase the price of Aid and Development programs. In other words, a paradox exists where Aid agencies are in terminal decline and cannot survive without an increase in price (i.e. retention of funding), but any increase in the price (i.e. retention of funding) would trigger the terminal decline of the Aid agency.

Jaggi (1994, p. 187) further expands the concept of Cost Stickiness in terms of suggesting that frequent price adjustments can alienate customers. This poses a second intriguing hypothesis suggesting that it would be better to maintain a continuous flow of funding into Aid agencies rather than continuing to have competitive funding rounds commonly associated with NGO programs. In so doing, an equilibrium of “fairness” in the eyes of the funders could be maintained, because continuity of funding should lead to less money being retained within the Aid and Development supply chain system as a buffer or reserve fund.

Kun, Guoxin and Chen (2013, p. 1063), Montazemi, Pittaway, Saremi and Wei (2012, p. 32) and Szulanski,(1995, p. 437), open a further hypothesis by discussing knowledge stickiness and the barriers and costs of sharing and transferring knowledge within a working or social environment. This concept has significant implications in the context of the cyclic nature of funding of Aid and Development programs and staff and therefore knowledge retention in the supply chain systems (see Chapter 5). As such, a hypothesis emerges that the retention of money in Aid and Development supply chain systems could be in part attributed to the cost of re-learning old, lost, knowledge as new supply chain systems team players and new organisations are introduced into the supply chain system for the next program of work from the next round of funding.

The comparative data on funding retention, observations and the hypothesis noted above, although outside of the scope of this work, offer considerable opportunity for further research in the Aid and Development sector.
APPENDIX 8 - DOCUMENTARY DATA SOURCE
<table>
<thead>
<tr>
<th>Amos Aid</th>
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</thead>
<tbody>
<tr>
<td>Hand written notes</td>
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<tr>
<td>Receipts</td>
</tr>
<tr>
<td>Purchase orders</td>
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<tr>
<td>Final report</td>
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<tr>
<td>Web site documentation</td>
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<td>Daadab</td>
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<td>Quarterly reports</td>
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<td>Annual Report</td>
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<td>UN media releases</td>
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<tr>
<td>UN web site reports</td>
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<tr>
<td>Hand written notes from interviews</td>
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<tr>
<td>USAID</td>
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<tr>
<td>Final Report (Roark et al., 1988)</td>
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<td>Media releases</td>
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<tr>
<td>WASH program proposals</td>
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<tr>
<td>UN country specific reports</td>
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