LEAN READINESS ASSESSMENT IN HUMANITARIAN ORGANIZATIONS LOGISTICS AND SUPPLY CHAIN MANAGEMENT: A STEP TOWARD SUSTAINABLE RESOURCE CONSUMPTION

MUHAMMAD SHAFIQ

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By Mr. Muhammad Shafiq

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Oral Defense Committee

---Chair
Associate Professor Dr. Aweewan Panyagometh

---Advisor
Assistant Professor Dr. Kullapa Soratana

---Internal Examiner
Assistant Professor Dr. Witiya Pittungnapoo

---Internal Examiner
Dr. Boonsub Panichakarn

Approved

.....

(Professor Paisarn Muneesawang, Ph.D.)

Dean of the Graduate School

4 APR 2019

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Muhammad Shafiq

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Author	Muhammad Shafiq
Advisor	Assistant Professor Kullapa Soratana, Ph.D.
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ABSTRACT

Humanitarian Organizations (HOs) are often under pressure to maximize their performance and to deliver the best results for their funding. Pressures come from various stakeholders, including donor agencies, government organizations, communities and business investors. Donors require confidence that their funds are spent efficiently and in a transparent and accountable manner. Stakeholders want to be assured that the organizations which have tax exempt status are utilizing their resources conscientiously. The donor funding behaviour is also shifting from "project based" toward "performance based" disbursement of funds. In this situation, only with the submission and successful evaluation of activity completion reports will donors release funds to HOs, and only for activities deemed achieved.

The importance of resources efficiency in HOs is quickly catching up with the traditional emphasis on time effectiveness. HOs need to adopt optimal solutions and strategies for efficient resource utilization in line with business organizations. In this regard, Lean Management (LM), which is a strategy for efficient resource management, can be applied without compromising the HOs vital role, being to provide services to more target groups. LM can aid in the management of cost and

time, e.g. reducing waste, increasing customer value and improving overall financial and production capacity of the HOs. Literature revealed that not every HO would be ready to successfully adopt the Lean Management System (LMS). Thus, organizational lean readiness assessment is an important process to be instituted in any HO intending to 'go lean'. This study provides a Lean Readiness Assessment Model for HOs to assess their readiness or other0580wise in adopting a LMS. The lean readiness of an organization can be measured by identifying different lean management Critical Success Factors (CSFs). CSFs could be based on lean principles and lean techniques. This is the first study on HOs lean readiness assessment to serve as a foundation for an implementation of an LMS in HOs.

The overall goal of this study was to improve HO's resource utilization efficiency and its sustainability in term of cost and time. To achieve the goal, application of the LMS in Logistics and Supply Chain Management (LSCM) of HOs was adopted and a LRAM was developed. The major four objectives framed for this study were to review literature and identify notable research gaps, to identify the HOs Lean and Agile paradigms, to develop a LRAM and to validate the application of the LRAM developed, using HOs working in Pakistan as a case study. The overall goal and objectives were achieved through four study phases.

Phase I was a comprehensive review of literature on Humanitarian Logistics and Supply Chain Management (HLSCM). This qualitative and systematic review provided notable research gaps in existing HLSCM studies. The results of this phase indicated that existing studies focused on effectiveness in management by adopting agile techniques. On the other hand, an efficiency in management by lean techniques is an under-developed area of study. Therefore, efficiency in HLSCM by lean techniques needs to be developed to save the HOs operational cost and to serve the maximum number of people in society.

Phase II was the development of Lean and Agile Paradigms through qualitative techniques. The Decoupling Points Model (DPM) was designed after researching and reviewing the scope and thematic areas of 88 international HOs. Seven HLSCM professionals' interviews (semi-structured) were conducted to accurately identify key processes of HLSCM and to establish optimal decoupling points. The optimal decoupling points were established in accordance with the priority

and scope of each thematic area. Out of the 88-international HOs researched, 79 HOs were doing both developmental and emergency operations. Therefore, a detailed Lean Agile Decoupling Point (LADP) model was designed for such dual-purpose organizations. The LADP model, built on a flowchart approach for handling key processes, was divided into developmental and emergency operations. Optimal decoupling points establishment consisted of two steps, an organization's broad scope identification and the details of HLSCM processes identification. This phase considered various points and situations where LMS shall implied. Therefore, an assessment of organization readiness, or ability to adopt the LMS, was required and has developed in Phase III.

Phase III was the development of a conceptual LRAM which was achieved by identifying the CSFs of LMS. The CSFs were identified through a comprehensive analysis and classification of available literature regarding LM principles, and LM techniques. The identified CSFs were validated through quantitative techniques such as the Partial Least Square Structure Equation Model (PLS-SEM). Data was collected through questionnaire survey and CSFs reliability, convergent validity, discriminant validity, coefficient determination, productive relevance, and path coefficients results were analysed using the SmartPlsm3 software. Conclusion drawn from this phase was the acceptance of six CSFs namely: process management, planning and control management, donor and community relationship management, human resource management, internal and external communication management, and positive organizational culture. Results were proved positively significant values of loadings, alpha, p-value and r squares. Therefore, this phase constituted the final LRAM which further practically applied in Phase IV to assess the readiness of HOs working in Pakistan.

Phase IV was the assessment of an HO's lean readiness by applying the developed LRAM to HOs. Non-government organizations (NGOs) working in Pakistan were used as case studies to validate the LRAM. The data relevant to the factors of LRAM was collected through a questionnaire survey. The data was used to calculate the descriptive statics results such as mean, percent and frequency. The results showed that out of 19 national NGOs, only three were ready to implement the LMS, which scored the mean value of required limit of equal to or more than 40%.

Other 15 national NGOs were found traditional in organizational culture because of non-supportive organizational culture and lack of LM awareness. Out of 15 international NGOs, 12 of which were ready to implement the LMS, while the rest were traditional in its management systems. These results indicated that international NGOs working in Pakistan were found more supportive organizational culture and were considered as "ready to adopt" the LMS. Therefore, the traditional HOs require LM awareness and staff trainings before initiation of the LMS. Failure in a successful LM adoption and implementation will cost the organization time, finance and resources.

This study is proved a step toward social and economic sustainability of HO sector. The economic sustainability aspect of this study refers to the reduction in the HLSCM cost and time with utilization of fewer resources. The social sustainability aspect refers to the serving and saving maximum lives of marginalised communities. Based on this study, HOs can serve and save more lives effectively and efficiently by adopting LADP and LRAM developed in Phase II and Phase III.

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ABBREVIATIONS

CSFs	=	Critical Success Factors
CBO's	=	Community-based organizations
CI	=	Continuous Improvement
CRM	=	Customer relationship management
CSFs	=	Critical Success Factors
CCM	=	Communication and coordination management
DPM	=	Decoupling Points Model
HOs	=	Humanitarian Organizations
HLSCM	=	Humanitarian Logistics and Supply Chain Management
HL	=	Humanitarian logistics
HRM	=	Human resource management
INGO's	=	International non-government organizations
LM	=	Lean Management
LMS	=	Lean Management System
LRAM	=	Lean Readiness Assessment Model
LSCM	=	Logistics and Supply Chain Management
LAP	=	Lean and Agile Paradigms
LADP	=	Lean Agile Decoupling Point
LR	=	Lean readiness
LC	=	Lean culture
MRO	=	Materials, repairs, and operations
MIT	=	Management Institute of Technology
NGOs	=	Non-government organizations
NNGO's	=	National non-government organizations
OCM	=	Organizational culture management
POUS	=	Point of use storage
PCDC	=	Pakistan Centre for Development Communication
PRM	=	Process management
PLS-SEM	=	Partial Least Square Structure Equation Model

ABBREVIATIONS (CONT.)

RBM	=	Result based management
SRM	=	Supplier relationship management
SCM	=	Supply Chain Management
SPSS	=	Statistical Package of Social Sciences
TML	=	Top management and leadership
TPM	=	Total productive maintenance
TQM	=	Total Quantity Management
TPS	=	Toyota Production System
UN	=	United Nations
UNAV	=	Unmanned air vehicle
VM	=	Visual management

CHAPTER I

INTRODUCTION

Background problem and significance of the study

Over the past decade, numerous natural and man-made disasters occurred. Examples of the major disasters are terror attack on World Trade Centre, USA in 2001, Pakistan earthquake in 2005, Nargis cyclone in Myanmar in 2008 and terror attack on army public school Peshawar in Pakistan in 2014 [1]. Approximately 75,000 people were killed and up to 200 million people were affected and lost their houses and livelihood (crops, livestock etc.) [2]. Victims from both natural and man-made disasters need material aid and assistance, which usually comes from the government, military and civil defence of neighbouring and developed countries. Non-government organizations (NGOs) are major contributors in relief operations and humanitarian responses [3]. Such organizations are also known as a humanitarian organizations and are the focus of this study [4].

Humanitarian organizations have different priorities from business organizations. A priority of business organizations is to earn the maximum profit with a minimum utilization of resources, while the priority of HOs is to save and serve a maximum number of people from a disaster in the minimum time [5]. HOs goal is to serve humanity without any discrimination of religion, ethnicity, boundary or cast. Major activities of HOs are to rescue the victims during a disaster, provide residential rehabilitative shelter, food, health, education, and sanitation facilities [6-7]. Program and operation are the two major departments which regulate HOs functions. The program department deals with the development of project proposals, monitoring and evaluation of these projects. The operation department deals with supply chain management, logistics, and procurement, finance, administration and security relevant issues. According to [2], operation is the most expensive part of HOs which accounted for 80% of the total relief budget [8].

Humanitarian logistics and supply chain management (HLSCM) is a process that delivers goods and services from point of origin to point of consumption to meet a

basic requirement of the targeted community. HLSCM is an integration of departments, institutions, and stakeholders (government, donors, vendors and community) to meet the vulnerable and affected community's requirements. HLSCM processes include planning, implementation, and control of the flow and storage of goods, materials, and information in an efficient and cost-effective manner [8]. The capacity of any HOs system for disaster responsiveness can be measured based on the ability to work together with different actors (i.e. administration, logistics, finance etc.) through effective coordination [9]. HLSCM is the most important part of any HOs relief effort because success or failure of any relief operation is highly depended on HLSCM [8].

Nowadays, HOs are often under pressure to maximize their performance and to deliver the best results for their funding. Pressures come from various stakeholders, including donor agencies, government organisations, communities and business investors [10]. Literature revealed that more than 40% of the HOs budget goes wastes [11-12]. Stakeholders wants to be confident that their funds are spent efficiently and in a transparent and accountable manner [13-16]. The stakeholders also wants the assurance that the organizations which have tax exempt status are utilizing their resources conscientiously [17-18]. Moreover, donor funding behaviour is shifting from "project based" toward "performance based" disbursement of funds, in which only with the submission and successful evaluation of activity completion reports will donors release funds to HOs, and only for activities deemed achieved. In this environment of increased competition and pressure of performance-based funding, the importance of efficiency in HOs is quickly catching up with the traditional emphasis on effectiveness. Sound and knowledgeable management of humanitarian organizations logistics and supply chain operations is required. In addition HOs must continuous improve their sustainability resource consumption scheme [19]. HOs need to adopt optimal solutions and strategies for efficient resource utilization in line with business organizations, without compromising the HOs vital role [7,10,20-21]. HOs vital role is to provide services to more target groups with the utilization of fewer resources such as by effective management of costs and time.

According to Drew et al., lean management (LM) has proven to be a successful approach for businesses, significantly improving their profits, cash flow, customer satisfaction, and market share [22]. LM can aid in the management of cost and time, e.g.

reducing waste, increasing customer value and improving overall financial and production capacity of the organization. Evidence can be seen from several cases of successful businesses which have adopted lean management techniques, e.g. Hewlett-Packard, Toyota, Zara fashion design and World Vision [23-24]. Although LM techniques can be used to improve the efficiency of HLSCM in resource utilization and HOs sustainability, but not every HO would be ready to successfully adopt the lean management system. Literature identified that organizations which tried to adopt LM, 70% of them remained failed to adopt LM because of non-readiness organizations [23-25]. Organizational readiness is a significant success factor, and Organisational readiness assessment is therefore an important process to be instituted in any HO intending to 'go lean'. The lean readiness of an organization can be measured by identifying different lean management critical success factors (CSFs) [25]. CSFs could be based on lean elements, lean pillars, lean principles, lean waste, and lean techniques.

This study has developed a Lean Readiness Assessment Model for HOs for the purpose of assessing the readiness or otherwise of an HO to adopt an LMS. This study serves as a foundation for the implementation of an LMS in HOs. Findings of this study (lean readiness assessment model) can be used as guidelines and a checklist prior to and during the implementation of lean management in such organisations. The overall goal of this study was to provide a basis for the application of a lean management system in the logistics and supply chain management of HOs, providing efficient resource utilization and sustainability in terms of cost and time. Therefore, objectives of this study were the development of an LRAM and its application to the assessment of the readiness of HOs working in Pakistan. Figure 1, presented details of each objective which depicted below.

This study adopted a mixed research methodology (qualitative and quantitative techniques). The implementation and results of this study were divided into four phases. Phase I was to explore literature comprised on HLSCM efficiency and effectiveness management including lean and agile techniques and had identified the notable research gapes.

Phase II is the development of Lean and Agile paradigms and decoupling points models for HOs various emergency and developmental operations. The decoupling

points models was designed through literature review and interviewing the HLSCM professionals in details.

Phase III is the development of a conceptual LRAM which was achieved by identifying the CSFs of such a system, through a comprehensive analysis and classification of available literature regarding lean management systems. The CSFs identified for the conceptual LRAM were process management, planning and control management, customer relationship management, supplier relationship management human resource management, internal and external communication management, and leadership management, which were considered to be the most relevant to a readiness assessment of an HO. These identified CSFs were validated through quantitative techniques. The quantitative validation was done by the development of hypotheses, described in Figure 2. Data was collected through questionnaire surveys. The quantitative results were analysed, and conclusions drawn by applying a partial least square structure equation model (PLS-SEM) using the SmartPlsm3, software. All the accepted factors (process management, planning and control management, donor and community relationship management, human resource management, internal and external communication management, and leadership management) constitute the final LRAM.

Phase IV is the assessment of an HO's lean readiness by the developed LRAM. In this assessment, the non-government organizations (NGOs) working in Pakistan were used as case studies to test the LRAM. The data was collected through a questionnaire survey and analysed through the statistical package of social sciences (SPSS). The results were derived in descriptive statistics (mean, frequency and percentiles) which were compared with LRAM established criteria. The NGOs which scored the mean value equal to or more than 40% considered ready to implement the LMS, whereas, below than 20% value organizations considered traditional in LSCM operations.

Based on the results of all above phases the final recommendations were given to aid in the policy-making processes of HOs. These recommendations are given in detail, focusing on the sustainability of the HO sector, which depends on the minimization of cost, and the timely delivery, of the goods and services provided.

Research aim and objectives

The goal of this study was to contribute to the efficient utilization of the resources available to HOs, and to bring about efficiencies in cost and time in HO processes. The objectives and sub-objectives, for the achievement of the research goals of the study, have been framed as follows:

1. To review the literature and identify the notable research gaps in HLSCM:

1.1 To identify research articles focusing on the key words e.g. concept of HLSCM, challenges and issues in HLSCM, HOs effectiveness and efficiency management, Lean and Agile management.

1.2 To review goals, objectives adopted methodologies and derived results and analysis of identified research articles.

2. To develop Lean and Agile paradigms for HOs various emergency and developmental operations.

2.1 To identify HOs different operations and its emerging scope.

2.2 To identify different Lean and Agile paradigms and define their boundaries for various emergency and developmental type of operations.

3. To develop a lean readiness assessment model for HOs:

3.1 To identify the critical lean management factors for HOs.

3.2 To develop a conceptual LRAM with respect to HOs.

3.3 To validate the conceptual LRAM qualitatively and quantitatively.

4. To examine the current state of HOs working in Pakistan, in terms of lean readiness, based on the LRAM, through a questionnaire survey:

4.1 To know HOs current management practices.

4.2 To know the barriers to lean management.

4.3 To know the lean management enablers

4.4 To recommend processes and practices to achieve HOs sustainability, in terms of the efficient resource utilization including minimising cost and timeliness.

The output from the activities of the first objective became the basis of second objective. A road map of the whole study is illustrated in Figure 1, and subsequently provided the inputs into achieving each objective.

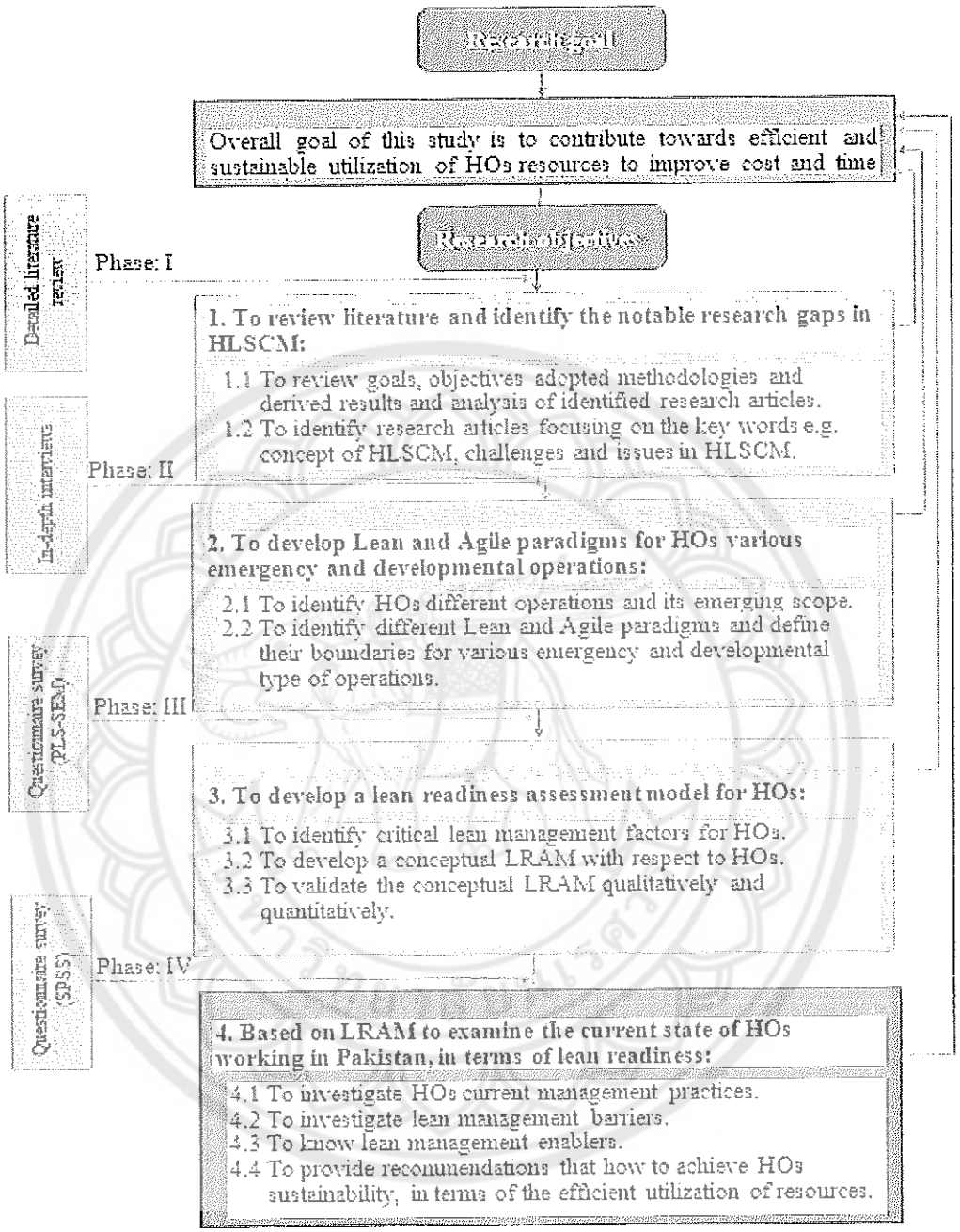

Figure 1 Research roadmap

Research hypotheses

Phase III of this study was the validation of the LRAM by applying a quantitative methodology to the hypothesis, using the Partial Least Square – Structured Equation Model (PLS-SEM). The literature review revealed that organization culture and management practices are the two major factors that can affect the lean management system of a corporate entity [19, 26-32]. Organizational culture encompasses the internal and external behaviour of any organization, while management practices include factors such as processes management, planning and control management, customer and supplier relations management, internal and external communication management, human resource management, leadership and top management practices [32]. Corporate culture and management requirements are different in nature from those of HOs [33]. The appropriateness of these factors in assessing HOs lean readiness have been tested as part of the development of the hypothetical framework. Following the SEM hypotheses structure, the necessary variables; independent, dependent and mediator variables, were defined (illustrated in Figure 2).

The management practices are conceptualized as being independent or exogenous variables that are not influenced by other variables in the model. Lean readiness is defined as being a dependent or endogenous variable that can be influenced by other independent and mediating variables, as shown in the model. Organizational culture is the mediating/moderating latent variable whose presence could affect the relationship between the dependent and independent variables, either positively and negatively. A positive or supportive organizational culture enhances the lean readiness by employing supportive management practices, while the negative organizational culture will have the opposite effect. Research hypothesis has been validated in Chapter, IV and Phase III.

The purpose of these hypotheses was to evaluate the relationship and effect of the various factors (dependent, independent & moderating) in terms of an HO's lean readiness, and to prove whether or not the factors are valid for HO sector lean readiness assessment. PLS-SEM was applied to estimate the validity of the hypothetical framework. Reliability and confirmatory analysis was used for variable analysis and the factors that proved positive were selected for inclusion in the LRAM and the negative factors were dropped from the model. Further additional information on the analysis and techniques is given in methodology chapter to the data analysis part of Phase III.

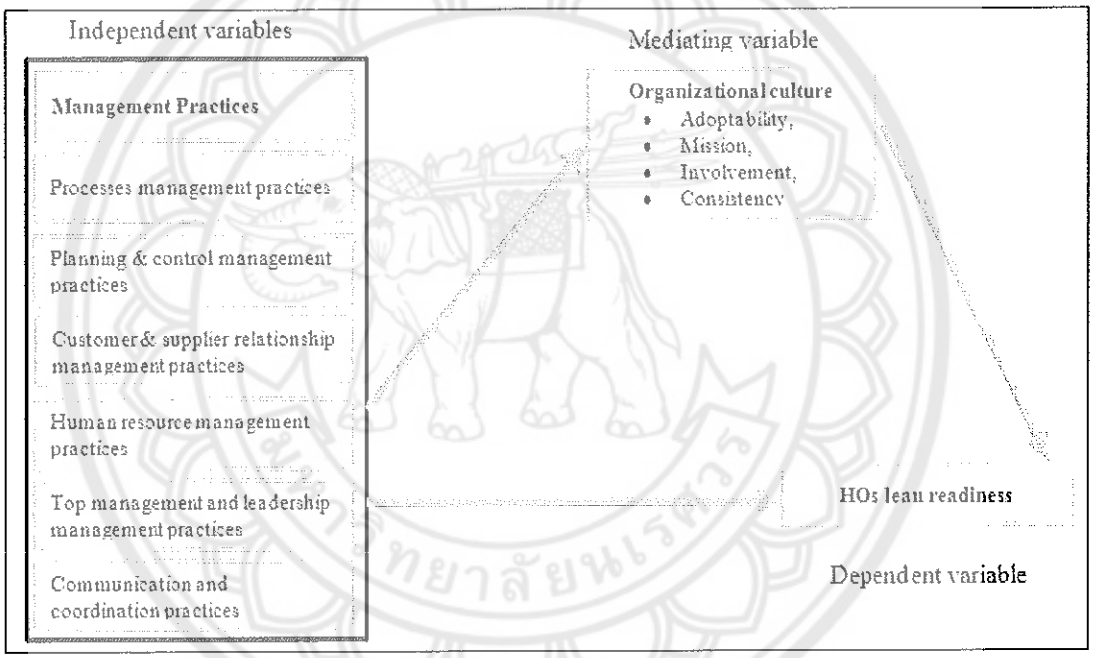

Figure 2 Hypothetical framework

Research significance

Existing studies on HLSCM have been based on the concept of organisational agility, supply chain management concepts, and the aspects of these concepts, and challenges inherent, that are applicable to the humanitarian supply chain as distinct from supply chain management in commercial organisations [34-35]. However, we can rightfully claim that our study is the first formal lean readiness assessment study for

HOs, and included the identification of both the external and internal factors that may obstruct the success of the implementation of an LMS in an HO.

Research scope

In Phase II: developed lean and agile paradigms and decoupling pints model are applicable to all the HOs which are operating in emergency or developmental type of operations. In Phase III the developed Lean readiness assessment model will also applicable to overall HO sector, whereas, this model has been proved and tested on national and international non-government organizations (NGO's) based in Pakistan. In Phase IV the recommendations derived from the case study will be supportive to improve the organizational culture and HLSCM processes of all those countries that have the same traits and culture such as Pakistan, India and Bangladesh.

Assumptions of the study were:

1. HOs working in developing countries are willing to adopt lean philosophy.
2. The donors and prevailing government policies are supportive for HOs lean adoptability.

Keywords

Humanitarian organizations (HOs), Non-government organizations (NGOs), Humanitarian logistics, Humanitarian supply chain management (HSCM), Lean management (LM), Lean readiness, Lean assessment (LA), Lean management system (LMS), Lean culture.

CHAPTER II

LITERATURE REVIEW

This literature review focuses to explore and explain the five major areas namely; humanitarian organizations, humanitarian logistics and supply chain management (HLSCM), sustainability perspective and HLSCM, agile management in HLSCM, lean management system in HLSCM, and development of lean and agile paradigms.

Humanitarian Organizations (HOs)

The concept of the humanitarian services has an ancient root and is admired in both Western and Eastern civilizations. The history of mankind is full of violence and brutality from ancient to present (e.g. World War I, Word War II, Middle East Iraq and Syria war, Afghan war etc.). The motives of humanitarian organizations is remained to protect the human rights, to provide the relief services and express the universal desire for personal and collective safety, security, respect, and dignity [36]. In 17^{th} and 18^{th} century the concept of humanitarian services was exist but there was no any organized movement about this concept and in 19^{th} century first time an organized political efforts start from the Western Europe to protect the human rights in international context [36]. Initially humanitarian organizations were an admittance of political leaders in the world of politics for solving the community problems and local level issues. Later on humanitarian organizations expanded and institutionalized after 1980 and during 1990's this field become more professional and strongly rationalized in the humanitarian services at national and international level [36]. So, the basic concept of humanitarian organizations is to serve the community or public beyond any profitable motives. According to Barentt et al. [37], organizations which provides the impartial, independent, and neutral relief to those who are in immediate danger of harm and to emerge in opposition to a particular meaning of politics and to help more to depoliticize the relief-oriented activities" [37].

It can be concluded that humanitarian organizations are those organizations which serve the deprived and deserving community beyond the profitable motive without any political, religious, geographical and ethnicity discrimination and its works only on the merits. In this regards the contribution of non-government organizations (NGO's) is remained significant and is admirable, details are defined below.

1. Non-Government Organizations (NGOs)

The term "nongovernment organization" (NGO) is expressed after World War II and first time that was coined by the United Nations (UN). According to UN charter 1945 article 71 that NGO could be accredited to UN for consulting and supporting process [38]. Following the UN charter and article 71 criteria the scholars first time uses the term NGOs for those social actors which were engaged with in the UN internationally. Gradually this concept flourished and in the decade of 1980 the term NGO become popular for all other sorts even which were engaged outside the UN framework either nationally or internationally [38]. Before the utilization of NGO that actors was known with different names like private organizations, international pressure groups, the League of the Nations, voluntary agencies, trusts, associations and foundations [39-41]. NGOs in academic research got late attention but since the last decade the NGOs recognized as one of the significant players in the world economy and political affairs [38]. In 2002, Marten has defined the NGOs from various perspective e.g. UN perspective, judicial perspective, international law perspective and social perspective and finally concluded NGO definition in the flowing words.

NGOs are formal (professionalized) independent societal organizations whose primary aim is to promote common goals at the national or the international level [38].

Thus, NGO's are the transformed form of HOs which have the responsibility to promote the common goal for the betterment of society and public interest without any profitable motives. In this study the discussion about HOs will refer us toward the NGOs. In recent decade the NGO's became more professional because they have the paid staff which possessed specialized trained skills, which are similar to corporate sector but still the ultimate objective behind the implementation of services and skills is not to earn the profit but to extend the support for humanity [38]. Mostly

NGOs are the in-dependent from the government funding sources because they receive the funds from private donors and members. In this decade the professional NGOs possessed their formal and independent organizational structure which allows them to operate and continue the organization work. Moreover, usually NGOs are divided into two types, national non-government organizations (NNGO's) and international non-government organizations (INGO's). The NNGO's are those which operating on national level in a single country, while, the INGO's are those organizations which operating their projects more than one country. Many stakeholders are concerns with NGO's operations e.g. media, government, societies and community-based organizations (CBO's) which are directly and indirectly are involved in the typical NGO hierarchy and they forced the organizations to be accountable and transparent in operations. NGO's are institutionalized and normally divided into two major departments namely, program department and operations department and these are further subdivided in various operational and implementation units. The common hierarchy or flow of NGOs setup from donors to implementing partner and then trickled down towards the deprived community as depicted under Figure 3.

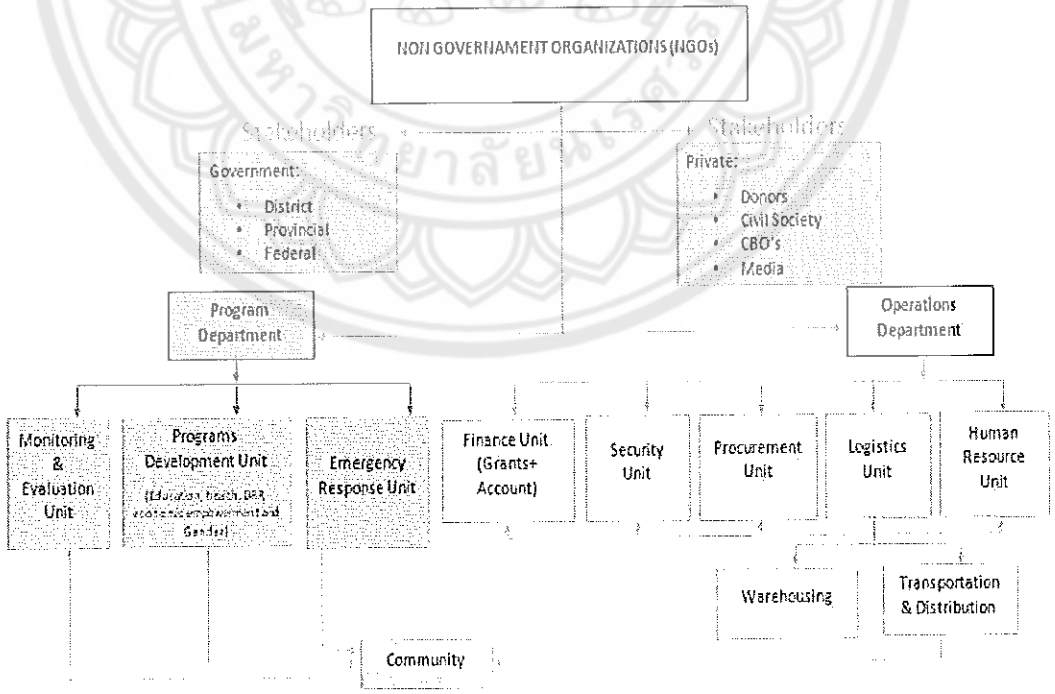

Figure 3 NGOs Hierarchy

1.1 HOs typical flow for funds

Donations normally flow from donors to International non-government organizations (INGOs) and then goes to national non-government organizations (NNGO's), to the community-based organizations (CBO's) and at last it reaches up to the end users which known as community. But some time the INGO's implements their projects by themselves and aid reach directly from INGOs to the CBO's and community or end users. HOs typical flow for funds is described in Figure 4. HOs mostly funds consumed by logistics and supply chain departments, which are 80% of total budgets [7]. Detail of humanitarian logistics and supply chain management is given below.

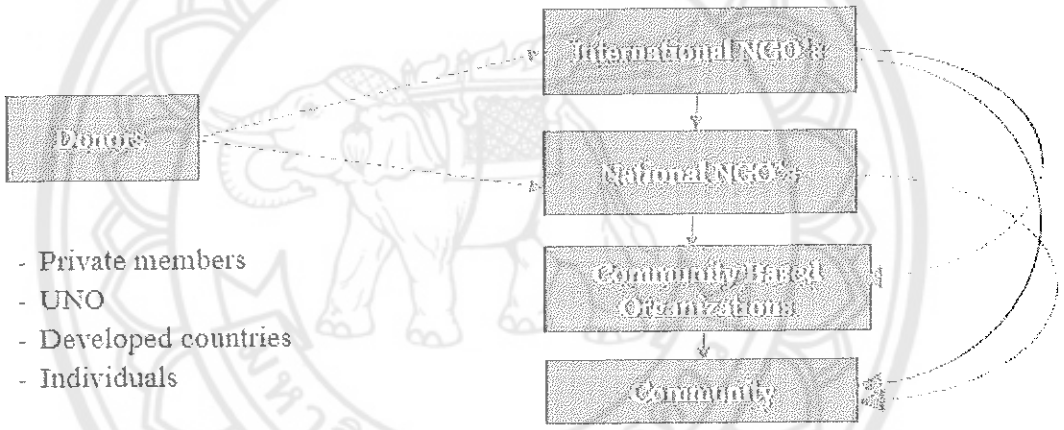

Figure 4 HOs Typical flow of funds

Humanitarian logistics & supply chain management (HLSCM)

Logistics and supply chain management is the backbone of humanitarian organizations' operations, which includes the processes of planning, implementing and controlling the efficient and cost-effective flow of goods, services, and information, and as well as the storage of goods, materials, and equipment from point of origin to point of consumption, sufficient to meet the beneficiaries' requirements [7]. Humanitarian supply chain management includes the establishment of an integrated network of relationships among different actors e.g. suppliers, government, military, partner organizations and community, for the efficient and effective delivery of goods and services [7].

Specifically, logistics is focused on moving something or someone from a point of origin to a destination, whereas supply chain management mainly focuses on the relationships among the actors that make such movement possible [42]. Logistics and supply chain management are both crucial to support a timely response to a disaster. Thus, the concept of HLSCM is the provision of goods and services, maximizing cost efficiency and speed effectiveness, achieved by close and effective coordination of activities and supply. HLSCM is a distinctive unit of any HO, and the success or failure of any humanitarian operation is highly dependent on this unit [42].

1. Various types of HLSCM operations

Usually, HLSCM is involved in two fundamentally different kinds of operations; long-term support and development projects operations, with sustainable development goals for rehabilitation of disaster-prone communities, economic development, education, health, energy, and equality, in which logistics and supply chain operations are usual and systemized. The long-term humanitarian support and development operations, delivering goods and services is properly managed, an orderly, plannable activity that is on-going and predictable. The performance of development related operations is instead a measure of efficiency (i.e. cost minimization and sustainable resource consumption) [43].

The second type of operations involve emergency response activities, requiring entirely different actions. Emergency operations are short term, unpredictable and severe, requiring critical and immediate response [44-46]. For emergency operations, disaster management includes preparing for, and planning responses to, disasters that suddenly and usually without warning, severely impact communities [44, 47, 48]. The performance of disaster management related operations is largely a measure of time effectiveness (i.e. prompt assistance to the beneficiaries) [43]. Existing studies on HLSCM are primarily focused on disaster responses and emergency operations, and long-term developmental operations are still an underdeveloped area that requires researcher attention.

2. HLSCM processes

Developmental processes of HLSCM are almost same as per the corporate sector, but the emergency supply chain management processes are significantly different, here is given the details of the emergency humanitarian logistics and supply

chain management processes stating from the occurrence of disasters till consumption of end users. After occurrence of any disaster, the first step for any HO is to make a quick review of their available contingency plan, budget and resources. HO may held a quick meeting for deciding either HO should intervene and mobilize the resources and their first priority shall be rapid need assessment (within 24 hours after the disaster occurrence) [33]. During an emergency, supplies from available stock or local market must be delivered to distribution point at least within 36 hours. If supplies are not available, HO may go to utilize their cash donations and procurement could be catered from the suppliers who are pre-identified and have long-term agreements. A strong coordination between HOs and suppliers is the pre-requisite for efficiency and effectiveness in overall supply chain management system. According to the availability of resources different organizations have different strategies for storage and distribution of emergency supplies and goods. Some of the large organizations like United Nation (UN) agencies have their contingency warehouses at large scale which locates on central, regional and field levels. During an emergency, organizations mostly use supply network directly from supplier to the filed warehouses and then directly to distribution point and end user community. The typical HOs emergency supply chain management process is depicted in Figure 5.

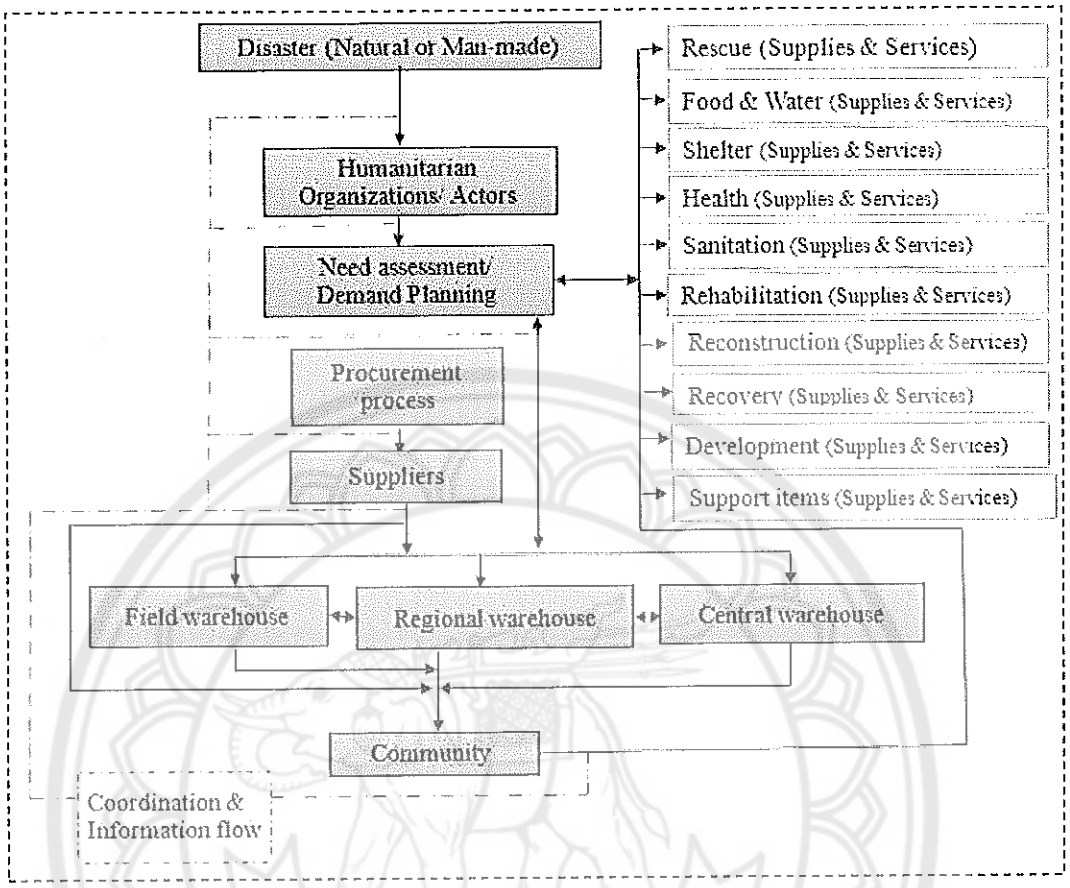

Figure 5 HOs emergency logistics & supply chain management processes

3. Difference between developmental, emergency, and business logistics & supply chain

In the main, HLSCM functions are the same as the logistics and supply chain functions in any business organization that involve a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing, and customs clearance. The functions imperative in disaster operations are more challenging than developmental HLSCM operations, and also quite distinct from the logistics and supply chain management operations of commercial businesses. Some of the important distinctive points about emergency HLSCM, Developmental HLSCM and business logistics supply chain management, derived from the literature, are shown in Table 1.

Table 1 Difference b/w developmental, emergency and business LSCM

No.	Distinctive point	Emergency HLSCM operations	Normal HLSCM operations	Business logistics and supply chain operations	Reference
1	Objectives	To help people and save lives without the objective of profit-making	To help and develop the people, environment, and nature without profit	To maximize profit	[33,42]
2	Demand pattern	Unknown and irregular demand	Predictable with forecasting techniques	Predictable with forecasting techniques	[33,45]
3	Supply pattern	Non-predictable mixed patterns with cash or kind, and in-kind donations	Predictable mixed pattern of cash or kind and in-kind donations	Predictable pattern with a specific product	[33,45]
4	Flow type	Flow of fundamental resources, e.g. vehicles, peoples, food and shelter	Flow of fundamental and specific resources e.g. education, health and awareness	Flow of commercial products	[33,42]
5	Lead time	Immediate demand with no lead time	Predictable lead time	Predictable lead time	[33,45]
6	Delivery network structure	Dynamic structure, voluntary and ad hoc facilitator	Pre-established network with voluntary and ad-hoc facilitator	Pre-established network with location, warehouses and distribution centers	[33,49]
7	Inventory control	Challenging to maintain inventory level	Easy to manage, predetermined demand and supply	Easy to manage, have safety stock and demand patterns	[33,48]
8	Technology and Information	Comparatively low technology, less use of software	Comparatively low technology, less use of software	Highly developed technology with software utilization	[45,50]
9	Performance evaluation	Time of response and number of lives saved	Time of response and number of people helped	Based on standard supply chain matrices, profitability	[33,49]
10	Equipment and vehicles	Robust equipment required	Both robust and ordinary equipment's are required	Ordinary equipment required	[51]
11	Human resources	High-employee turn-over	Project-based high-employee turn-over	Stable, permanent respected career paths	[52]
12	Stakeholders	Donors, governments, military, community and partner NGOs	Donors, governments, military, community and partner NGOs	Shareholders, customers and suppliers	[33,53]

HLSCM studies found in the literature are mainly focused on the relevant operations demanded by natural and man-made disasters and discuss the processes involved in the disaster management cycle. Disasters impact directly on the life, infrastructure, and economies of communities and countries, and there seems to be a general perception that HO functions are only about disasters and disaster relief [54]. Developmental HLSCM operations are often ignored and these have not attracted sufficient research attention, given their importance.

4. Sustainability perspective in HLCM operations

The humanitarian aid adheres the policy of "Do no harm" and its help and support those peoples who are socially, economically and environmentally are underprivileged [55]. The principle of "Do no harm" have various interpretations such as supporting humanitarian aid, hampering development, and not harming the natural environment [55]. The logistics and supply chain management are the instrument which hindering such bigger support of social development by delivering the humanitarian aids efficiently. In humanitarian logistics and supply chain management many of the performance expectations can be understood as sustainability expectations such as saving the lives and decreasing suffering correspond with social responsibility and contribution about longer-term aims of sustainability especially when the struggles combine with the ecological aspects of sustainable development [55]. Following the triple bottom line models the sustainability literature usually differentiated between the economic, ecological and social dimensions of sustainability [56-57].

Active Learning Network for Accountability and Performance in Humanitarian Action has defined that "sustainability is measuring whether an activity or impact is likely to continue after donor funding has been withdrawn" [55]. The definitions have highlighted the broader and long-term impacts of the social interventions, or HOs projects, though, broader concept definitions about sustainability is "meeting the needs of present without compromising the ability of future generations to meet their own needs".

In HO context the sustainability in social perspective represents the long-term thinking for protection of the ecology and the development of intervened society, such as educational development, health sector development or development in the food and its security. Continuity of such developments required the permanent sources and long-term source of funding for making the society more sustainable, now days funding is the obvious concern of HO sector. Beneficiary sustainability refer us toward those person or thing which are directly being benefited through such development or reliefs projects, like the provision of shelters, food, and water to the deprived community. Supply chain perspective sustainability concerns are, HO's should adopt such type of supply chain and logistics modes which more permanent and long term with minimum cost and servicing maximum people [55]. The supply chain and logistics sustainability

perspective is the prime objective of this study. The fourth one perspective is the program perspective which indicates that how program would be beneficial in long run and what could be attain for the benefit of current and future or upcoming society. During the development of any new program, HO sector program departments is responsible to address the society sustainability issues and organizational sustainability issues as well [83].

These four perspectives can be approached through contingency theory, which extends organizational theory by stating that it is not only the organizational structure and strategy that influence organizational performance but also the context [58- 59]. The contingency theory is used in such environment where the uncertainty played a role, though HO sector is most victim of uncertainty because they usually operate in an uncertain setting and their operations are often the ad-hoc nature. The other organizations which organic structure fit best in using the contingency theory are such type of organizations which operates for the projects like consultancy firms [60]. This study is focused on the sustainable development of supply chain perspective which is financially maximum budget consuming part of any HO and usually costing more than 80% of the total relief budgets. Economic and social sustainability are more crucial in humanitarian logistics and supply chain management. Social and cost sustainability in supply chain can bring through effective and efficient logistics and supply chain management system which could possible by adopting agile and lean management techniques in overall supply chain operations. Details about effectiveness, efficiency, agility and lean is discussed below.

Efficiency and Effectiveness in HLSCM

Firstly, the effective management in HLSCM is defined as ensuring the quickest delivery of humanitarian goods, services, and other relief items, within the shortest time-frame [61]. Effectiveness means "doing the right thing" when an emergency situation arises, which is usually without warning, is sudden, and often devastating [61]. HLSCM effectiveness is based on strong coordination between stakeholders, which includes donors, government, military, vendors, communities, and local community-based organizations [62]. To enhance stakeholder coordination and to meet the HOs common goal, many organizations have developed their clusters for

cooperating and coordinating during a disaster, for the provision of humanitarian services. Some examples of such clusters are: the UN logistics cluster, the international search and rescue group (INSARAG), and the urban search and rescue group (USAR) [62].

In HLSCM operations, effectiveness must be a "Plug and Play" concept, meaning pre-determined, well-organized operations that can be put into place with immediate effect, which can only be possible through a well-coordinated, effective flow of information. HLSCM effectiveness means significant savings in goods and services delivery time, which means that more lives are saved [63].

Secondly, efficiency management in HLSCM is the ability to minimize waste, avoid redundancy and duplication of activities, conserve energy, and maximize efforts, while minimizing both time taken and overall operational costs [61]. In other words, efficiency means "doing the thing right" that is applicable in Developmental HLSCM operations. Efficiency in HLSCM processes and actions can be achieved through the most common practices which are as much as 50% of the solution to any problem. Some of the common practices can be, have been, developed as a standard set of guidelines, training syllabi, certification processes and process alignment, especially with appropriate IT systems [64].

HLSCM efficiency means ensuring cost savings that can result in more supplies being available and delivered, resulting in more lives being saved and more people being helped [63]. Efficiency can be achieved through standardization of processes and systems [54]. Thus, to bring both Effectiveness and Efficiency by the understanding of, and application of, both the Lean paradigm and the Agile paradigm, will enhance competitiveness, cost efficiency and time effectiveness in the overall HLSCM processes [65-66].

Agility management in HLSCM

The concept of organizational agility, previously defined according to the international consultancy, McKinsey and Co, manifested as Agile Management (or agility management), arose in the early 1990s, defined by a group in the Iacocca Institute, a consultancy and think-tank located at Lehigh University [67-68]. Agility is an holistic and strategic idea and a "business-wide capability", shedding light on all aspects of a supply chain, including internal organizational structures and trade partners. The major purpose of Agility Management is to bring effectiveness to the overall operations by rapidly meeting uncertain and unstable demand situations in an orderly and well managed manner.

In the case of humanitarian organizations, this clearly means meeting the challenge of sudden disasters. The most important prerequisite to achieving agility is the development of a culture compatible with the agile enterprise. That is, the people side of the supply chain [6, 69]. The key to being agile is at the service level; flexibility and responsiveness, which together are the market winner characteristics of an agile supply chain, as distinct from cost considerations, which are the market winner characteristics of leanness. The humanitarian sector is well known as being expert in agility management by applying various techniques for contingency planning and pre-positioning of inventory. Other techniques recommended for HLSCM agility are strong communication with its partners about the current situation, selection of the suppliers most able to quickly deliver resources, postponement of supplies, buffer stock, creation of third party logistics relationship and formation of emergency response team [70,71]. Being agile in the provision of humanitarian services is a challenging task due to uncertainties, complexities, and the unknown demand for humanitarian services in a timely manner, yet it is almost an imperative in HLSCM, especially in operations of disaster response which usually arise suddenly and in great proportion [63].

Due to increase in disasters, agility interest has attended more focus in both academic and professionals circle of HOs [63]. Humanitarian organizations required the capability of prompt, rapid and effective response to deal with any disaster operations. According to Sheffi [96], supply chain agility is, the ability of any organization to response an uncertain demand or changes. Lee [97], described the major objectives of agile supply chain management is to handle the external disruption and to respond

quickly to short terms demand with flexibility [72-73]. Thus, in case of any disaster, major priority of HOs is to serve the humanity and to save the lives in maximum number. For meeting periodic and short term demands agile supply chain requires interim sources of supplies and employment which cannot be reached through the lean philosophy-low level cost, [74-75]. The agility is not a struggle or only a use of redundant capacity of any single firm, it can be concluded with stakeholder's and overall supply chain efforts [63]. According to Christopher, [190] the agility can be ensured from the clear and strong communication with partners and stake holders about the occurred situation following the given rules [75]:1) preparation of emergency plan, 2) networking with suppliers, 3) contingency stocking, 4) postponement of routine projects, 5) low-cost stock, 6) creation of stable networking, and 7) formation of a relief, emergency implementation team.

Lean management system in HLSCM

Leanness implies improvement in the overall supply chain management systems, focusing on efficiency and cost saving [63]. Lean thinking started in the 1980s, based on Toyota Production System, but the first time the word "lean" was coined was in 1990 by John Krafcik into his master thesis, reported in [76]. Lean management refers to doing more with less resources, and mainly seeks to minimize on-hand inventory of components and work-in-progress, and to move towards a just-in-time replenishment environment [76]. Lean means the elimination of waste and doing more with the less resources. To overcome inventory outage, lean systems thinking recommends that inventory is produced in advance, but primarily for immediate on-hand requirements, and just-in-time availability, with production only weeks in advance at most, as distinct from the more traditional inventory management thinking of eradicating outages by holding inventory months and even years ahead of allocation to production [67].

In HLSCM, 40% of budgets expenditure has been reported as wasted, due to factors such as duplication of ordering, duplication and redundancy of effort, lack of time to carry out effective analysis, and lack of coordination and sequencing of activities. [11-12]. HOs are funded and governed in different ways from different donors who are increasingly demanding proper control and accountability, transparency and

value for money in return for their sponsorship [77-78]. This return-on-investment is possible through improved, efficient, operational performance, achievable by a professional management approach and supply chain efficiency, enabling continued effective use of resources [49].

In operational performance, the interesting part is the transition and shift from agile (speed) to lean (cost reduction) strategy. During disasters, due to the urgency of immediate needs and high levels of uncertainty, all supply chain process must focus on speed, and cost must take a back seat. Once the immediate urgent operations have been achieved, and the continuing needs roles have been defined, meaning better visibility of the process necessary to assist beneficiaries, then efficient cost drivers can be adopted at this stage [77]. In all situations, the legitimacy of the need for efficient HLSCM system, recommends lean management through the integration of local, regional and central level management plans [79].

Developed countries has benefited to their business utilizing LM approaches and have improved their profits, cash flows, customer satisfaction, and market share [22]. In comparison the developing countries economy is still in the improvement process and trying to integrate their business with the lean philosophy [80]. Simultaneously, lean management in HOs is also under discussion and not widely explored as exist in corporate sector [63, 80-81]. Therefore, adoptability of lean management philosophy in HOs sector is much important for the sustainable transformation. Some of the LM studies found in the field of HLSCM are presented in Table 2.

Table 2 Summary of lean management studies in the filed of HLSCM

Sr. No.	Name of the author	Applied Lean Scope	Reference
1.	Andrew Parris	Process improvement, 5S visualization.	[80]
2.	Alessandra Cozzolino	Defined lean principles and application stage	[63]
3	Alexander Blecken	Process modelling	[81]
4	Julie Langer and Kelly LeRoux	Culture and effectiveness	[82]
5	Vikki C. Lassiter	Process improvement	[19]
6	Watcharavee Chandraprakaikul	Lean, agility and CSF	[83]
7	Ben Cairns, Margaret Harris, Romayne Hutchison and Mike Tricker.	TQM, Benchmarking, balanced scored and results-based management	[10]
7	Murray, Paul Ma, and Steve	Planning "Plan your tests and test your plans"	[21]

The organizational efficiency depends on the LM which ensures that HOs are saving the cost and time by reducing wastes. In HOs saving the time could come through agile management which represents the organizations are saving more lives, whereas, saving the cost which could be achieved through lean management represents the organizations is helping the more lives [63]. Lean and agile both can be applied to same HOs' supply chain operations depending upon circumstances. Lean should be dissociated when demand is unpredictable and lead time is high [6, 49, 84-87]. Lean management provides the base for agility which can be achieved from the use of redundant capacity of organizations and strong communication flow among stakeholders [63, 75, 88]. Efficiency and sustainability in HOs resources utilization can be achieved through lean implementation with the assessment of organizational culture and strategic planning [21].

For the support of lean adoptability in HOs, needs a great awareness of different lean approaches and tools for bringing improvement in overall system [19]. A sustainable transformation or successful lean adoptability approach requires to maintain a continuity between existing and evolving organizational culture and management processes [19]. Thus, lean management through organization culture change is a strategic goal and required the improved processes, discipline and committed leadership to overcome internal and external challenges, constantly [19]. The leadership contribution in lean management is management of organizational vision, values, and

focus in term of identifying the customer gaps and is also cultivation of environment for organizational learning and innovation [19]. According to Lassiter, for HOs efficiency needs to determine how their organization structure (e.g. process, mission, culture, leadership etc.) is impacting to their lean transformation ability.

Due to continuous change in the consumer demand, technological developments and increased competition for funding sources HOs required to adopt the lean approach with continuous improvements in terms of sustainability. Through the coordinated approach, processes improvement and leadership environment, can produce a competitiveness in HOs in terms of resource utilization. Furthermore, HOs are the more flexible in adoptability, and innovation is one of their strength. Thus, HOs processes improvement, lean culture practices and innovative ideas may bring the optimization in resource utilizations and can improve the logistics and supply chain management system overall [19]. In response to HOs efficiency and effectiveness pressure, Cairns et al, discussed the quality and critical success factors such as management practices. According to Cairns et al, organization infrastructure is considered important pillars for quality and management practices in terms of efficiency and effectiveness. Organization infrastructure toward quality and management practices are: organization culture, leadership, management practices, and consistency.

Lassiter, expressed, processes management is important for HOs performance, organizations required consistent improvements in processes and need connectivity with existing and new processes involvement in organization culture. Furthermore, that is a challenge for any organization to modify its culture as per consumer demand, improvement only possible through system planning, processes and discipline [19]. Improvement demands change champions and leadership vision, the role of management is more important for bringing any change in the organization culture, it is often a top-down organization approach [19].

According to Murray et al. [21], Worldreader (a non-government organization) implemented a successful lean management through a strategic planning and lean culture. The planning is considered important in lean management but need to reinvent from traditional planning to strategic planning [21]. Worldreader, lean model offered a new adage "Plan your tests and test your plans" means, after construction of planning it should be tested, without experiment the results cannot be concluded. Moreover lean

management has two distinct strain: lean production and lean start-up; lean production is concern with lean manufacturing developed by Toyota, and lean start-up is a set of principles developed in Silicon Valley [21]. Lean production is maximizing organization efficiency with impact of good idea, while lean start-up is assessment of the idea, to know that is worth full pursuing in first place [21]. Through the lean validation, the lean revenues model can be created and adopted to create the sustainable and long term funding streams [21]. Some of lean management critical success factors identified from various lean management definitions are describe in Table 3.

Table 3 Lean management critical success factors

Serial number	Reference	Lean Management Definition/ interpretation	Critical success factors (CSFs)														
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
			Set of processes	Removing wastes	Create the value	Lean is a system	Effect on productivity	Customer focused	Peoples of enterprise	Continuous improvement	Optimum utilization of resources	Commitment	problems Solutions	Change manage	Integration of lean practices	Lean is a philosophy	Supplier & Customer relation
1	[89]	Lean management is a set of processes that add or create value by removing the unnecessary work and preventing future wastes	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-
2	[89]	Lean is a system for identifying and eliminating wastes that affect productivity	-		-			-	-	-	-	-	-	-	-	-	-
3	[90]	The dynamic knowledge-driven, and customer-focused process through which all people in a defined enterprise continuously eliminate waste with the goal of creating value		-		-	-				-	-	-	-	-	-	-
4	[91]	To do more and more with less and less utilization of resources and provide customers with exactly what they want and also offers a way to make work more satisfying by providing immediate feedback on efforts to convert Muda (waste) into value"	-			-	-		-	-		-	-	-	-	-	-
5	[92]	A commitment, a process of continuous improvement that can significantly impact as organizations competitiveness. Lean is a strategic tool for resolving severe organizational problems and can unite several changes.		-	-		-	-	-		-				-	-	-
6	[91]	LS is the production and manufacturing without any waste during the process, waste means anything which occurring but adding no value to the end users			-		-	-	-	-	-	-	-	-	-	-	-
7	[93]	Lean is an integration process of different elements which involve different management practices e.g. JIT, teamwork and cellular manufacturing		-	-	-	-	-	-	-	-	-	-	-		-	-
8	[94]	Lean system is a manufacturing philosophy which focuses on delivering final product with the highest quality, lowest cost and minimum time	-	-	-		-	-	-	-		-	-	-	-		
9	[95, 96]	Lean system is elimination of waste from the process to provide the high value to the customer and lean management is to use minimum everything and with involvement of different departments to produce a final product				-	-		-	-		-	-	-		-	-
10	[27]	A lean system is an approach which requires multi-skilled workers and flexible machines to produce a high variety of products. To utilize minimum resources and acquire high customer satisfaction	-		-	-	-			-		-	-		-		-
11	[22]	An integrated set of principles, practices, tools and techniques designed to address the root cause of operational underperformance.							-	-	-						-

1. Lean management wastes

Organizational competitiveness can achieve by reducing cost and increasing quality by reducing wastes in goods, services and processes. Elimination of wastes is possible after identification of waste, For the identification of waste, the customer perspective is required. This includes understanding what the customer wants, what steps the customer is willing to take, and what the customer is willing to pay for a particular product. In a production process there are many activities which do not add any value to the product but the customer is willing to pay for that non-value added activity, which is considered to be necessary in the production process, rightly or wrongly, and therefore cannot be eliminated [97]. Thus, three types of activities are involved in the value perspective: value added, non-value added but essential, and non-value-added waste activity that can properly be eradicated. The motive for organizational leanness is the identification and differentiation of the three types of wasteful activities, and to eliminate the unnecessary non-value added activities in the production of the product [97].

The Toyota Management System, considered as a leading exemplar, and the seminal proponent, of lean management, included the rigorous identification and eradication of wastes and categorization of activities as value-adding or otherwise [97]. Therefore, the seven types of waste identified from the Toyota Production System and described in the literature include: holding of inventory, transport, motion, waiting, overproduction, over-processing, and defects, with behavioural waste (wasted talent) subsequently added to define the eight wastes of manufacturing. These lean wastes have been validated by many analysts [91, 97-99] and reduction in waste in the situation results in a lean organization, with high performance, high profitability and high level of customer satisfaction [98]. The further outcome of this activity was shorter lead times, shorter cycle times, and the improvement of the overall supply chain [100]. George et al explained the various reasons for the occurrence of such waste, which included poor layout, long set-up times, poor workplace, lack of training, inadequate equipment maintenance, improper methodology, processes that are vague and unstructured, lack of clear information and instruction, lack of planning, delivery and quality problems from the supplier, and poor working conditions. Organizations should understand the lean

management philosophy, sources and types of waste and the reasons for waste, to allow for the development of solutions to the problem by applying the LM principles [101].

2. Lean Management Philosophy and Lean Principles

According to [102], LM is a philosophy rather than a hard set of rules. Lean holistic philosophy is to adopt continuous improvement and to accept organizational changes inevitably brought about by the adoption of this philosophy [102]. Continuous improvements can be made by identifying areas of waste in the overall supply chain system and applying the suitable lean techniques for elimination of that waste [103]. This philosophy requires a clear understanding of the needs of an organization. In order to implement a successful LM it also required to establish a lean supportive organizational culture that includes trust of, and on the part of, employees which empowers them to participate in the organization's decision-making process. A supportive organizational culture will enable the employees to implement the LM principles which include: specifying value, identifying the value stream, creating a smooth flow, responding to customer pull, and striving for perfection by continuous improvement [91,104].

A first LM principle is that value is specified by the customer, and is normally based on these factors: delivery time, product cost, product quality and services [91, 105-106]. In the HO sector, both donors and community members are customers whose needs must be satisfied. Value, however, is not a static concept in this sector as it varies with the nature of HO operations, which may be emergency relief operations in which the customer's perceived value is "timely delivery of products and services", or may be in non-emergency relief operations in which the customer's perceived value is "cost, quality and time" [42].

The second LM principle is the identification of a value stream, and the analysis of that value stream, thus value stream analysis. This refers to the identification of non-value adding activities in supply chain management processes and the establishment of solutions to eradicate or improve those wasteful activities [99]. This value stream analysis can be done using LM process mapping techniques in which all the processes from point of origin to point of consumption, including information management and the physical transformation of resources, are mapped and discrepancies are identified [91, 101, 107].

The third LM principle of smooth flow applies to the production procedures, ensuring the smooth supply of product or service from the point of origin to the point of consumption with minimal disruption or stoppage [91, 108, 109].

The fourth principle, pull system, is the production of supplies on an as-needed basis, and includes the Just-in-Time technique [91, 110]. This strategy conserves resources by ensuring the production and delivery of the maximum amount of useful and usable goods and services to the marginalized communities, rather than being assigned to producing what may be termed Just-in-Case stocks of product.

The fifth and last lean principle is that of continuous improvement of the overall supply chain system and the continuous striving for perfection, with the intention of enabling the organization to produce goods and services with zero waste [91].

Successful adoption and implementation of LM principles requires a cultural transformation within the organization, followed by the maintenance of modified management processes, with discipline and leadership [111]. During this transformation process, it is important to maintain continuity between the existing and evolving organizational culture [19-102]. The pre-existing efficiency and readiness of the organization must be measured in order to determine how the organization's structure and management practices (e.g. process, mission, culture and leadership etc.) impact its potential for lean transformation. Such LM readiness can be assessed through the unique combination of CSFs which are required by that particular sector, and which must be identified and assessed [19, 26-31].

All above discussion about lean management principles has summarized the lean management critical success factors, depicted under Table 4.

Table 4 Critical success factors with reference to lean management principles

Sr. #	Lean principles	Critical Success	References
1	To specify the value	Customer relationship: focus of every organization department is the customer to create the value for the customer to identify their satisfaction. Supplier relationship: the maintenance of flow and pull system is not possible without a strong supplier relationship, the delay and poor quality of the material will force toward the wastes and will cost the organization.	[112]
2	To identify the value stream	Human resource, teamwork, skilled and multi-tasking employees: for problems solutions and achievement of work efficiency with the team involvement e.g. value stream mapping and to specifying the value and problem solving, that is pre-requisite.	[24,142, 122,144]
3	To create the flow	Empowerment and training: the empowerment and training system promotes the sustainable flow and pull in the organization.	[113,114]
4	Respond to customer pull	Good layout: a good layout is the pre-requisite for the smooth flow, poor layout leads toward the wastes.	[25]
5	To ensure the perfection	Efficient management and leadership: for the empowerment of the peoples, and getting the right expectations need to put the person on right job, for the promotion of the trust and encouragement in employees and to invest on the training and development of the staff to promote the lean management system in the organization.	[115]

3. Leagility management in HLSCM

The term "Leagility" was introduced in the supply chain design to avoid or minimize inflexibility and overage in the supply chain by making it lean and agile. Its origins are unstated, but numerous papers addressing supply chain management have adopted the term. Leagility is the ability of an organization to keep balance in agile and lean practices of supply chain management. Leagility management techniques bring efficacy to the overall supply chain management system, combining leanness and agility at an identifiable decoupling point. The decoupling point in supply chain management is the product axis where lean and agile strategy intersect each other for ensuring deliveries according to customer requirements [67]. Implementation of agile does not exclude lean principles; rather; both lean and agile can work within the same supply chain management situation at different points and at different moments [6, 49, 70, 87].

Literature revealed that that the existing studies that proposed Leagility for the disaster management cycle, and which are very relevant to HO disaster management planning and implementation, have not been studied for their applicability to the non-emergency operations of HOs [85]. Leagility should be applied to the detailed activities of HLSCM, and Lean and Agility priorities should be optimized in procurement/

sourcing and distribution into the beneficiary community [76]. No information was found in the literature that examined, tested or proved the achievements in HLSCM by the application of this concept of Leagility, thus it is suggested to have a self-evaluation model to analyses situations before and after adoption of the strategy, and to evaluate the outcomes.

Efficiency that can be achieved through Lean Management techniques has not been explored in detail in academic and professional research areas, while, the effectiveness, which can be achieved through Agile Management, has been given more attention, presumably due to the nature of disasters; suddenness, urgency, seriousness, and therefore of the nature of the demands on HOs; meeting emergencies has been seen as the normal situation in which HOs find themselves. Again, it can be presumed that this is the case due to the nature and scope of HOs disaster management. There has been a perception that 'normal' in disaster situations is not 'normal' as understood in day-to-day operations, yet researchers have not given equal importance to the efficiency of the overall HLSCM operation.

Finally, the sector which is still ignored from the lean implementation is the HOs e.g. non-government organizations which working in the society for the better of the marginalized community. The academics research about lean implication in HOs is limited and not expanded as much as the corporate sector. Exiting work is limited to case studies or single organizations analysis, still need more intention. Most of the organizations which applied lean, adapted "value chain analysis" techniques.

In HOs sector more important thing is the provision of aid on time with optimal utilization of cost, which is only possible through the strong coordinated system. Therefore, overall aim of the lean is to reduce the wastes in process and workplace and improve the overall value of the response with minimum cost and time expansion [116]. Learning from corporate sector services and manufacturing industry this study provided a holistic and specific view for delivering the best possible efficient and effective value addition to non-government organizations. This study supported the sustainability measures for HO sector and implementation of just in time is overhaul with respect the HOs. The term Jidoka by Liker et al. [116] is that for designing the just in time system the foundations of the house provides the stability. Some of the processes are standardized for humanitarian logistics considering the variations in the nature of the

disaster and other relevant instabilities. The resulted model of this study is helpful for the implementation of any projects in the developing countries like Pakistan with considerations of the basic standardizations and customer needs.

Lean and Agile management paradigms in HLSCM

HLSCM efficiency management relates to savings of costs and the reduction of waste in the process, which enables HOs to "serve the maximum lives", while, effectiveness management enables HOs to deliver goods and services rapidly, which is essential in disaster situations, thereby contributing to "save the maximum lives". Each focus area discussed must be seen as being interrelated and each is dependent on the others Figure 6 illustrates the detailed lean and agile management framework.

Emergency response operations are guided by the need "to do the right things" rapidly with the purpose to save the maximum number of lives and to mitigate to the fullest the immediate devastation of the disaster [117]. Rapid, timely, delivery of the right goods and service is possible through quick leadership decision and agile management techniques which are "effectiveness" oriented [23,42]. Usually HLSCM effectiveness and agility management address external interactions e.g. coordination with stakeholders [62] , and HLSCM effectiveness can be assessed by outcomes (i.e. saving lives). To assess disaster response outcomes continuous performance management is necessary [118].

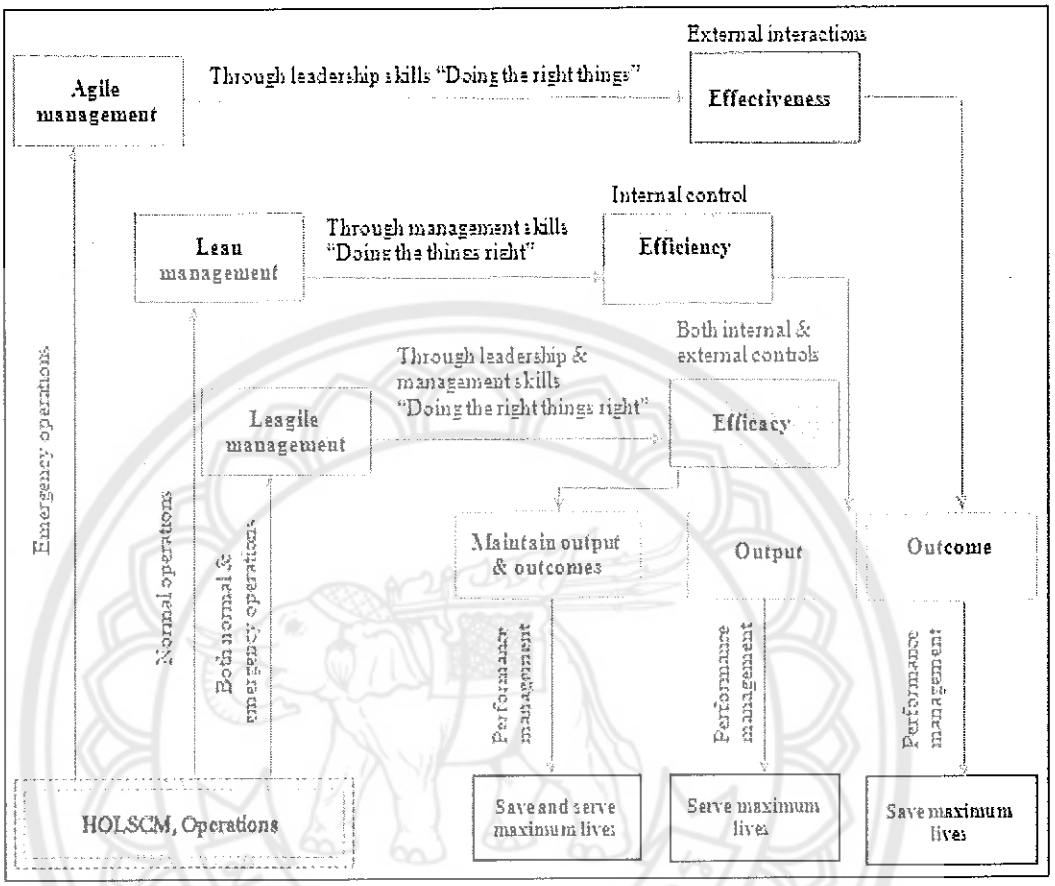

Figure 6 HLSCM, Lean and Agile management paradigms and its framework

Priorities of the non-emergency, developmental and on-going support humanitarian responses are "to do the things right", that is, to deliver the best value for money, with the purpose to serve the maximum number of people at the minimum cost still commensurate with satisfactory quality. This can be achieved through efficiency management which, in HLSCM efficiency management terms, means the reduction in waste, if not the eradication of waste, to provide maximum control over the overall operational cost. This can be attained through skilful management action, based on lean management techniques [23-42]. Efficiency management applies specifically to the organization's internal controls, and efficiency can be measured as the overall cost of outputs. Control of costs and reduction in overall waste can be maintained through continuous performance management systems.

In HLSCM operations, cost efficiency and time effectiveness are both critical for organizational success which can be achieved through efficacy management, which has been previously defined as encompassing both terms: efficiency & effectiveness. In HLSCM, efficacy can be applied in non-emergency (developmental) operations. Efficacy can then be seen as "doing the right things right", a situation that can be achieved by both lean and agile management techniques together, which means leagility management, a term first identified by Naylor, Maim and Berry. Results of efficacy and leagility management can be assessed in outputs and outcomes and, for the attainment of better, or optimal, results, continuous performance management is necessary (Figure 6). This is not to say, however, that both lean and agile paradigms are no longer relevant for enhancement of competitiveness, cost efficiency and time effectiveness in the HLSCM operations: they are! [65-66].

Toyota lean culture and its critical success factors (CSFs)

The Toyota culture encourage their managers to think out of the box for identifying problems solutions and to use the innovative approaches for improvement of organizational system. Toyota puts the efforts for making sure the managers are creative and is committed for the achievement of goals [119]. Liker and Hoseus, says Toyota core competencies are organizational culture, which still have no changes from the time of its origin [120]. According to [136] the Toyota culture is not limited to internal culture only but also included the external stakeholders, e.g. suppliers, customers, investors, communities and employees are major contributor in organization cohesive culture [121]. Every employee in the Toyota is aware about the company future plan and goals, random behaviours are not acceptable everyone performs according to the company goals, principles and philosophy [120].

Young, expressed Toyota makes the small improvements in its plants but makes sure that the employees understand and aware about such constant improvement, this is important for the lean management system [122]. The distinctive feature of Toyota culture is the "learning culture" which linked directly to the customer demand that what's the customer wants and have flexibility to mould them as per customer demand so swiftly [122]. According to Yamamoto and Bellgran, Lean system is "a situation created by force in which people have no choice, but they feel the need for

improvement". Spending most of the time on creating a detailed plans which have no sense for the workers, the organizations should create a sense of responsibility and need of urgency to make a challenge to its workers to rise this sense [123].

Many companies in various sectors have tried to implement the lean system but they failed, the reason was lack of understanding about the lean philosophy and core principles e.g. critical success factors including organizational culture and leadership [115]. Spear & Bowen, suggested some key rules for successful lean implementation, and they declared these are the secret weapons of Toyota lean system: how employees work, how employees connected, how production line is connected and how production line can improve [115]. Toyota LM, CSFs are summarized below in Table 5.

Table 5 Toyota Lean Culture Critical Success Factors (CSFs)

Sr. #	Lean culture critical success factor	Reference	Management practice
1	Respect of the people about their skills and capabilities	[124]	
2	Teamwork (group incentives)	[124]	
3	Humility (encourage modesty, honesty and fairness)	[124]	
4	Employees satisfaction	[105]	Human resource
5	Peoples on job safety & security	[113]	
6	Job security/ no fear of layoff	[113]	
7	Mental encouragement, and empowerment	[113]	
8	Continuous improvement/ sustainable long-term innovation process	[115]	
9	To minimize the waste reducing non-value-added activities from the timeline	[76]	Top management & Leadership commitment
10	First priority is the customer	[115]	
11	To own the things first hand, take the challenges.	[124]	Customer relationship
12	Lean management is a philosophy (Behavioral change)	[125]	Coordination & communication
13	In lean transformation the leadership role is most important	[126]	Leadership
14	Training and education development	[114]	Training and development
15	Supplier relationship	[127]	Supplier relationship

Thus, there are many other traits and attitudes as well which make distinct from others and have driven Toyota toward success e.g. fairness, loyalty and sincerity are the work, willingness to improve, job security, safety at the work place, no communication barrier between workers and managers and equal chance for the promotion toward managerial positions [128]. The above traits helped Toyota to adopt the lean system

successfully, even some of the traits are not easy to imitate and also not exportable to other culture and are customized only with Japanese culture and values [129].

Another distinctive part of Toyota lean system is well coordinated supply chain management, the relationship of supplier and customers. Toyota believes that for meeting customer demand, suppliers are the cornerstone of production system, without a strong relationship with supplier the leanness is not possible in any organization [127]. The involvement of suppliers in institutional practices and processes with aim to transfer the knowledge is reflection of a strong relationship [127]. Furthermore, the communication is one of the big stones of lean system, in Toyota culture there is open communication and complaint mechanism. For coordination Toyota have different administrative bodies e.g. labor management councils, joint labor management, round table conferences, committees and sub committees which regularizing the employees concern with top management and in case of compliant they have hotline as well for employees' convenience [130]. Lean management critical success factors which widely applied by corporate sector are summarized and presented below in Table 6.

Table 6 Lean management critical success factors widely applied in corporate sector

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																														
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	127]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
1	Housekeeping (5s)	The neat and clean work place, well organized in terms of layout, documentation and oral presentation. Everything should	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	Cellular manufacturing	Items should be placed there where required exactly.	✓	✓	✓	✓	✓	✓	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
3	Skilled workers on place	Each process and job should run by the relevant qualified staff.	-	✓	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	TPM	Total productive maintenance is required through a routine maintenance by skilled employee, to avoid breakdown.	-	-	✓	-	-	✓	✓	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-
6	Documentation	The documentation should be simple, clear and includes the complete information including (change, repair, cost, or cycle time etc.). Thus, every point should well documented, the required information.	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-

Table 6 (Cont.)

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																														
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	127]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
7	Production based on pull	The actual internal and external demand should decide the production.	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Problem solving	For continuous improvement the problem solving techniques is mandatory, required to encourage the problem solving with skilled persons, groups.	✓	-	-	-	-	✓	-	✓	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓
9	Benchmarking	For improvement needs to aware about the competitors and should have the benchmark to achieve the top-class performance around the industry comparisons.	-	✓	-	-	✓	-	-	-	-	-	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Standardized activity	All the activities, processes, documentations should be standardized and clearly understandable to avoid the waste.	-	✓	-	-	✓	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	✓
11	Visual management (VM)	Required the skilled peoples, and flexible a visual management technique required to save the time, resources, and required lead time.	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	✓

Table 6 (Cont.)

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																														
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	127]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
12	Understanding the customer	The organizations must should aware about their customers, including value for the customer, to what price and quality the customer is agreed to attain maximum utility.	-	-	-	-	-	✓	-	-	-	-	-	-	✓	-	-	-	-	-	✓	✓	✓	✓	✓	-	✓	-	-	-	-	-
13	Customer involvement & feed back	The organizations required to build the strong relations with customers to understand their issues, changes in demands, and for trouble shooting the supply chain and other product relevant issues. To attain the best level of customer loyalty and should involve the customer feedback system as well.	-	-	-	-	-	✓	-	✓	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	✓	-
14	Quality suppliers	The involvement and strong relation with supplier is as important as with customer, for timely delivery and productions the supplier is the key contributor. Thus, should have strategy to deal with suppliers' strategically.	-	-	-	-	-	✓	-	✓	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	Supplier location	For JIT implementation the location is important matter, for receiving the material timely for ensuring the delivery timely.	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-					-		-	-	-	-	-

Table 6 (Cont.)

Sr. #	Lean critical success	Definitions and interpretation	Reference																																			
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	127]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
16	Number of suppliers	Many researchers recommended the single suppliers for attaining the strategic relations in terms of spending the best value of money through a strong negotiations' powers.	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-
16	Supplier relationship	The relationship is the critical subject, it required to be strong but open with some strategic organization policy.	-	-	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	✓	-
17	Supplier Involvement	May researchers recommended it strongly for attainment of technical inputs in terms of design, inventory management and quality aspects.	-	-	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	✓	-
18	Supplier feedback	The regular feedback will help to reduce in mistakes and will improve the relationships	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-
19	Participation of employees	For continuous improvement the employees' suggestions, feedback and other system improvements information and strong coordination is mandatory for LMS.	-	-	-	-	-	✓	-	✓	✓	-	-	-	✓	-	✓	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓
20	skilled workers	For LMS the employees' skills level should be multi-tasking and satisfactory for system improvements.	-	-	-	-	-	-	-	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 6 (Cont.)

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																														
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	127]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
21	Training	For employee's development the training is required skilled for problem solving and multi-tasking, cross sectional responsibilities.	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	✓	-	-	-	-	✓	-	-	-	-	✓	-	-	-	✓	-
22	Motivation	For creativity and innovative ideas, the motivation is mandatory, can be implemented through clear rewarding system.	-	✓	-	-	✓	-	-	✓	-	✓	-	-	✓	-	-	-	-	-	✓	-	-	-	-	-	✓	-	-	-	-	✓
23	Teamwork	Teamwork is needed in a LS as it will help employees to share knowledge and Ideas. It also creates challenges between workers, which can serve to motivate them.	✓	-	-	-	-	-	-	✓	-	-	-	-	-	-	✓	-	-	-	✓	-	-	-	-	-	✓	-	-	-	✓	-
24	Visible management	A significant role of the management is required to motivate the employees and should be committed for improvement	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Knowing people's capabilities	In order to best performance of the employees required the job fit, capabilities of the employees and right person at right place with best match.	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-	-	-

Table 6 (Cont.)

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																														
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26	Job security	For employee's commitment and trust "life time employment policy is required". Toyota believe job security push the creativity in employees.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-
27	JIT	To follow the demand pull system, just in time delivery of supplies and goods.	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	Cellar design	Cellar design is the stocking layout of the goods, tools and equipment as per required utilization hierarchy e.g. material, tools, information, raw material, spare parts etc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-
29	Point of use storage (POUS)	The material, goods, tools, procedures, information standards, equipment, formats and documents should be stored at such places where that is mostly used.	✓	✓	✓	-	-	-	-	-	✓	✓	✓	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Reduction in the batch sizes	it can reduce the work in process (WIP) and lead time which discharge the positive impacts on overall cycle time.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 6 (Cont.)

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																														
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	[27]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
31	Communication Management	The effective communication in between the internal and externals should be clear, and well-coordinated for reducing the waste in time and resources.	✓	-	-	-	-	-	-	✓	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	-	-	-
32	Process integration	To integrate the procurement, logistics, finance and other relevant processes	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
33	Management of employees	The overall management of employees including benefits, compensation and development etc.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	-	-	-	-	-	✓	-	-	-	✓	✓	✓
34	Risk management	Management of risks involved in businesses including financial, environmental and social risks	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
35	Stakeholders management	Management of all stakeholders including the suppliers, customers, donors, etc.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	-	-	-	-	-	-
36	Top management	The management, which have the decision-making powers.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	-	-	✓	-	-
37	Value stream mapping	To map the current state of business for identification of problems, challenges.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	-	-	-

Table 6 (Cont.)

Sr. #	Lean critical success factors/	Definitions and interpretation	Reference																													
			[131]	[102]	[100]	[102]	[132]	[133]	[123]	[29]	[134]	[135]	[136]	[122]	[137]	[138]	[139]	[140]	[131]	[141]	[142]	127]	[143]	[144]	[145]	[112]	[146]	[147]	[25]	[148]	[149]	[150]
38	Dominant Characteristics	To identify the major, critical factors to evaluate the organization lean culture.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	-	-
39	Leadership	Leadership is the key factor for continuous change management in organizations lean culture.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	-	✓
40	Organization glue	Organization vision, mission is the key evaluation part for lean culture development	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	-	-
41	Strategic emphases	Organization strategic goals, decisions emphases are main lean culture contributors.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	-	-
42	Criteria of success	Organization success criteria is important (increase sales, profit, quality)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓	✓	✓	-	-
43	Continuous improvement	The organization culture required management vision for a continuous improvement.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓	✓	✓
44	Respect for peoples	To honour the employee's skills and self-esteem, to encourage and listen their problems.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	✓

Summary of literature review

The concept of humanitarian organizations (HOs) has ancient roots and is admired in both Western and Eastern civilizations. A common theme of HOs is service to humanity in a spirit of impartiality and neutrality without discrimination. Logistics and supply chain management identified most critical part of HOs operations and has required sustainability in terms of cost and time efficiency, which can be bring through the lean management practices. Therefore, the detailed discussion on five major areas (mentioned in first paragraph of this chapter) had identified notable research gaps which can be entertained in this study and also can include for further future investigation.

This chapter is a reproduction of an article published in the journal LogForum with the citation: Shafiq, M. & Soratana, K. 2019. Humanitarian logistics and supply chain management-a qualitative study. LogForum, 15. The article appears as published per the copyright agreement with LogForum, publisher Poznan School of Logistics (Poland). Therefore, some of the notable research gaps identified from this literature review are presented below.

Notable research gapes

Thematic analysis identified a significant gap in the literature, that of *efficiency management* in non-emergency HLSCM operations, which are largely ignored, even though the challenges and issues of disaster response and aid management are well reported. Our view is that more research attention to operational efficiency, particularly of non-emergency operations, is required.

Previous HLSCM studies have presented a variety of frameworks for Agility management, and Efficient management, as discussed before, but few of these frameworks been well tested, and few have been adopted. No quality assessment and assurance frameworks have been assessed for their adherence to standardized frameworks within either ISO or the humanitarian sphere. Most studies have presented HO-Business partnership frameworks, but none presented a standardized model which may be applicable to every HO in pursuance of *effectiveness* and *efficiency*.

Relevant studies and frameworks for HLSCM operations (procurement, inventory, fleet) presented various measures to promote *effectiveness* but there is a lack of research on operational *efficiency*. Fleet management of HOs under non-emergency

conditions lack research on optimizing resources, and no studies were found that provide guidance to organizations' on developing good relationships management and supply efficiency, such as that which can be achieved through short term engagement of suppliers. HOs objectives are the same but HLSCM policies and implementation procedures vary significantly. Standardization of policies and procedures is a notable gap in the research which may enable proactive measures to be taken to bring about efficiency in HLSCM.

Leagility management is an important tool for bringing both *effectiveness* and *efficiency* in HLSCM, and the boundaries between Agility Management and Lean Management need to be redefined in detail for both disaster and developmental HLSCM operations alike. Furthermore, *Lean Management* is an ignored area in HOs activities and very few studies on organizational *efficiency* were found, indicating a need to more extensively explore *efficiency* and *Lean management* in HLSCM.

CHAPTER III

RESEARCH METHODOLOGY

A combination of qualitative and quantitative approaches was applied in four different phases of this study. Phases I and II mainly used qualitative approaches, while Phases III and IV mainly used quantitative approaches. The qualitative approaches were a review of literature and semi-structured interview which were analyzed through content analysis technique. The quantitative approaches in Phase III and Phase IV were applied to validate the LRAM and its application on NGOs working in Pakistan. The data were collected through questionnaires survey. The quantitative results were drawn through structural equation model using various statistical techniques such as Cronbach's alpha, Composite Reliability, Average Variance Extracted, Path coefficients and R Square. Statistical software's used in this process were "SmartPlsm3" and "statistical package for social sciences (SPSS)". The results of each phase served as a foundation for development of other phases as illustrated in Figure 7.

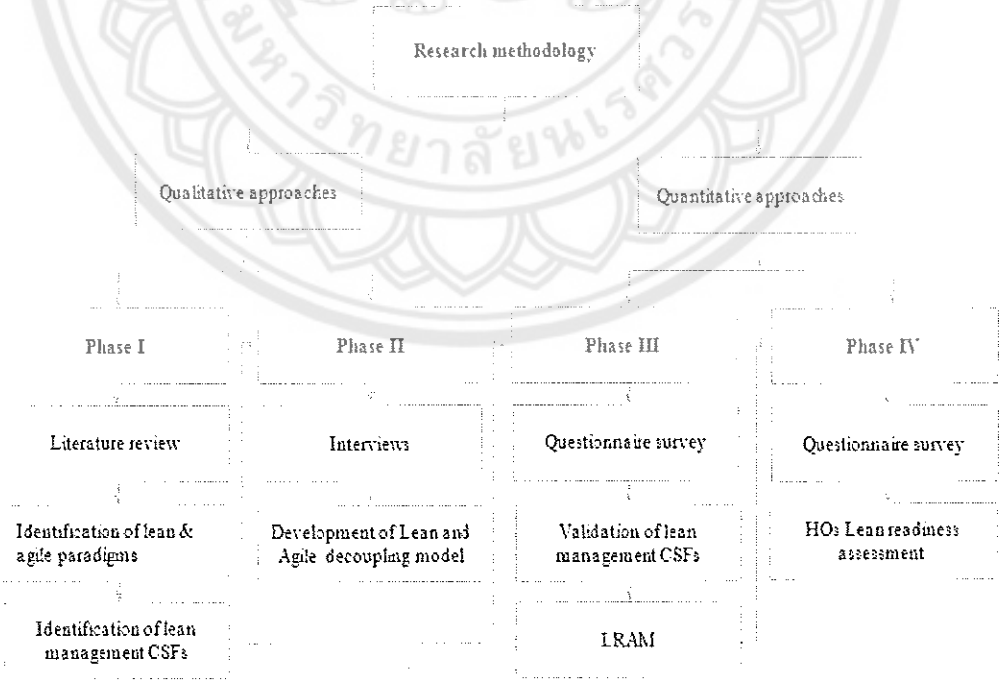

Figure 7 A schematic diagram of research methodology

In Phase I, a comprehensive systematic literature review on HLSCM, lean management and agile management was conducted to identify various lean and agile management notable research gaps.

In Phase II, lean and agile paradigms were used to frame lean and agile decoupling point model for HOs' different emergency and developmental operations. The identified decoupling points were validated by the qualitative results from an in-depth interview.

In Phase III the LM, CSFs were identified and were used to frame a conceptual "lean readiness assessment model". The LRAM factors identified were validated by the quantitative approach conducting an extensive questionnaires survey, with the responses analysed using the structural equation model in Smart-PLSM. The factors that proved to be positively relevant were considered for inclusion in the assessment model of lean readiness of HOs.

In Phase IV, another quantitative survey was conducted among HO professionals in Pakistan to examine the lean management readiness of HOs operating in that country, using the framework proved in Phase III. The conclusion and recommendations with the possible reasons for an HO adopting, or not adopting, a lean management approach, were also derived in this phase.

Phase I: Identification of Lean and Agile paradigms and Lean CSFs

The goal of this phase was to identify various lean and agile paradigms and lean management CSFs for HOs. Different lean and agile paradigms were identified based on the comprehensive literature review of the research on leagility and existing decoupling point models.

Lean management CSFs were identified through review of the elements and characteristics of LM and identifying existing frameworks for the assessment of LM implementations in manufacturing, government public service, and the HO sector. The lean elements identified includes what are termed the lean pillars, lean principles, lean techniques and the wastes in processes that lean management seeks to eradicate. Using this model, HO professionals are able to assess the organization's readiness prior to attempting the implementation of lean management techniques. An assessment of readiness is important for predicting the success of leam implementation.

Secondary data on Lean, Agile and LM elements and its different frameworks were collected to inform the subsequent development of the LRAM concept, with the focus on peer-reviewed articles and books. Data was collected from online databases including Science Direct, SCOPUS, Web of Science, Emerald, and Google Scholar, using different key terms such as "lean management elements", "agile management", "Leagile management", "lean management critical success factors" (CSF's), "lean frameworks", "lean readiness", and "lean assessment tools", in manufacturing, government and the HO sector. Only articles discussing Lean and Leagile that were specifically relevant to our topic were selected for further scrutiny and analysis.

The CSF's included are relevant to the organization's culture, the organization's policies, and the standard operating principles applied in both their internal and external management policies and practices. The CSF's for the corporate sector's lean readiness assessment models were identified and modified as appropriate for HOs. The CSFs identified were modified as necessary and conceptualised in the LRAM appropriate in the HO context.

Therefore, factors identified and included in the LRAM were processes management, customer relationship management, supplier relationship management, human resource management, and communication/coordination management.

Phase II: Development of Lean and Agile paradigms decoupling point model

The purpose of Phase II was to identify and understand the lean and agile paradigm decoupling points in both emergency and developmental operations of HOs. By visiting websites of non-government organizations (NGOs) their thematic areas were identified to know the critical importance of lean and agile paradigms in HO sector. Thus, this phase comprised two steps; the first step being the identification and justification of the need for the Lean and Agile paradigms in the HO sector. The second step was the development of the Lean and Agile paradigms in terms of the HO sectors particular requirements.

In Step 1, the potential of the Lean and Agile paradigms were determined by collecting, analysing and comparing the information from the websites of different HOs on the operational and thematic areas described or implied in those websites. The HOs included in the search included only International Non-Governmental Organizations

(JNGO's), 88 in all randomly selected from the results of a search on Google, and from the United Nations Organization website.

A comparative descriptive analysis was derived, based on the Lean and Agile qualifiers and enablers identified, together with the scope and thematic areas indicated. These were divided into two major categories; the developmental operations, and the emergency operations. Based on this analysis, the Lean and Agile paradigms particularly applicable to HOs were designed. These were then decoupled utilizing the two-matrix model approach and a broad level Lean and Agile decoupling model.

Second step of the study was development of Lean and Agile paradigms by mapping HOs logistics and supply chain management processes involved in both disasters/emergency supply chain management and developmental logistics and supply chain management. To map the HLSCM processes, interviews and discussions were held with seven professionals experienced in HO logistics and supply chain management, who were selected on the basis of having more than 5 years' experience in these operational areas in international humanitarian organisations. From the infinite population the purposive sampling was used and at least five years middle management level respondent was contacted. After conducting five interviews the information was started to repeat and was overlapped, though after seven interviews we stopped to conduct further interviews. Each professional was interviewed for up to an hour. The information elicited in these interviews regarding the development operations of the HO was characterised as, and divided into hard components and soft components, and the emergency operations were divided into sudden onset disasters and slow onset disasters.

Using the decoupling points approach, a detailed Lean and Agile Decoupling Point (LADP) model was developed. In this model, HLSCM activities were identified in detail and the areas of HLSCM that had been previously overlooked in the literature were highlighted.

Phase III: Development and validation of LRAM

Phase III is the development and validation of LRAM factors through collecting observations of HOs professionals. Observations was collected through questionnaires survey, which were developed based on the CSF's and lean elements identified in the literature review. The data was analysed through Smart-Plsm3. Details

of all research process e.g. definition of the population, sample of population, sampling techniques, data collection techniques and data analysis techniques are described below.

1. Population and sample

The population considered in this study was professionals in both national and international organizations. According to James Stevens' general rule for sample size, 15 cases per predictor in a standard ordinary least squares multiple regression analysis are required [151]. Following the Stevens' general rule, the total required responses was calculated to be 135 (15x9=135) HOs professionals. Priority respondents were HO professionals who had a minimum of two year's work experience [151]. To include a respondent in the the survey the potential respondent was required to be a full-time volunteer or paid employee of an HO who was willing to participate in the survey.

2. Sampling techniques

Purposive sampling techniques were used for data collection. The relevant HO professionals, those who had previously participated in the Logistics and Supply Chain management of an HO, in a professional capacity, were contacted for their responses. To achieve the maximum response the snowball sampling was also adopted. Snowball sampling is the chain sampling method using references to collect the information and data; respondent A would be a reference to approach respondent B for a completion of the targeted sample, for example. A general principle applied was that all responses would be held in strict confidentiality with all respondents' identities, and that of their organization, remaining anonymous.

3. Data collection & its techniques

Data was collected by the questionnaire survey technique, with direct approach to the HO professionals who had previously agreed to participate. The questionnaires were based on a 5-point Likert scale to provide reliable numeric results for statistical analysis. The respondents' perceptions of and intents while participating in their HO's CSFs, organizational culture and lean readiness, were identified and rated on the 5-point Likert scale. Likert scale responses consist of 1, 2, 3, 4 and 5: for strongly disagree, for disagree, (3) for neither agree nor disagree, (4) for agree and (5) for strongly agree.

4. Data analysis

The component based partial least square structure equation model (PLS-SEM) was employed to validate the LRAM. The context-driven predictions are the primary reasons to use PLS-SEM to estimate relationships between the latent (dependent) and exogenous (independent) variables under inquiry. The SmartPLS 3 software was used for validating the structural model. The validation process started by testing the uni-dimensionality of the constructs through exploratory factor analysis with varimax rotation (squared correlation with factors). Factors with low loadings were removed and the factors that were retained were used for further analysis. The significance of each factor, that is the individual factor's similarity with the responses from others, was assessed to identify the variance in each individual responder's opinion. Descriptive statistics (mean, standard deviation etc.) were used to measure the significance of each factors. To test the hypotheses, PLS analysis was used to estimate the regression weights, t-statistics and adequacy of the model by R2 values. Model construct reliability was assessed by using Cronbach's alpha and composite reliability, while, construct validity was assessed using convergent and discriminant validity.

Phase IV: HO's Lean Readiness Assessment by using LRAM

Phase IV of this study was a quantitative assessment of HOs lean readiness, through questionnaire survey. In this phase, the LRAM developed in Phase III was utilized to assess the lean management system (LMS) readiness and existing situation of the NGOs' working in Pakistan and represented in the survey. The required data, samples and step-by-step analysis techniques for the NGO's quantitative readiness assessment, were divided into five steps: 1) population and sample selection, 2) identification of appropriate sampling techniques, 3) data collection, 4) validation of data collection techniques, and 5) data analysis.

1. Population and sample

The sample considered in this study was drawn from the population of registered and government authorized national and international NGOs working in Pakistan. According to the Pakistan Center for Development Communication (the PCDC), more than 700 registered national NGOs and international NGOs operate in Pakistan [152], which includes is almost 600 national NGOs, and about 100

international NGOs. Of the 100 or so international NGOs, 66 held a NOC (non-objection certificate). Only these were considered as population in this study.

All NGOs, both international (INGOs) and national (NNGOs), included in the study had more than 10 years active presence in Pakistan, as at December 2017, and had implemented more than 10 projects with local and international staff during that 10-year period. A further requirement for selecting the participants for our study included that the organizations were currently involved in more than 4 projects in progress, employing at least 30 employees, and operating in 2 or more of the 4 provinces of Pakistan. Based on these selection criteria and restrictions, only 19 NNGOs and 15 INGOs from the top 50 NGOs, as ranked by the PCDC, were included in the study

A questionnaire survey was conducted with supply chain and logistics management professionals, such as department heads, managers, coordinators, and officers with a minimum of 2 years of NGO work experience and were currently a paid employee of an NGO who were interested in the topic of lean management and had voluntarily agreed to participate in the questionnaire survey.

2. Sampling techniques

Both snowball and purposive sampling techniques were used for data collection. Snowball sampling, the chain sampling using references to collect the information and data. An important aspect of using this method was that any participant felt confident that they had been selected based on the recommendation of another participant and were not somehow under official scrutiny from any government department or agency.

3. Data Collection

To assess the current state of an NGO in terms of lean management, primary data relevant to the NGO's lean management system (LMS) was required. The data was collected through a questionnaire survey, using the questions that had been tested for relevance of ease of understanding in a pilot study. This primary data included data on the current management practices of each NNGO and INGO allowing the organisational type to be a relevant variable in the survey. It is emphasised that the collected information was kept strictly confidential and never disclosed without the specific permission of the respondent and organization.

4. Data collection techniques

In this study, the quantitative data relevant for the readiness analysis was collected through a questionnaire survey, with the questionnaires being distributed by email, with email responses. The questionnaires were based on the 5-point Likert scale to provide reliable numeric results for statistical analysis. The respondents' perceptions of, and intentions in applying the LMS within their NGO, were identified and measured using the Likert scale. The Likert scale responses of 1, 2, 3, 4, 5 and 6 representing 0%, 20%, 40%, 60%, 80% and 100% level of adoption of the particular LMS process within their NGO. Detailed discussion of the responses is given below in the data analysis techniques section.

5. Data analysis techniques

Quantitative data was analysed using Statistical Package for Social Sciences (SPSS) by applying descriptive analysis techiques. Mean values drawn through descriptive analysis were converted into percent manually using Miscrosoft excel worksheet.

5.1 Descriptive analysis

In this analysis, the mean value of the data was compared with the criteria defined by Paul Myerson [25] for lean readiness analysis.

A mean value between 0% to 20% indicated that the organization in question had a traditional supply chain and logistics management system and was not ready to implement an LMS successfully. The organization was considered to need time to develop its lean management foundation through amendments to its culture.

A mean value between 20% to 40% indicated that the organization was nearly ready to implement an LMS and an adequate foundation to adopt LMS was present in the organisation.

A mean value between 40% to 60% indicated that the organization was ready to implement an LMS, or already had an LMS in progress, and therefore there was good awareness and a good foundation for adopting or successfully proceeding with, an LMS, with a positive organizational culture.

A mean value between 60 % to 80% indicated that the organization had a high level of readiness to successfully implement an LMS, whereas a mean value between 80% to 90% identified the organization as having already applied a fully

operational LMS and was fully aware of the need to apply it to continue the consistent improvement in the logistics and supply change operations. Finally, an organisation rated with a mean value between 90% to 100% meant that that organization had a best-practice lean management system in place and could be considered as a lean leading organization.

CHAPTER IV

RESULTS AND ANALYSIS

This study comprises of four research objectives and four research phases. The first Phase was the literature review and its results and analysis has been discussed in Chapter 2, (notable research gaps). The results and analyses of the remaining three phases presented below which describing each research objective.

The second Phase presents lean and agile paradigms for emergency and developmental operations of HOs, which were developed based on literature review of HOs scope and thematic areas. The boundaries for lean and agile paradigms were also identified and lean and agile decoupling point (LADP) model was developed. LADP was developed based on content analysis of in-depth interviews. A detailed description of each result is given below in Phase II.

The third Phase presents the LRAM. A hypothetical framework was developed through literature review and was validated through PLS-SEM. The data was collected by questionnaire survey of HOs professionals and results are presented in structural and measurement models. The outcomes values included: measures of outer loadings, Cronbach's alpha, Composite reliability, correlation, path coefficients, t-values and p-values. The details of these results presented below in Phase III.

The fourth Phase presents the practical implication of developed LRAM through assessment of NGOs lean readiness, working in Pakistan. Detailed results of readiness or non- readiness are presented below Phase IV.

Phase II: Lean and agile paradigms for emergency and developmental operations of HOs

In this study, the term lean and agile paradigms are defined as the applicability of lean and agile management techniques at various types of HOs operations (emergency and developmental). Lean and agile paradigms prioritized based on HOs scope and thematic areas (Section 1).

The decoupling points are various situations where one paradigm could be suspended to prioritise the second one (agile) for achievement of the HLSCM operations overall efficiency and effectiveness. In this section, we have developed two decoupling models (Figure, 9 and Figure 10) which presented various decoupling points where lean and agile paradigms can be prioritised.

This Phase of analysis is a reproduction of an article published in the journal LogForum with the citation: Shafiq M., Soratana K., 2019. Lean and Agile Paradigms in Humanitarian Organizations' Logistics and Supply Chain Management. LogForum 15 [153], 139-153. The article appears as published per the copyright agreement with LogForum, publisher Poznan School of Logistics (Poland).

1. HOs scope and thematic areas

Traditionally, scope and thematic areas of international HOs were limited to disaster (natural & manmade) responses in affected countries through provision of relief and basic life necessities (e.g. food, water, shelter and health) [36]. Later, with globalization, the scope and thematic areas have extended to development of deprived community through education, infrastructure, awareness and capacity building. Thematic area denotes HO products (services, goods, and works) which they are offering for betterment of society, e.g. education, health, livelihood, disaster management, human rights, women's empowerment, old age rights, child care, sustainability and poverty reduction. Priority of Lean or Agile application for delivering products can be decided through identification and categorization of thematic areas. For identification of organizations thematic areas, a review of the websites of international NGOs were held. The organizations' websites review results show that more than 79 organizations out of 88 are engaged in both disaster management and long-term development operations. A sample of derived results is shown in Table 7. The results show that the role of HOs is not limited to disaster response, but is extended to strategic partnership for long-term development of society [53]. The examples of strategic partnership are United Nations Organization (UN) partnership with HOs for achievement of sustainable developments goals and corporate logistics companies partnership for enhancement of HOs response capability (e.g. Agility, TNT and UPS) [7].

Table 7 International HO's thematic areas

Name of HOs	Web address	Scope/thematic areas	
		Developmental	Emergency
Sight Savers	www.sightsavers.org	Protecting sight & fighting for disability	Not specified
SIF	www.secour-islamique.org/	Providing people with the means to be independent	Responding to the basic needs
Muslim.H	muslimhands.fr	Supporting communities in the long run	Providing immediate help
Relief Int	www.ri.org/	Education, economic opportunity	Providing health and emergency basic needs

2. **Agile and Lean paradigms**

In disasters/emergency situations, Agility is required in terms of time effectiveness. In such situations search, rescue and provision of basic life necessities like food, water, shelter and health needs precise time management. Despite emergency situations HOs are involved in developmental activities to uplift the deprived (socially and economically) communities, as presented in Table 7. To achieve sustainability in the HO's operation, Lean management can play an important role through implementation of strategic partnership and developmental projects. The major developmental scope found on international HOs websites comprises on education, poverty reduction, livelihood, child care, woman's empowerment, youth leadership, and support to disabilities. Using two matrixes model, the boundary of Lean and Agile paradigms is defined and presented in Figure 8. Two matrix model explains emergency scope of HOs operations required high level of Agile paradigm, whereas, developmental scope required high level of Lean paradigm.

3. **Decoupling point model**

Decoupling point recommends most suitable supply chain processes and practices. When the priorities of processes and their boundaries are well defined, the real opportunity of Lean and Agile strategies will be increased using decoupling point for employing hybrid Lean and Agile supply chain management [23]. Previous studies indicated that decoupling point approach has been applied in emergency part of HOs scope, for Lean and Agile paradigm boundary identification, but the models are limited to disaster management cycle (preparedness, immediate response and reconstruction) and emergency supply chain management processes (donor, HO, sourcing and distribution)

[44-154]. This study presents decoupling model for both developmental and emergency scope defining boundaries between Lean and Agile management for various HLSCM processes.

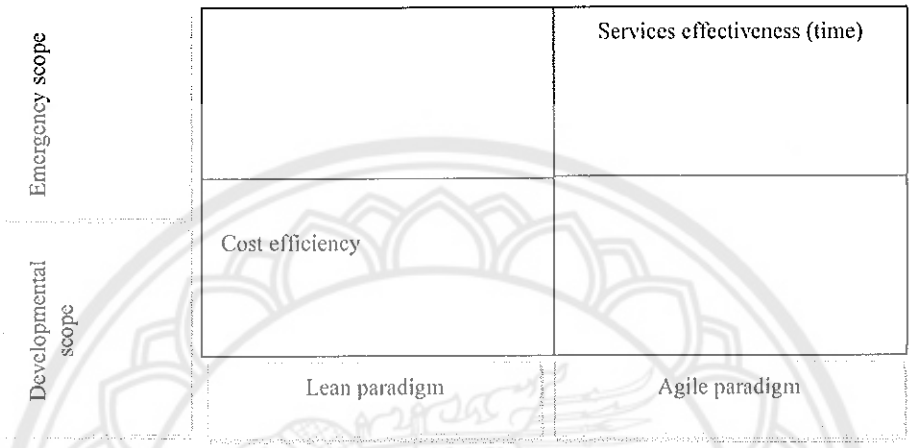

Figure 8 Lean & Agility paradigms

3.1 Decoupling of organizational scope in broader terms

Thematic areas/scope analysis found that out of 88 HOs 90% are involved in both emergency and developmental activities. In this study decoupling of HLSCM has been proposed in broader terms as shown in Figure 9. The boundary between emergency and developmental areas for Lean and Agile application is defined through decoupling point approach. For carrying out emergency operations Agile application is more appropriate, while, Lean management paradigms should be applied for developmental scope. While considering the broader scope of HLSCM Lean and Agile application the internal processes of both emergency and developmental scopes have not been explored in this part of model.

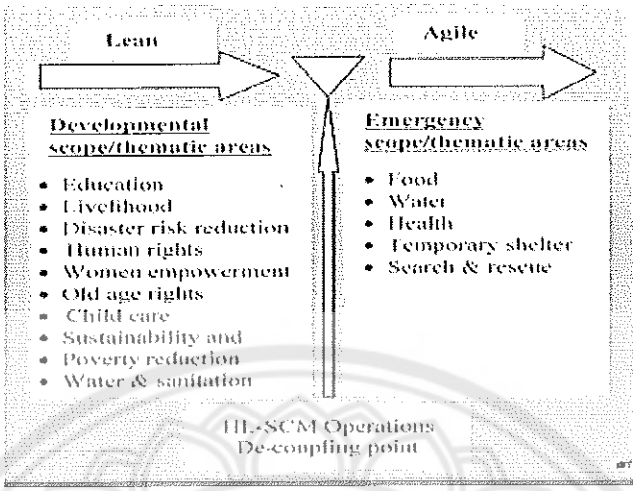

Figure 9 HLSCM, Lean & Agility paradigm decoupling point model

3.2 HLSCM, Lean and Agile Decoupling Point (LADP) Model identified developed through interviews

Discussion with HOs professionals were carried out to identify developmental and emergency HLSCM processes (cycle). HLSCM decoupling points were defined according to urgency of each process based on the professionals' interviews. Developmental HLSCM processes were divided into hard components and soft components. HLSCM hard components represents supply chain management of visible-deliverables of HOs such as supply chain of infrastructure related materials, equipment and other supplies. Whereas, capacity building, policy making, human rights campaigns, education and health services etc. represents soft components of developmental HLSCM processes. Developmental components of HOs require efficiency in resource utilization (procurement, warehousing and fleet management), but due to time bounds need effective distribution of goods and services. Thus, Lean (which gives efficiency) is proposed to be used for developmental processes from procurement to fleet/transportation, while, Agile (which gives effectiveness) is proposed to be applied for distribution related processes as shown in Figure 10. Legends are described that green dotted line represents the Lean, while, red dotted line represents the Agile boundaries.

Emergency HLSCM processes are divided into sudden onset disasters and slow-onset disasters. Earthquakes, explosions, fire, landslides etc. are considered sudden onset disasters, whereas droughts, diseases, climate change are considered as slow

onset disasters. In sudden onset disasters (especially in initial 90 days) Agility is more appropriate because priority is to save the time instead of cost. After 90 days the priority may change making the Lean application possible for certain processes. Slow onset disasters require adoption of Lean strategy until transportation/fleet process, however, for distribution process Agility paradigm will be appropriate. Decoupling points between Lean and Agile paradigms in HLSCM processes are presented in Figure 10.

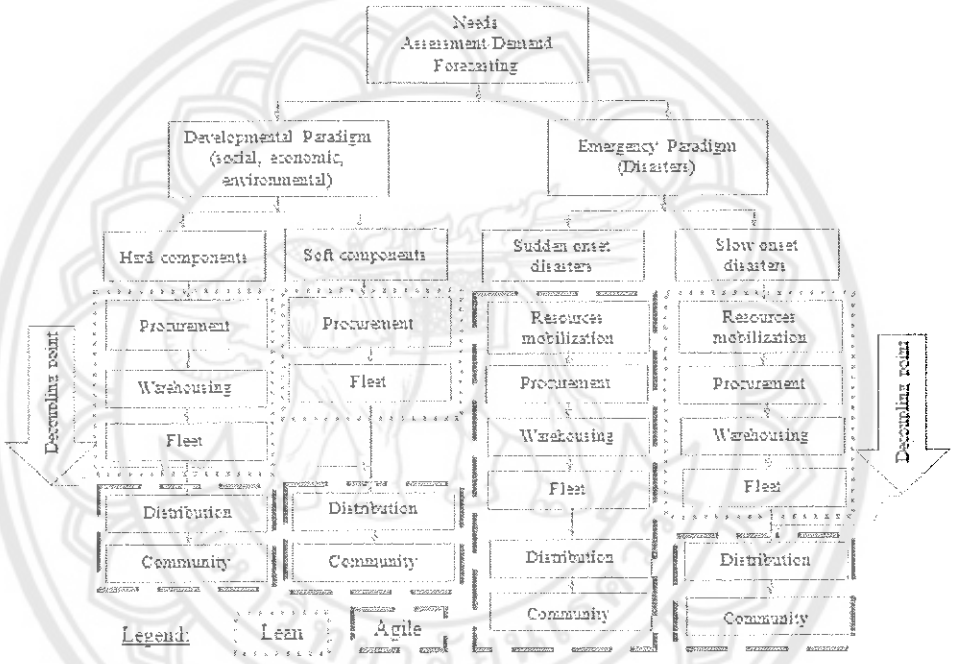

Figure 10 HLSCM, Lean & Agility de-coupling point model

4. Concluding summary of objective one

The scope/thematic area analysis showed that 79 out of 88 organizations were dealing with dual scope (developmental and emergency). It was found that the developmental scope was higher than emergency scope in these organizations, but developmental scope got less attention in academia and professionals' research. Application of Lean was found most appropriate for developmental HLSCM in contrast to emergency paradigm. The Agility needs to be applied to emergency scope/thematic areas where the time is more important and requires immediate and effective measures. The identified boundaries of Lean and Agility will be useful for making HLSCM

operations more effective and useful. A basic model is developed for HLSCM processes of the developmental and emergency scope using two matrix model and decouple point approach. Further, decoupling points are identified and proposed for developmental and emergency HLSCM processes and are framed in a comprehensive model. Application of Lean management (cost efficiency) in HLSCM of HOs can bring many benefits and should be explored further to make HOs operations more efficient and sustainable.

Phase III: Development and validation of Lean Readiness Assessment Model

Objective three of this study was the development of "Lean Readiness Assessment Model". In this section the CSFs identified in hypothetical framework (Figure 2), that have been validated empirically by the collection of the views, opinions and observations of the HOs professionals through the questionnaire survey. The data were analysed using the SmartPlsm 3, software. Validation of each variable has done empirically. The latent, exogenous and moderating variables was processed through the implications of PLS-SEM [155]. The primary reason of using PLS-SEM was the small sample size (163 respondents) and context driven prediction of the latent variables which are under enquiry [155].The structural model was analysed using the SmartPLS3 [156]. The results were divided into three sections; first section is analysis of the respondents' demographic information; second section is analysis of the measurement model results and third section is analysis of the structural model results.

Results of this Phase and objective are reproduction of an article under review in the journal of humanitarian logistics and supply chain management: Shafiq, Muhammad and Soratana, K "Lean readiness assessment of humanitarian logistics and supply chain management, as step toward social and economic sustainability." JHLSCM, 2019: revision is under process.

1. **Respondents' demographic information analysis**

Demographically, more than 80% of the respondents were male and 20% female (Table 8 Demographic details (n=163). This discrepancy may be explained by the fact that there is a clear gender imbalance in this HLSCM field, perhaps indicating a social issue in the sector.

Over 54% of the respondents had 5 to 10 years of HO sector experience, with 37% having greater than 10 years' experience in the sector. The positions, or rank,

of the respondents were: officer (44%), coordinator (25%), manager (25%), directors (6%), and 1% were country heads or consultants. As well, 47% of the respondents were working with national HOs, 23% were working with international HOs while 30% had exposure to both national and international HOs.

Educationally, 85% of the respondents had attained a master's degrees, 12% had attained a Bachelor degree with 2% having a PhD. These results showed that the educational quality and experience of the respondents was good, and their views were dependable. In the field of HLSCM, the deployment of PhD employees was very low which may well be one of the reasons for there being little research in this area. These demographics of the respondent's will be supportive in future exploration of, and planning research into, the HO sector.

Table 8 Demographic details (n=163)

Description of demographic information		Frequency	Percentage
Gender of respondent's	Male	131	80%
	Female	32	20%
Total years of experience employed in the humanitarian sector	Less than two years	1	1%
	2- to five years	11	7%
	6 to 10 years	88	54%
	More than 10 years	63	39%
Respondents current job position or designation	Officer	71	44%
	Coordinator	40	25%
	Manager	41	25%
	Director	9	6%
	Country head	2	1%
Type of HO, respondents worked	National HO	76	47%
	International HO	35	23%
	Both	52	32%
Respondents highest education level	PhD	3	2%
	Master	139	85%
	Bachelor's	20	12%
	Intermediate	1	1%

From the descriptive statistical analysis, the mean value of all variables (latent, exogenous and mediating variables) was high, at 4.7, which indicates that the CSFs are of significance and relevance for inclusion in LRA model.

2. Measurement model results

Measurement and analysis of the CSFs included in the model started by testing the uni-dimensionality of constructs through exploratory factor analysis. The factors, representing questions in the questionnaire, containing low loading were removed, with the main factors identified for further analysis.

Table 9, shows the overall quality criteria of measurement model evaluation. The construct reliability was assessed by Composite Reliability and Cronbach alpha [157]. The threshold point for composite reliability, and the Cronbach alpha, were determined at the minimum of 0.70 [156]. All the Cronbach's alphas were found to be greater than the 0.70 threshold point, declared by [156]. The composite reliability also exceeded 0.70, which proved that the latent variables were very strong.

The construct validity was determined by convergent validity and discriminant validity. Convergent validity has assessed through composite reliability, Average Variance Extracted and loading of the items. A rule of thumb for composite reliability determined that the value should be greater than or equal to >0.70 [153] and our analysis found the values to be very significant (Table). Using the bootstrapping procedure at ($p < 0.05$), average variance extracted was used as a measure of convergent validity which also exceeded the minimum threshold of 0.5 for all constructs [158-159]. Factors loading of items for the all constructs including mediating variable organizational culture were found to be significant with the minimum threshold of 0.70, [153] (Table 9 and Figure 11).

Table 9 Quality Criteria for Measures Assessments

Variables Construct	Measure	Measures Outer Loading	Cronbach 's alpha	Composite Reliability	Average Variance Extracted
Processes Management (PRM)	PRM 2	0.882	0.799	0.870	0.626
	PRM 3	0.751			
	PRM 4	0.770			
	PRM 5	0.754			
Planning and Control Management (PCM)	PCM 1	0.717	0.827	0.886	0.662
	PCM 2	0.873			
	PCM 3	0.823			
	PCM 4	0.832			
Customer Relationship Management (CRM)	CRM 1	0.778	0.794	0.879	0.707
	CRM 4	0.859			
	CRM 5	0.883			
Supplier Relationship Management (CRM)	SRM 1	0.820	0.839	0.892	0.674
	SRM 4	0.813			
	SRM 5	0.846			
	SRM 6	0.804			
Human Resource Management (HRM)	HRM 1	0.720	0.787	0.854	0.540
	HRM 4	0.789			
	HRM 6	0.724			
	HRM 7	0.722			
	HRM 8	0.718			

Table 9 (Cont.)

Variables Construct	Measure	Measures Outer Loading	Cronbach 's alpha	Composite Reliability	Average Variance Extracted
Top Management and Leadership (TML)	TML 2	0.865	0.808	0.888	0.727
	TML 3	0.741			
	TML 5	0.940			
Communication and Coordination Management (CCM)	CCM 1	0.818	0.747	0.855	0.663
	CCM 3	0.810			
	CCM 6	0.815			
Organizational Culture Management (OCM)	OCM 1	0.791	0.879	0.909	0.626
	OCM 2	0.730			
	OCM 3	0.768			
	OCM 4	0.749			
	OCM 5	0.839			
	OCM 6	0.861			
Lean Readiness Assessment [160]	LRA 1	0.743	0.789	0.855	0.542
	LRA 2	0.706			
	LRA 3	0.753			
	LRA 4	0.722			
	LRA 8	0.756			

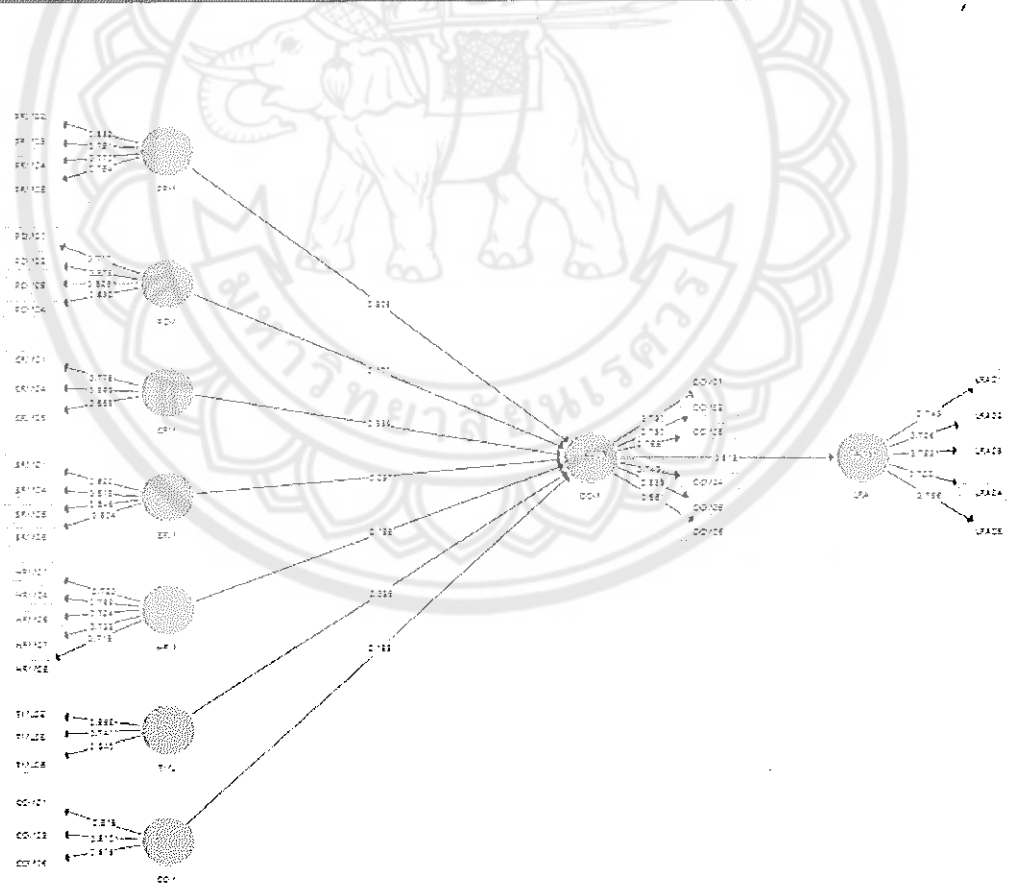

Figure 11 Algorithm, Reflective Model

Discriminant validity was assessed through the "Fornell Leker Criterion", with the rule of thumb presented by [161-162] being that the square root of AVE should be greater than the correlation value of the latent variables.

Table 10 shows the values of AVE, where the square root was greater than the other correlation values of the latent variables [155-158].

Table 10 Latent Variables correlation

Variables *	TML	SRM	PRM	PCM	OCM	LRA	HRM	CRM	CCM
TML	**0.853**	0.586	0.658	0.627	0.681	0.643	0.655	0.615	0.638
SRM		**0.821**	0.687	0.691	0.752	0.720	0.728	0.836	0.689
PRM			**0.791**	0.693	0.762	0.727	0.719	0.793	0.739
PCM				**0.813**	0.709	0.707	0.704	0.784	0.688
OCM					**0.791**	0.713	0.721	0.833	0.802
LRA						**0.736**	0.726	0.807	0.809
HRM							**0.735**	0.821	0.801
CRM								**0.841**	0.798
CCM									**0.814**

* PRM=Process management, OCM= Organizational culture management, CRM=Customer relationship management, SRM=Supplier relationship management, HRM=Human resource management, TML= Top management and leadership, CCM=Communication and coordination management, LRA= Lean readiness assessment.

3. Structural model results

To test the hypotheses, this study used PLS analysis and followed the procedure recommended by [159-163]. Given the distribution free assumptions in PLS, the non-parametric bootstrap procedure with 5000 samples was used to examine the significance of the path coefficients [159-163]. Bias corrected and accelerated (BCa) confidence interval was applied with a two-tailed test and $p<0.05$. The path coefficients (β), t-statistics and p-values are reported with significance decisions in Table 11 and Figure 12.

Table 11 Summary of path coefficients, *t*-values and *p*-values

Path*	Path coefficients (β)	Standard Deviation (STDEV)	*T*-Statistics (|O/STDEV|)	*P*-Values	Decision
PRM -> OCM	0.305	0.060	5.077	0.000	Significant
PCM -> OCM	0.177	0.079	2.255	0.024	Significant
CRM -> OCM	0.339	0.079	4.285	0.000	Significant
SRM -> OCM	-0.097	0.056	1.741	0.082	Insignificant
HRM -> OCM	0.155	0.073	2.123	0.034	Significant
TML -> OCM	0.028	0.043	0.661	0.508	Insignificant
CCM -> OCM	0.138	0.070	1.964	0.050	Significant
OCM -> LRA	0.813	0.032	25.058	0.000	Significant

Critical value for t >1.96, and significance value for P is < 0.05

* PRM=Process management, OCM= Organizational culture management, CRM=Customer relationship management, SRM=Supplier relationship management, HRM=Human resource management, TML= Top management and leadership, CCM=Communication and coordination management, LRA= Lean readiness assessment

The magnitudes of the path coefficient *β*, *t*-value and *p*-values were found to be positive and significant for process management (*β* 0.3.5, t-value 5.077, *p*-value 0.000), planning and control management (*β* 0.177, *t*-value 2.255, *p*-value 0.024), customer relationship management (*β*, 0.339, *t*-value 4.285, *p*-value 0.000), human resource management (*β* 0.155, *t*-value 2.123, *p*-value 0.034), and communication and coordination management (*β* 0.138, *t*-value 1.964, *p*-value 0.050), organizational culture management (*β* 0.813, *t*-value 25.058, *p*-value 0.000). These CSFs have significant and positive effects on an HO's lean readiness assessment. The organizational culture was found to be significantly supportive as a mediation variable of the lean readiness assessment to HLSCM.

Top management and leadership (*β* 0.028, *t*-value 0.661, *p*-value 0.508) draws little inspiration from this construct, with an insignificant *t*-value<1.95) and *p*>0.05) whereas the value of supplier relationship management was insignificant, with negative *β* of -0.097, *t*-value = 1.741, and *p*=0.082). Having proved the negative relation, supplier relationship management (SRM) was dropped from the final model. Top management and leadership management (TML) were also dropped from the model. Figure 12, illustrates the model drawn by bootstrapping the results.

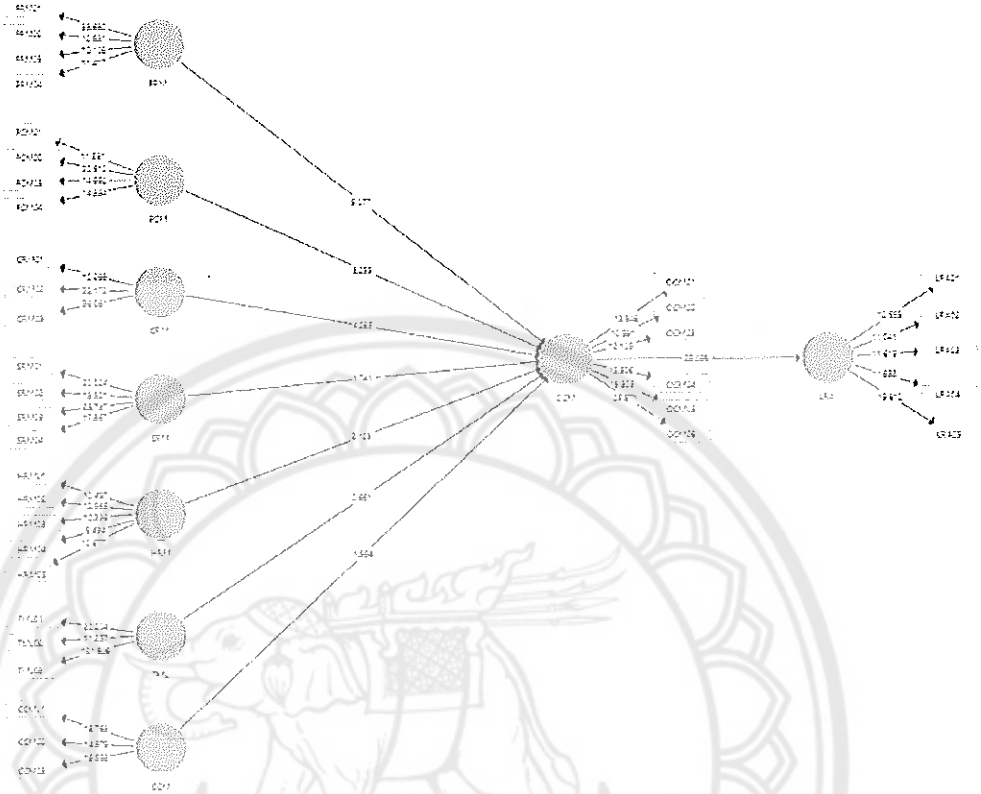

Figure 12 Bootstrapping results model

The adequacy of the model was tested by calculating the coefficient of determination (r^2). The coefficient of determination r^2 is most commonly used to measure and evaluate the structural model with the values 0.75, 0.50, and 0.25 for endogenous latent variables that are known to be substantial, moderate or weak [159]. The results explain the 66% variance in dependent variable "lean readiness assessment" and 89% variance in mediating variable known organizational culture. These values show a substantial and moderate r^2 for the model (Table 12).

In order to assess the quality of the structural model, we computed the effect size, f^2, of each exogenous construct [159]. The threshold decided by [153], that is the value f^2 , where f^2 => 0.02 is small, f^2 => 0.15 is medium and f^2 => 0.35 is large. The results showed that mediating variable OCM (f^2 1.954) has a large effect, and the CCM (f^2 0.051), CRM (f^2 0.175), HRM (f^2 0.053), PCM (f^2 0.107), and PRM (f^2 0.285) have a

medium effect, whereas the SRM (f^2 0.025) and TML (f^2 0.004) have minimum effect. These results are shown in Table 12.

In a similar vein, the blindfolding algorithm was run in SmartPLS 3.0 to compute the cross validated redundancy, and hence the predictive relevance, of each exogenous variable. The results indicated that LRA, q^2 value 0.325 and mediating variable OCM, q^2 value 0.510, though both are significant to the threshold value > 0 [153] (Table 12).

Table 12: Summary of structural model r^2, q^2 and f^2

Variables	R Square	Q Square	F Square
Lean readiness assessment	0.661	0.325	-
Organizational culture management	0.899	0.510	1.954
Communication and coordination management	-	-	0.051
Customer relationship management	-	-	0.175
Human resource management	-	-	0.053
Planning and control management	-	-	0.107
Process management	-	-	0.285
Supplier relationship management	-	-	0.025
Top management and leadership	-	-	0.004

4. Discussion and research implications

The purpose of this study was to contribute to the efficient utilization of HOs' resources by achieving cost and time efficiencies to the HOs' processes and activities. To achieve this aim, lean management was considered a viable tool which can be applied. However, prior assessment of an HO's lean readiness was considered essential to consider the likelihood of success of that implementation. To this end, a Lean Readiness Assessment Model for HO sector was created and validated as an important and significant step towards achieving social and economic sustainability within the HO sector.

The conceptual model was based on the seven Critical Success Factors which were identified from the synthesis of the research information identified in our literature review and subsequently validated through PLS-SEM. The model also addressed and included a mediating factor known as a supportive organizational culture.

The results showed a positive relationship among the latent variables and also showed that the CSFs were significant in the assessment of lean readiness assessment. Organizational culture was also identified as a significant mediating variable. Accepted factors for the LRAM are: process management (β 0.3.5, t-value 5.077, p-value 0.000), planning and control management (β 0.177, t-value 2.255, p-value 0.024), customer relationship management (β, 0.339, t-value 4.285, p-value 0.000), human resource management (β 0.155, t-value 2.123, p-value 0.034), and communication and coordination management (β 0.138, t-value 1.964, p-value 0.050). The significance values of the mediating factor "organizational culture management" were β 0.813, t-value 25.058, p-value 0.000.

The values of supplier relationship management (β 0.028, t-value 0.661, p-value 0.508), and top management and leadership (β -0.097, t-value 1.741, p-value 0.082) showed that this was insignificant and non-supportive for both organizational culture and lean readiness assessment. The reason for this, as the authors understand, is that HOs discourage strong supplier relationships as this is usually considered to potentially create a conflict of interest. Top management and leadership, however, could prove negative as HOs always project self-empowerment and leadership as an organisational concept, where every employee thinks that he is a leader and independent of management control.

Finally, the factors included in the LRAM were process management, planning and control management, customer relationship management, human resource management, and communication and coordination management. Organizational culture management has also been accepted as a mediating factor which included in this model positively. This LRAM will be applied in the HO sector following the Paul Myerson lean assessment criteria [25].

According to these lean assessment criteria, these CSFs will be considered by the HO's staff. Where these criteria are measured as having a mean value between 0% and 20%, this would indicate that the organization has a traditional supply chain and logistics management system and therefore is not ready to implement lean management. It would further indicate that the HO needs to develop and improve its organizational culture before the implementation of lean management is likely to be successful. A mean value of these criteria between 20% to 40% indicates that the organization has the

foundation and supportive organizational culture, but this needs to be further developed to ensure that the adoption of a lean management system would be successful. If the mean value is between 40% and 60%, this would indicate that the organization is already in a state of readiness to implement LMS and has probably already progressed in implementing a lean management system. The organization will be aware of the necessity of an LM, and already has a good foundation for implementing an LMS. A mean value of LRAM factors between 60% and 80% clearly indicates that the organization is in good readiness to implement the LMS, and a mean value between 80% to 90% shows that the organization has already applied fully a lean management system and only needs continuous improvement action. A mean value above 90% indicates that the organization has the best lean management system in place and is already fully functional with a state-of-the-art lean management system [25]. A summary of this mentioned criteria is presented below in Table 13.

Table 13 LRAM criteria [25]

Sr. No.	CSF's Mean Vale in %	Level Readiness
1	0% and 20%,	traditional LSCM and not ready
2	20% to 40%	Have some supportive OC but not ready
3	40% and 60%	Ready to implement
4	60% and 80%	Enough good with some of existing practices
5	80% to 90%	already applied fully LMS
6	above 90%	State of the art LMS in place

The LRAM provided here is simple and is an easy-to-use tool that will allow managers to understand their current practices and to evaluate if their organisational and managerial environment is supportive of a lean management system, or if these need to be addressed and appropriately modified before a successful implementation is likely. This will inform managers if they have the required resources for a successful LMS implementation, and to identify if they are able to afford the resources necessary for this purpose. For example, by using the LRAM, managers will be able to assess the human

resource management factors of availability of skilled workers, workforce empowerment, and investment of funds for training to implement LMS. If HOs are not ready to adopt these of items, they will have a minimal chance of success in lean management system and implementation of LMS itself will cost the organization.

5. Concluding summary of objective two

We had concluded by literature that Lean Management (LM) is a valuable tool for resources conservation in humanitarian organizations. LM is a proven philosophy encompassing an on-going process of continuous improvement in the organization's overall supply chain management system. Through the continuous improvement in the conservation of resources, HOs can save cost, thereby enabling them to spend this saving on serving more people in the marginalized communities. These savings directly contribute to HO sector social and economic sustainability. Lean management implementation itself is a cost, thus before implementation of LM it will necessary to check the readiness of the HO to implement the lean system.

Phase IV: Implementation of LRAM on NGOs working in Pakistan

The objective four of this study represents the implementation of the LRAM "Lean readiness assessment of NGOs working in the Pakistan". The analysis describes the situation identified where NGOs working internationally were ready or nearly ready to adopt the lean management system. The NGOs which were working at the national level were not ready to adopt the LMS, out of 19 organizations 3 organizations were ready to adopt the LMS. The detailed results are presented below which were divided into two sections; demographic analysis and descriptive statistics analysis.

1. Demographic analysis

Demographic analysis shows that male gender was dominant in NGOs operation departments specifically supply chain and logistics filed, in this study males' frequency were 24 whereas female respondents were 10 (Table 14). The respondents were acquainted rich experience of NGO sector, out of 34 the 13 respondents were found more than 10 years of experience, while, 13 were found up to 10 years of total experience. Education level of the respondents were master degree, which found 31 out of 34 respondents and all the organizations were operating their projects into two or more than two provinces of Pakistan (Table 14). All these demographic information

shows that NGOs participated in this survery were good in experince, education and staff, though, the results presents more reliable representation of this scetor towards LMS.

Table 14 Demographic analysis

Type of information	Name of category	Frequency
Gender	Male	24
	Female	10
Total experience in years	< 2	0
	3 to 5	8
	6 to 10	13
	>10	13
Current position	Officer	13
	Coordinator	5
	Manager	12
	Director	4
	Country head	0
	Other (please specify)	0
Education Level	PhD	0
	Master	31
	Bachelor's	3
	High School	0
	Diploma	0
	Other (please specify)	0
Type of the organization	International-NGO	15
	National-NGO	19
Organization age in year's	< 2	0
	3 to 5	7
	6 to 10	4
	>10	23
No. of projects implemented the organization	< 10	0
	11 to 15	5
	16- to 20	15
	>20	14
No. of projects currently in progress	< 2	0
	2 to 4	6
	5 to 6	7
	> 6	21
Organization working in how many provinces	1	0
	2	17
	3	8
	4	9

2. Descriptive analysis

Results showed that out of 15 international NGOs two NGOs mean value is scored highest more between 60% to 80% (shown in Table 15) which indicates the organization is in good readiness to implement the LMS and some of the basic LMS

techniques have already in progress. Out of remaining 13 NOGs, 10 organizations mean values were scored between 40% to 60% which indicates that these organizations are ready to implement the LMS and has a good foundation and awareness about the basic knowledge of LMS. The last 3 NGOs mean score graded less than 20% which indicates that the organizations have a traditional supply chain management system and were not ready to implement an LMS successfully. The investment into less than 20% scored NGOs would be wastes itself without awareness of its employees and creating a positively lean supportive organizational culture.

The results also indicate that out of six CSF's (Process management, planning and control management, customer relationship management, human resource management, communication and coordination management, and organizational culture management) the process management of international NGOs scored highest up to 56% whereas the organizational positive culture is rated lowest 35% of total scores (Table 15). Though, overall scores of international NGOs are between 40% to 60% which shows that these organizations are ready to adopt the LMS with fully techniques.

Table 15 Results of International NGOs Mean Score's in %

I-NGO	PRM	PCM	CRM	HRM	CCM	OCM	Overall mean score in %	Comments
1	60%	16%	43%	42%	63%	20%	41%	ready
2	68%	44%	53%	44%	60%	53%	54%	ready
3	53%	60%	60%	53%	60%	23%	52%	ready
4	78%	68%	73%	60%	67%	67%	69%	in progress
5	53%	44%	60%	58%	70%	67%	58%	ready
6	48%	52%	60%	53%	60%	63%	56%	ready
7	63%	44%	53%	40%	40%	13%	42%	ready
8	60%	48%	30%	31%	27%	3%	33%	not ready
9	60%	12%	47%	42%	73%	23%	43%	ready
10	28%	28%	30%	24%	13%	10%	22%	not ready
11	45%	48%	50%	51%	57%	47%	50%	ready
12	43%	16%	27%	40%	63%	37%	38%	ready
13	53%	44%	40%	42%	63%	33%	46%	ready
14	63%	60%	57%	51%	77%	63%	62%	in progress
15	68%	12%	10%	20%	50%	13%	29%	not ready
	56%	40%	46%	44%	56%	36%		

Results of national NOGs shows that only three organizations have mean score between 40% to 60% (Table 16) which expressed that these NGOs are ready to implement the LMS and to some extend implementing some basic LMS techniques. The mean score between 20% to 40% found 6 organizations which indicates that the organization has the foundation and supportive organizational culture (Table 16), but this needs to be further developed to ensure that the adoption of a lean management system shall be successful, so yet this considered risky and not ready to implement the LMS without some improvements. The NGOs found with traditional supply chain management without any basic knowledge of LMS were 10 which scored the mean value less than 20%, results are shown in Table 16.

The interesting thing found that out of six CSFs the communication and coordination (CCM) factors of national NGO's was stronger which score the mean value 39%, and close to ready for LMS. This result support the international NGOs theory of engaging local NGOs in disasters management for better coordination with stakeholders (community, government, media etc.). The lowest factor identified organizational lean supportive culture (OCM) and planning and control management 14% and 16% respectively.

Table 16 Results of National NGOs Mean Score's in %

N-NGO	PRM	PCM	CRM	HRM	CCM	OCM	Overall mean score in %	Comments
1	13%	12%	47%	13%	37%	17%	23%	Not ready
2	18%	12%	37%	33%	37%	7%	24%	Not ready
3	15%	12%	50%	36%	40%	23%	29%	Not ready
4	25%	12%	20%	7%	37%	3%	17%	Traditional
5	63%	36%	40%	51%	50%	13%	42%	Ready
6	33%	8%	20%	7%	33%	7%	18%	Traditional
7	30%	24%	30%	7%	40%	20%	25%	Not ready
8	28%	4%	13%	9%	33%	3%	15%	Traditional
9	25%	4%	33%	4%	33%	7%	18%	Traditional
10	23%	4%	17%	4%	33%	3%	14%	Traditional
11	30%	0%	27%	2%	40%	0%	16%	Traditional
12	28%	16%	13%	11%	40%	3%	19%	Traditional
13	15%	52%	40%	47%	40%	20%	36%	Not ready
14	35%	4%	30%	9%	37%	7%	20%	Not ready
15	68%	36%	40%	40%	60%	53%	49%	Ready

Table 16 (Cont.)

N-NGO	PRM	PCM	CRM	HRM	CCM	OCM	Overall mean score in %	Comments
16	55%	60%	60%	56%	53%	47%	**55%**	Ready
17	30%	4%	23%	4%	37%	3%	**17%**	Traditional
18	30%	0%	30%	4%	33%	13%	**19%**	Traditional
19	28%	12%	13%	9%	27%	7%	**16%**	Traditional
	31%	16%	31%	19%	39%	14%		

6. Concluding summary of objective three

This part of the study presented the findings from questionnaires surveys in order to evaluate NGOs readiness and preparedness with respect to LMS. The survey results indicate that international NGOs are almost ready to adopt the LMS and some of them are already implementing the LM practices. The organizational culture of INGOs still required the improvements before implementation of lean techniques, though, the leadership vision and willingness are much important in this regard.

Comparatively the national NNGOs are not ready to implement the LMS and most of them still found the traditional in supply chain operations and did not know even basic information about LM techniques and principles.

The qualitative analysis shows that many factors affecting the implementation of LMS in NGO sector such as lack of quality workers in terms of education and skills, technology, donors and government attention towards LMS, lack of knowledge about competitiveness and urgency to adopt LMS. Moreover, it was found that the NGOs do not follow a clear strategy in terms of involving employees in improving processes, nor in promoting the continuous improvement. It was found that there is no real pressure or urgency to adopt LS within the NGO sector by any regulating authority because of non-availability of NGOs operations policy at national level.

CHAPTER V

CONCLUSION AND RECOMMENDATIONS

Findings of the four phases focusing three objectives of this study are concluded and recommendations of each phase are provided in this chapter.

In Phase I, the comprehensive literature review analysis founds that the term "logistics" and "supply chain" in the HO sector are overlapping. HOs have no standardized role in logistics and supply chain professionals and their jobs responsibilities are varied from organization to organization. It is recommended to present such standardized framework, which may regularize the responsibilities of HLSCM professionals overall, to any organization. The job descriptions should be standardized to overcome the ambiguous views on the constitutions of a "logistics professional" and a "supply chain professional".

Literature revealed that developmental operations of HLSCM are ignored; thus, they are requiring well-based studies. Most HLSCM studies have presented various frameworks but only some of them have been well tested and a few has been adopted. There are, clearly, no HLSCM quality assessment and assurance frameworks to assess their adherence to standardized frameworks within ISO or the humanitarian sphere. Most studies presented HO and business organizations partnership frameworks, however none presented a standardized model which may be applicable to every HO in pursuance of lean (efficiency) and agility (effectiveness). While HO-business partnership models have been presented as successful case studies, unsuccessful HO-business models case studies have not been investigated for the cause of failures, which professionals can learn and avoid. HOs share the same objectives, but their HLSCM policies and implementation procedures are significantly varied. Standardization of the policies and procedures is a notable gap in the research, and proactive measures are needed to promote efficiency in HLSCM. Lean Management in HOs is an ignored area of study. Limited number of studies on organizational efficiency is found, which indicating a need to a more extensive exploration of lean management in HLSCM.

Phase II, which represents the **objective two** shows that HOs thematic analysis indicated nearly 90% of HOs are involved in both developmental activities and emergency response. In the developmental scope of HLSCM, lean paradigm is considered as the most appropriate, whereas in the emergency scope/thematic, the agility paradigm becomes prominent. When the time and immediate and effective measures are required, lean and agile, both can be applied together. The lean and agility are defined in terms of decoupling points between the developmental and emergency HLSCM processes. Decoupling points are various identified areas which present when HOs should focus on lean and when HOs should place importance on the agile paradigm. Results of this phase suggested that the practical implications of implementing the lean paradigms in the HO sector, including the assessment of the readiness of any HO to adopt the combined paradigm, requires further studies.

Phase III which represents objective three development of LRAM. The quantitative analysis was conducted on PLS-SEM. The results showed that out of eight exogenous and mediating variables (CSFs), six factors approved positively significant. The CSFs that proved significant for the final LRA model were processes management, planning and control management, donor and community relationship management, human resource management, communication and coordination management, and mediating factor know as organizational culture. The supplier relationship management, and top management and leadership factors proved insignificant which were dropped from the final LRAM. Measurement models construct reliability and validity were assessed by composite reliability, Cronbach alpha, composite reliability, average variance extracted and loading of the items. All approved variables values were found significant with threshold value > 0.70. The structural model was validated through the path coefficients, t-values and p-values (Critical value for $t > 1.96$, and significance value for p is < 0.05). The six factors were qualified for the final LRAM.

Lean readiness assessment were defined for HOs based on Paul Myerson lean assessment criteria [25] . If the mean value of the six CSFs results between 0% and 20%, it indicates that HO is not ready to adopt LMS. If the mean value is between 20% to 40%, it indicates that HO has the foundation and supportive organizational culture for lean. The mean value results between 40% and 80% indicates that the organization is ready for lean. The mean value results between 80% to 90% indicates that the HO has

already applied fully LMS, and if the mean value results over 90%, it indicates that HO has the best LMS in place

This model contributes to the development of lean management awareness to motivate HOs in adoption of lean supportive culture. The adoption of a lean culture will expediate the delivery of services and supplies to the targeted communities in the most timely and cost-effective manner. Cost minimization will create an opportunity to serve the maximum number of people, thereby making a substantial contribution towards the social and economic sustainability of HO sector. In next phase this model has been applied on the NGOs to know their readiness.

Phase IV represents the **objective four**. The quantitative analyses of 34 NGOs (15 International and 19 national) working in Pakistan indicates that 20% of the international NGOs in Pakistan were not ready to adopt LMS. This is due to the use of traditional processes and management techniques of the NGOs. Therefore, 80% of the international NGOs were fully ready to adopt the LMS.

Comparatively, the national NGOs were not ready to implement LMS. The results showed that almost 53% of the national NGOs in Pakistan were traditional in processes management, whereas, only 16% of the national NGOs were ready to adopt LMS. In national NGOs, there is a lack of coordination and involvement of middle and professional level employees in strategic decision makings. It is recommended that Pakistan's government should regularize the NGOs with a clear policy and encourage them to adopt LMS in both emergency and developmental HLSCM operations.

Therefore, this study contributes in the motivation level of HOs professionals to implement LMS. HOs can adopt LMS for reduction of the wastes without compromising the major objectives of the NGOs, which are the provision of humanitarian goods and services to more target groups with the utilization of fewer resources. Such resource conservation is a distinctive step toward economic & social sustainability as it is serving more people through utilization of less resources.

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APPENDIXS

APPENDIX-A Leading Questions for Semi-Structured Interviews

1. Introduction and background information:

Type of organization:

1. International humanitarian organization (IHO) ☐ **2.** National humanitarian organizations (NHO) ☐

Designation:

☐ Officer ☐ Coordinator ☐ Manager ☐ Director ☐ Country head

Work experience:

1. Total work experience _____ **2.** Work experience in humanitarian field _____

2. What is HOs supply chain management cycle?
3. Do you feel any urgency to adopt some new quality improvements in HOs supply chain management cycle?
4. Do you intend to implement new quality improvements steps in your organization?
5. What's type of operations are involved in HOs supply chain management?
6. How you differentiate the emergency supply chain management operations from the developmental supply chain management operations?
7. Usually what type of supplies and services are requires in emergency and developmental type of operations?
8. In emergency operations to what level HOs should focus only on time?
9. In emergency operations to what level HOs should focus only on cost?
10. In developmental operations to what level HOs should focused on time only?
11. In developmental operations to what level HOs should focused only on cost only?
12. In emergency and developmental operations of HOs to what point both cost and time can intersect each other?
13. How often are improvement suggestions received from filed office staff for logistics and supply chain improvements?
14. How do you drive and recommend a continuous improvement programs in HOs operations?

APPENDIX-B Survey Questionnaire

Humanitarian organizations' logistics and supply chain management (HLSCM) efficiency can be achieved through Lean Management (LM). LM implies the ability to minimize waste, avoid duplication of activities, conserve energy, and maximize capabilities while minimizing time taken and overall operational costs. Unfortunately, not every humanitarian organization (HO) is ready and in a position to implement LM, so before LM implementation it is important to assess an HO's readiness.

A HO's readiness for LM can be measured through identification of Critical Success Factors (CSFs), which consist of process management, planning & control management, customer (i.e. community and donor) relationship management, supplier relationship management, human resource management, communication & coordination management, organizational culture (i.e. adaptability, mission, involvement, consistency) as well as executive management itself.

Your assessment of the relevance of each of these CSFs specifically to HLSCM would be of great benefits to the community and appreciated.

Part I: Respondent Background Information

What is your gender?
☐ Male ☐ Female
2. How many years, in total, have you been employed in the humanitarian sector?
☐ 2 years ☐ 2-5 years ☐ 5-10 years ☐ >10 years
3. What is your current Job Position or Title?
☐ Officer ☐ Coordinator ☐ Manager ☐ Director ☐ Country head ☐ Other (please specify) _____
4. Which of these organizational types have you worked for?
☐ International-NGO ☐ National-NGO ☐ Both International and National-NGOs
5. What is your highest education level?
☐ PhD ☐ Master's degree ☐ Bachelor's degree ☐ Intermediate degree ☐ High school certificate ☐ Other (please specify)

Part II: Critical Success Factors (CSFs) to Assess Readiness for Lean Management
(Readiness for Lean Management means becoming more efficient)

Please indicate how much you agree with the following statements, using this scale: **1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree**						
Code	**1. Processes Management**	**1**	**2**	**3**	**4**	**5**
PRM01	Process management is an important element of HLSCM to ensure efficient procurement, warehousing, fleet, distribution, general administration, safety, security, inventory and assets.	☐	☐	☐	☐	☐
PRM02	It is important to have well-documented policies, manuals and standard operating principles (SOPs) with summarized steps to follow.	☐	☐	☐	☐	☐
PRM03	It is important to utilize technology in processes management, e.g. operational software's.	☐	☐	☐	☐	☐

PRM04	Processes should be assigned to relevant organizational departments, which should be controlled by qualified, effective leaders and workers.	☐	☐	☐	☐	☐
PRM05	It is important that a calculated pre-determined lead time with required documents and processes should exist, and it should be re-assessed and revised on a regular basis.	☐	☐	☐	☐	☐
PRM06	Each item/file and inventory item should be labelled to indicate where the item should be placed in an allocated zone/location of the workplace.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale:
1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Code	**2. Planning and Control Management**	1	2	3	4	5
PCM01	A planned and continuous improvement in HOs supply, distribution and services are important for efficiency management.	☐	☐	☐	☐	☐
PCM02	Organizations should have a focus group of employees that may help to identify the HLSCM wastes and to create plans, by generating new ideas and solutions to assist the HOs to solve their problems	☐	☐	☐	☐	☐
PCM03	Management control should be scrutinized through a regular evaluation process.	☐	☐	☐	☐	☐
PCM04	Management control through benchmarking, and continuous performance evaluation through a clear strategy (at a field, national level and international level) is an important for efficiency management.	☐	☐	☐	☐	☐
PCM05	It is important to improve planning and control management by keeping up-to-date charts showing key performance indicators, progress and next job activity of each department.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale:
1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Code	**3. Customer Relationship Management**	1	2	3	4	5
CRM01	Close customer relationships are important to enable efficient provision of goods and services.	☐	☐	☐	☐	☐
CRM02	Complaints from customers (community, donors) and other stakeholders (government, vendors etc.) should be seriously considered and acted upon.	☐	☐	☐	☐	☐
CRM03	A proper baseline survey and needs assessment mechanism, to identify community (customer) real demand and issues before designing and implementing any project, is essential.	☐	☐	☐	☐	☐
CRM04	Important and valued community members and social champions (customers) should brought into visit the organization to give these customers ideas about distribution and local safety security scenarios.	☐	☐	☐	☐	☐
CRM05	Regular customer (donors and community) feedback to improve the quality of supplies and services is important.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale:
1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Code	**4. Suppliers Relationship Management**	1	2	3	4	5
SRM01	Close attention to supplier relationships are important for the efficient procurement of supplies and services.	☐	☐	☐	☐	☐

CSR02	A supplier's database should be maintained and suppliers should be categorized according to their specialty in goods, service or work ability.	☐	☐	☐	☐	☐
CSR03	Local suppliers should be encouraged to apply for, and bid for, tenders	☐	☐	☐	☐	☐
CSR04	Suppliers should be encouraged to participate in product design and should also be aware of the organization's, and community's, requirements.	☐	☐	☐	☐	☐
CSR05	Cooperative and committed suppliers should be retained and the organization should maintain a long term-relationship with these suppliers.	☐	☐	☐	☐	☐
CSR06	Suppliers feedback regarding quality of products, delivery and performance should be sought, and acted upon.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale: **1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree**						
Code	**5. Human Resource Management**	**1**	**2**	**3**	**4**	**5**
HRM01	Human resources are a basic key contributing factor to organizational efficiency.	☐	☐	☐	☐	☐
HRM02	Employees' workplace should be well configured and reviewed regularly, based on feedback from employees.	☐	☐	☐	☐	☐
HRM03	Employees coordination meetings should held regularly and their feedback and suggestions should be taken seriously and fully assessed for implementation.	☐	☐	☐	☐	☐
HRM04	To maintain a continuous innovation process, employees who have produced innovative ideas, and have been actively involved in process improvement, should be encouraged through incentives, pay increases and promotional opportunities.	☐	☐	☐	☐	☐
HRM05	Each employee should have a clear understanding of about their responsibilities and job description.	☐	☐	☐	☐	☐
HRM06	Employees should have a sufficient opportunity to participate in quality training, particularly in the soft skills of problem-solving techniques, and process analysis to identify non-value-adding activities.	☐	☐	☐	☐	☐
HRM07	Employees should be authorized to immediately stop the supply and distribution of goods and services, and termination of any other HO operations, where supplier or stakeholder misconduct or abnormal practices arise.	☐	☐	☐	☐	☐
HRM08	Employees should be encouraged to act on the interest of the group instead of their personal or individual interest.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale: **1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree**						
Code	**6. Top Management and Leadership**	**1**	**2**	**3**	**4**	**5**
TML01	The role of management and leadership are important factor in any HO, especially to provide an efficient, lean, management process.	☐	☐	☐	☐	☐
TML02	Good management and leadership includes having an open-door policy, and encouragement of close cooperation between all levels of employees.	☐	☐	☐	☐	☐

TML03	Employees should know that there is a strategy of regular promotional opportunities, and that they have job security.	☐	☐	☐	☐	☐
TML04	Management should locate the workers where their skills, experience and qualifications can be best used.	☐	☐	☐	☐	☐
TML05	Management should encourage multi-tasking skills in employees, by providing cross-job training and skills development programs.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale:
1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Code	**7. Communication and Coordination management**	1	2	3	4	5
CCM01	Strong communication and coordination are the basic elements to bring efficiency and lean management in HLSCM.	☐	☐	☐	☐	☐
CCM02	Employees should have sufficient facilities and equipment available to them to ensure efficient coordination and communication.	☐	☐	☐	☐	☐
CCM03	Employees should have regular updates and information about the operational situation, achievements, and safety and security alerts in case of disruption.	☐	☐	☐	☐	☐
CCM04	The organization should have a strategic plan and a designated person for coordination with donors, government stakeholders and media.	☐	☐	☐	☐	☐
CCM05	To ensure efficient and effective response to emergencies, it is important for the organization to have a dedicated, well-trained Crisis Management Committee, skilled in their roles, with well stated responsibilities in dealing with any disaster.	☐	☐	☐	☐	☐
CCM06	Standardized formats for documents, procedure manuals and other information should be created, and stored in clearly visible and easily accessed locations by every employee.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale:
1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Sr. #:	**8. Organizational Culture**	1	2	3	4	5
OCM01	People should be flexible and adaptable when changes are necessary.	☐	☐	☐	☐	☐
OCM02	Individuals and teams should have a clearly defined goals that relate to the vision and mission of the HO.	☐	☐	☐	☐	☐
OCM03	People should always be looking for new ways to better serve clients and customers specifically community & donors.	☐	☐	☐	☐	☐
OCM04	It is important that individuals and teams should participate in defining specific goals.	☐	☐	☐	☐	☐
OCM05	People should know that what's expected of them and understand their impact on other people, teams and functions.	☐	☐	☐	☐	☐
OCM06	It is important that HOs should constantly stretch their goals, to continuously improve efficiency.	☐	☐	☐	☐	☐

Please indicate how much you agree with the following statements, using this scale:
1= Strongly Disagree, 2= Disagree, 3= Neutral, 4= Agree and 5= Strongly Agree

Sr. #:	9. Lean Readiness Assessment	1	2	3	4	5
LRA 01	Processes management is an important factor for HOs' lean readiness assessment.	☐	☐	☐	☐	☐
LRA 02	Planning and control management is an important factor for an HO's lean readiness assessment.	☐	☐	☐	☐	☐
LRA 03	Customer relationships are a significantly important factor for lean readiness assessment of an HO.	☐	☐	☐	☐	☐
LRA 04	Supplier relationship management is a significantly important factor for HOs lean readiness assessment.	☐	☐	☐	☐	☐
LRA 05	Human resource management is a significantly important factor for HOs' lean readiness assessment.	☐	☐	☐	☐	☐
LRA 06	Internal and external communication and coordination management is significantly an important factor for an HO's lean readiness assessment.	☐	☐	☐	☐	☐
LRA 07	Top management and leadership are significantly important CSFs for lean readiness assessment of HOs.	☐	☐	☐	☐	☐
LRA 08	Organizational culture significantly important to mediate the above-mentioned CSFs for lean readiness assessment.	☐	☐	☐	☐	☐

Additional comments if any:

APPENDIX-C: Part I: Organization Background Information

1. Type of the organization (International or National- Non-Government Organization)			
☐ International-NGO			☐ National-NGO
2. Organization age in year's			
☐ < 2	☐ 3-5	☐ 6-10	☐ >10
3. No. of projects implemented up till now			
☐ < 10	☐ 11-15	☐ 16-20	☐ >20
4. No. of projects currently in progress			
☐ < 2	☐ 2-4	☐ 4-6	☐ > 6
5. Organization working in how many provinces.			
☐ 1	☐ 2	☐ 3	☐ 4

Part II: Respondent Background Information

1.Gender			
☐ Male			☐ Female
2. Total years of employment in this sector			
☐ < 2	☐ 3-5	☐ 6-10	☐ >10
3. Job Position/ Current Title			
☐ Officer	☐ Coordinator	☐ Manager	
☐ Director	☐ Country head	☐ Other (please specify)	
4. Education Level			
☐ PhD	☐ Master	☐ Bachelor's	
☐ High School	☐ Diploma	☐ Other (please specify)	

Part III: Management Practices

Please rate your organization against the following statements, using this scale:
0= 0%, 1= 20%, 2= 40%, 3= 60%, 4= 80% and 5= 100%

Sr.#:	1. Processes Management	0	1	2	3	4	5
PRM01	The organization is divided into different departments (procurement, logistics, warehousing) and every department has a specific task.	☐	☐	☐	☐	☐	☐
PRM02	For procurement, logistics, warehouse and assets management processes organization is using a software.	☐	☐	☐	☐	☐	☐
PRM03	Every process is assigned to relevant organizational departments, which are controlled by qualified, effective leaders and workers.	☐	☐	☐	☐	☐	☐
PRM04	Each item/file and inventory is labeled to ensure it is located in the right zone/location in the workplace.	☐	☐	☐	☐	☐	☐
PRM05	The organization has a calculated pre-determined lead time with all required documents and processes, which are being re-assessed and revised on a regular basis.	☐	☐	☐	☐	☐	☐

PRM06	A certain person is assigned as a part of his activities to ensure that the workplace is clean, and all inventory and equipment's are put back in their appropriate places.	☐	☐	☐	☐	☐	☐
PRM07	Equipment's and supplies maintained regularly, and the status actively shared with employees.	☐	☐	☐	☐	☐	☐
PRM8	Organization have well-documented policies, manuals and standard operating principles (SOPs) for procurement, logistics and warehousing with summarized steps to follow.	☐	☐	☐	☐	☐	☐

Please rate your organization against the following statements, using this scale: **0= 0%, 1= 20%, 2= 40%, 3= 60%, 4= 80% and 5= 100%**							
Sr. #:	**2. Planning and Control Management**	**0**	**1**	**2**	**3**	**4**	**5**
PCM01	Organization have a focus group of employees that helps to identify the HLSCM wastes and to create plans, by generating new ideas and solutions to assist the HOs to solve their problems.	☐	☐	☐	☐	☐	☐
PCM02	Organization have in place the management control through benchmarking, and continuous performance evaluation through a clear strategy (at a field, national level and international level) for efficiency management.	☐	☐	☐	☐	☐	☐
PCM03	There is followed prescribed standard for loading distribution material and moving toward distribution point.	☐	☐	☐	☐	☐	☐
PCM04	Problem solving techniques are used to identify the cause of problem like quality, quantity safety and security relevant problems and issues.	☐	☐	☐	☐	☐	☐
PCM05	Organization have up to date charts showing the key performance indicators, progress and next job activity are displayed on the work stations of each department.	☐	☐	☐	☐	☐	☐

Please rate your organization against the following statements, using this scale: **0= 0%, 1= 20%, 2= 40%, 3= 60%, 4= 80% and 5= 100%**							
Sr. #:	**3. Customer (community & donor) & Suppliers Relationship**	**0**	**1**	**2**	**3**	**4**	**5**
CSR01	A community complaints mechanism is in place and regularly monitored and catered to improve the services and quality.	☐	☐	☐	☐	☐	☐
CSR02	Organization always did a proper base line survey for needs assessment mechanism, to identify community (customer) real demand and issues before designing and implementing any project.	☐	☐	☐	☐	☐	☐
CSR03	Important and valued community members and social champions (customers) regularly brought into visit the organization to give HO customers ideas about distribution and local safety security scenarios.	☐	☐	☐	☐	☐	☐
CSR04	Feedback is sought regularly meetings are held often with donors and community to improve the quality of supplies and services.	☐	☐	☐	☐	☐	☐
CSR05	The donors have a regular update, field visits and appreciation for the team with a positive technical support.	☐	☐	☐	☐	☐	☐
CSR06	There is an awareness of what supplied product has customer value and genuine requirement.	☐	☐	☐	☐	☐	☐

Please rate your organization against the following statements, using this scale: **0= 0%, 1= 20%, 2= 40%, 3= 60%, 4= 80% and 5= 100%**

Sr. #:	4. Human Resource Management	0	1	2	3	4	5
HRM01	Employee's workplace is configured and re-considered regularly as per the feedback from employees.	☐	☐	☐	☐	☐	☐
HRM02	Employees coordination meetings being held regularly, and their feedback and suggestions been taken seriously and fully assessed for implementation.	☐	☐	☐	☐	☐	☐
HRM03	Employees who's remained involve in innovative ideas and processes improvements by eliminating the wastes are being encouraged through the incentives and bounces.	☐	☐	☐	☐	☐	☐
HRM04	Workers are capable to solve the problems and work as team, enough qualified.	☐	☐	☐	☐	☐	☐
HRM05	Have a good departmental and employee's relations, conflicts occur rarely.	☐	☐	☐	☐	☐	☐
HRM06	Each employee has a clear understanding of about their responsibilities and job description.	☐	☐	☐	☐	☐	☐
HRM07	Employees have a sufficient opportunity to participate in quality training, particularly in the soft skills of problem-solving techniques, and process analysis to identify non-value-adding activities.	☐	☐	☐	☐	☐	☐
HRM08	Employees are empowered to stop the supply, distribution and any other HO operation in case of occurrence any abnormality.	☐	☐	☐	☐	☐	☐
HRM9	Employees are encouraged to act in the interest of the group instead of the individual interest.	☐	☐	☐	☐	☐	☐

Please rate your organization against the following statements, using this scale:
0= 0%, 1= 20%, 2= 40%, 3= 60%, 4= 80% and 5= 100%

Sr. #:	5. Communication and Coordination management	0	1	2	3	4	5
CCM01	Organization have a clear communication policy for interaction in between the organization and external stakeholders during the disaster and normal situations differently.	☐	☐	☐	☐	☐	☐
CCM02	Employees have sufficient facilities and the equipment's are available to them to ensure efficient coordination and communication.	☐	☐	☐	☐	☐	☐
CCM03	Employees have the regular updates and information about the operations situation, achievements and safety and security alerts in case of disruption.	☐	☐	☐	☐	☐	☐
CCM04	The organization have a strategic plan and designated person for coordination with donors, government stakeholders and media.	☐	☐	☐	☐	☐	☐
CCM05	For dealing with any disruption the organization have a dedicated well-trained crises management committee which is enough clear about their roles and responsibilities.	☐	☐	☐	☐	☐	☐
CCM06	Organization have the standardized formats, documents procedures and required information which stored at such place which is visible and easily in approach of every employee.	☐	☐	☐	☐	☐	☐

Please rate your organization against the following statements, using this scale:
0= 0%, 1= 20%, 2= 40%, 3= 60%, 4= 80% and 5= 100%

Sr. #:	6. Organizational culture	0	1	2	3	4	5
OCM01	Organization have open door policy and management have close intact and encouragement behavior with all level of employees.	☐	☐	☐	☐	☐	☐

OCM02	Employees have a regular promotional strategy and job security.	☐	☐	☐	☐	☐	☐
OCM03	Organization have a regular overall performance evaluation strategy through external consultants and experts.	☐	☐	☐	☐	☐	☐
OCM04	Management locate the workers where they can use their skills, experience and qualification.	☐	☐	☐	☐	☐	☐
OCM05	Management encourage the employees for cross-job trainings and invest on the skills development programs.	☐	☐	☐	☐	☐	☐
OCM06	Organization is constantly stretch with its goals, to continuously improve efficiency.	☐	☐	☐	☐	☐	☐

Additional comment if any: