IMPACT OF INNOVATION PLATFORMS AND INFORMATION SHARING ON NURTURING OF SMALLER INNOVATION PLATFORMS: A CASE STUDY OF TANZANIA DAIRY DEVELOPMENT FORUM

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented in this or any other university for the award of a degree.

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Recommendation

This thesis has been submitted to graduate School of Egerton University with our approval as University and ILRI supervisors.

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DEDICATION

I dedicate this work to my loving wife, Beatrice Wambui, my sons, and my ever-supportive grandma.

ABSTRACT

Information sharing on production, marketing, processing, and consumption are key determinants on the effectiveness and efficiency of the dairy industry. However, innovation platforms bringing together dairy industry stakeholders harbour the potential to improve accountability and quality of information, to benefit all actors in the dairy value chain. As a result, several innovation platforms have been established at village and district levels in Tanzania to address these challenges, among them the Tanzania Dairy Development Forum (DDF). DDF was established in 2013 as a national level innovation platform with a mandate to enhance information and knowledge sharing and nurture smaller innovation platforms at the regional levels, districts up to the milk-shed level. This study assessed how the structure of the DDF was influencing information sharing between dairy value chain actors and how this was contributing to nurturing of smaller innovation platforms. Both qualitative and quantitative data were collected through focus group discussions, key informant interviews, and individual questionnaires of Tanzania Dairy Development Forum members and non-members. Thereafter, descriptive and inferential statistics were used to analyse the data with specific focus on ANOVA tests, Chi square and Factor Analysis. In total, 83 individual respondents were selected through stratified sampling and interviewed as representatives of their organizations that had taken part in DDF meetings. Further, 5 focus group discussions conducted and 6 key informant interviews administered to members of the DDF secretariat and co-hosting partners. Gender (β= -0.274, ρ<0.05) and Region (β= -.404, ρ<0.05) were found to be influencing information sharing. The coefficient on gender was indicative that men were worse off by a -0.274 score in promoting information sharing through DDF compared to women. On the other hand, the results on region suggested that DDF was yet to overcome regional barriers limiting information sharing between regions despite periodical conventions of dairy value actors drawn from across Tanzania. Further, information sharing between actors with other platform partners was contributing positively (Beta-value = 0.296, Sig. = 0.5) to nurturing of smaller innovation platforms. Lastly, DDF membership was found to influence platform autonomy (β= 0.623, Sig. = 2) indicating that DDF members were contributing more to platform autonomy by a score of 0.623 than the DDF non-members. Gender (β= 0.510, Sig. = 1.3) was also influencing nurturing of smaller innovation platforms with the results suggesting that indicating that men were contributing more to the autonomy of regional platforms and working groups within DDF by 0.510 score than women. The suggested recommendations include strengthening collaboration with organised dairy cooperatives and virtual dissemination of information shared during DDF meetings to benefit a larger number of dairy stakeholders.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

AKIS	Agricultural Knowledge and Information Systems
ANOVA	Analysis of Variance
APA	AustroProject Association
BROSDI	Busoga Rural Open Source and Development Initiative
CIAT	International Center for Tropical Agriculture
DaFCo	Dairy Farming Company
DDF	Dairy Development Forum
FSR	Farming Systems Research
GDP	Gross Domestic Product
HPI	Heifer Project International
ILRI	International Livestock and Research Institute
KALIDEP	Kagera Dairy Development Project
KMO	Kaiser-Meyer-Olkin
LiDA	Livestock Development Authority
MLDF	Ministry of Livestock and Fisheries Development
NDB	National Dairy Board
NDDC	National Dairy Development Conference
R4D	Research for Development
SCP	Structure-Conduct-Performance
SDSP	Smallholder Dairy Support Programme
SHDDP	Southern Highlands Dairy Development Project
SNV	The Netherlands Development Organization
SUA	Sokoine University of Agriculture
TDB	Tanzania Dairy Board
TDL	Tanzanian Dairies Limited

CHAPTER ONE

INTRODUCTION

1.1. Background Information

The efficient and effective functioning of the dairy industry anywhere in the world requires good information flow on a variety of subjects including production, marketing, processing, and consumption (Smallholder Dairy Project, 2005). This need for information flow becomes crucial in developing countries where the dairy industry is a key source of livelihood and is predominantly based on small-scale production and marketing. However, access to credible and quality information is always challenging to small-scale farmers because they often deal with informal markets characterized by poorly developed infrastructure, inputs, and services. This results in high transaction costs, information asymmetry, and increased risks along the value chain (Van Rooyen & Homann, 2007).

Even though actors in the value chain are involved in generating information that would be useful to other actors along the dairy value chain, linkages between actors are complex and often weak thus exacerbating problems for accessing and transmitting information. The introduction of innovation platforms towards the end of 1990s was a key step in bridging the gap between different value chain actors (Pali & Swaans, 2013). An innovation platform facilitates the integration of perspectives, knowledge, and actions of different stakeholders in a value chain around a common interest and fosters learning through interaction (Tui *et al.*, 2013).

Information sharing is the exchange of data and knowledge between people or institutions. Information sharing occurs through use of different communication channels. This differs with communication in the sense that, communication entails the means and frequency of communication and sharing information (Droppelman *et al.,* 2013). In the context of this study therefore, information sharing will be explored by focusing on what type of information is shared within the dairy industry and its relevance in attaining objectives of innovation platforms in the Tanzanian dairy industry.

The livestock sector in Tanzania is estimated to contribute 5.9 percent to the national Gross Domestic Product (GDP). Specifically, the dairy sector contributes 2 per cent to the national GDP. However, the potential of the dairy industry is still unexploited with over 70 percent of milk being produced by indigenous zebus. There is extensive feed scarcity during

the dry seasons and inaccessibility of markets and inputs by the agro-pastoral producers (Makoni *et al.*, 2014).

To address these challenges, the Tanzania Dairy Development Forum was developed in 2013 to convene annually as an innovation platform and oversee the nurturing of smaller innovation platforms, ensure capacity development of stakeholders, and influence the elaboration of policies. The forum was also intended to identify and fill gaps in dairy technology and agribusiness skills, propose strategies to expand the national dairy herd, and recommend business solutions to address seasonal feed scarcity faced by producers. The stakeholders that engage in the Tanzania Dairy Development Forum span across the dairy value chain and convene periodically to co-create solutions to challenges facing the Tanzania dairy industry. Consequently, the Tanzania Dairy Development Forum is expected to spearhead many changes in the Tanzania dairy sector.

The need for dairy focused innovation platforms is driven by global trends in the dairy industry. Over the past two decades, global production, consumption, and trade in livestock products has rapidly increased and continues to rise (Hall *et al.*, 2004). Indeed, Delgado, (2003), identifies immense opportunities in the dairy industry noting that the rise in demand of dairy products is being driven by population growth, urbanization, changes in consumer preferences, evolving lifestyles, rising disposable incomes, and technological changes in production, communication, and transportation. Negassa, (2009) notes that increased opportunities in the dairy industry include increased market outlets for live animals, increased employment opportunities, and improved availability of choices and qualities of products at lower prices to consumers. The changes in consumer preferences also present opportunities for value addition and charging of premium prices.

This study focuses on elements of information sharing and nurturing smaller innovation platforms in the DDF and contributes in charting a way forward and informing future innovation platforms on the opportunities to exploit and bottlenecks to observe.

1.2. Statement of the Problem

Access to information is a constraint for many actors in the smallholder dairy subsector, and uncertainty exists regarding the quality and reliability of the information that is available. Information gaps have been identified in areas such as markets, prices, credit, finance, business services, legal services, and effective group formation and management.

Actors in the dairy value chain such as smallholder farmers and traders lack awareness of where and how to access information. Further, in instances that they are aware of information sources, they are faced with the inability to access those sources principally because extension workers and research institutions have limited resources or opportunities for passing on information. Innovation platforms bringing together dairy industry stakeholders harbour the potential to improve accountability and quality of information, to benefit all in the industry. However, there are still limited conceptual frameworks for monitoring and evaluating innovation platforms on how they influence information sharing and impact on the overall performance of the dairy industry. However, little attention has been accorded to highlighting a comprehensive characterization of information sharing in innovation platforms. This study therefore, seeks to assess how the structure of innovation platforms influences information sharing and how this then influences the performance of the dairy industry particularly in regards to nurturing of smaller innovation platforms.

1.3. General Objective

The general objective of this research was to evaluate how the structure of the Tanzania dairy development forum impacts the information sharing among dairy value chain actors and impacts on nurturing of smaller regional innovation platforms for the development of the Tanzanian dairy industry.

1.3.1 Specific Objectives

The specific objectives of the research were;

i. To evaluate the extent that the structure of the Tanzania Dairy development forum impacts information sharing between dairy value chain actors within the Tanzania dairy industry.
ii. To examine the impact of information sharing within Tanzania dairy development forum on nurturing of regional innovation platforms in the Tanzania dairy industry.
iii. To examine how the structure of Tanzania dairy development forum impacts nurturing of regional innovation platforms in the Tanzania dairy industry.

1.4. Hypotheses

H1: The structure of the Tanzania dairy development forum does not positively impacts information sharing between dairy value chain actors within the Tanzania dairy industry

H2: Information sharing within and outside of the Tanzania Dairy development forum does not positively contribute to the nurturing of smaller innovation platforms.

H3: The structure of the Tanzania Dairy development forum does not positively contribute to the nurturing of smaller innovation platforms.

1.5. Justification

Information sharing and transfer of knowledge is nearly as important as the transfer of physical inputs and farm outputs (Juma, 2010). Innovation platforms have the potential to link supply and demand by enabling producer-consumer linkages through information sharing. Bolstered by a growing recognition of the need to involve a variety of different stakeholders in the innovation process, innovation platforms will undoubtedly trigger much needed changes in industries requiring multi-stakeholder coordination. Considering that, there is still limited choice of monitoring and evaluation frameworks capable to hold innovation platforms to account on benefits they are premised to bring to value chain actors, this study is very relevant to users, researchers, and the Tanzanian dairy industry. Besides testing and contributing to the refinement of a monitoring and evaluation tool, the study provides a baseline view of the Dairy Development Forum as a benchmark for other evaluative studies on the DDF. By highlighting how structure of innovation platforms and conduct of their actors influence overall performance of innovation platforms, the study results will guide the initiation of other innovation platforms in Tanzania's administrative regions, and elsewhere. Acknowledging that the innovation platforms foster the creation and dissemination of information necessary for development, adaptation, and future profitability of value chains, results from this study will greatly inform the essentials of nurturing innovation platforms.

1.6. Scope and limitation

1.6.1. Scope

In this study, DDF was considered as a national dairy innovation platform that is bringing together dairy value chain actors to share and generate ideas for the development of the Tanzania dairy industry. The study therefore primarily focused on how DDF is promoting information sharing and assisting in nurturing regional innovation platforms. The study did not

evaluate existing regional dairy innovation platforms in Tanzania because the conceptual framework for this study had already been tested on a regional dairy innovation platform previously (Diep *et al.*, 2014).

1.6.2. Limitation

There is limited literature on nurturing innovation platforms thus limiting amount of information available on this study. Further, DDF has only held three meetings and its impact on the Tanzania dairy industry might still have been minimal.

1.7. Definition of Terms

Innovation: An innovation entails the process of translating an idea or invention into a good, process, or service that will create value for value chain actors.

Innovation platform: An innovation platform as an equitable, dynamic space that brings together heterogeneous actors together to exchange knowledge and take action to solve a common problem (Cadilhon, 2013).

Information sharing: Information sharing is the practice of exchanging relevant data and knowledge between people or institutions to reduce information asymmetries (Yu *et al.*, 2001).

Nurturing: Help or encourage the development of a platform.

Nurturing innovation platforms: is the facilitation on formation and functioning of structures for innovation platforms across local, intermediate, or national levels to enhance vertical and horizontal linkages for value chain actors in the co-identification of value chain challenges and co-creation of solutions to those challenges.

CHAPTER TWO
LITERATURE REVIEW

2.1 Overview of Innovation Platforms

There have been different agricultural approaches aimed at revolutionizing smallholder agriculture. In the 1960s and 1970s, agricultural innovation was promoted in a linear approach whereby scientists would develop technologies that would then be transferred to farmers. This linear approach regarded scientists as the core generators of knowledge and farmers were supposed to adopt recommended technologies. The model was criticized for its top-down approach that failed to acknowledge contributions to agricultural innovations by farmers (Pali & Swaans, 2013).

Inevitably, the linear approach was replaced by more participatory approaches in the 1980s that were regarded to be more holistic. The participatory approaches included Farmer Field Schools (FFS) and Farming Systems Research (FSR). However, the participatory approaches only involved researchers and farmers and failed to acknowledge the important role played by other institutional agricultural stakeholders involved in policymaking and support services, among other roles. This necessitated the introduction of system approaches in the 1990s.

The Agricultural Knowledge and Information Systems (AKIS) were particularly popular in the 1990s while Innovation Systems that focused on application of knowledge for social and economic use gained prominence in the 2000s. The innovation systems premised that enhanced interactions between value chain actors were critical in improving communication, information exchange, and tackling of common problems in the value chain. Innovation platforms are based on the concept of innovation systems and focus on enhancing collaboration among different stakeholders in agricultural value chains to support agricultural research for development. Different names including multi-stakeholder platforms, learning alliances, innovation networks, inter-professional platforms, and R4D platforms among others are used to refer to innovation platform (Pali & Swaans, 2013). A major difference between an innovation platform and a cooperative is that cooperatives involve only one type of value chain actor while innovation platforms encompass multiple actors.

In the dairy industry, innovation platforms facilitate dialogue between actors in the value chain including farmers, input suppliers, traders, transporters, processors, distributors, service providers, extension workers, regulators, and the research and development partners.

According to Adekunle and Fatunbi, (2012) an innovation platform depicts a dynamic network of stakeholders interacting and learning together towards the generation, dissemination, and continuous adoption of technological output. As dynamic entities, innovation platforms often have an evolving membership that draws relevant expertise based on the problem being addressed.

2.2 Need for innovation platforms

Innovation platforms greatly improve markets through improvement of institutions, infrastructure, access to markets, information sharing, and access to credible information that is vetted before its dissemination through alternative channels of information exchange. This is attained through removal of institutional and policy-related barriers by engaging policy makers both nationally and regionally to identify shortcomings in existing policies and proposing new ones. Ultimately, this results in the reformation of markets by making them more transparent and organized. Further, innovation platforms also influence production by aligning production strategies of producers with market demands through identification and promotion of technologies that address quantity and quality of dairy products (Van Rooyen & Homann, 2007).

Kilelu *et al.*, (2013) view innovation platforms as the result of a realization that innovation occurs through collective interplay among actors and is influenced by policies, rules, regulations, infrastructure, technology, and cultural norms. Klerkx, *et al.* (2010) highlight that innovation platforms are continuously being regarded as a critical intervention for creating dynamic spaces that orients interaction to enable innovations. This then stimulates changes among the platform actors and within the wider environment in which the actors operate.

Innovation platforms perform varied functions that include information brokering whereby through innovation platforms, actors are able to identify information needs of the different actors and facilitate its gathering from different sources, synthesis and dissemination. Further, they address institutional failures through advocacy and interaction with regulatory bodies, innovation platforms institute policy changes and attract institutional support besides facilitating capacity building to enable the improvement in knowledge and skills of platform actors while nurturing and strengthening new organizational frameworks. Kilelu *et al.* (2011) observe that innovation platforms also enable demand articulation whereby stakeholders are able to identify opportunities and challenges affecting their value chains through visioning, and assessment of their needs. At times, these needs include information, finances, or technologies.

Lastly, there is easier coordination of the innovation process under innovation platforms. This is because of facilitated negotiation and ability to learn from varied stakeholders acting jointly through innovation platforms.

2.3 Overview of the dairy industry in Tanzania

Dairying on a commercial basis was started in 1921 through the establishment of Temeke dairy farm by European settler dairy farmers in Tanzania that was then called Tanganyika. Temeke dairy farm was located in the present day Central Veterinary Laboratory, five kilometres from Dar es Salaam. This was followed by the establishment of Kingolwira in 1949 on the outskirts of Morogoro, about 200 km west of Dar es Salaam. Shortly thereafter, the Tanzanian government assumed a regulatory role after handing over Temeke milk deliveries to the privately-owned Express Dairy.

To regulate the dairy industry, the Tanzanian government formulated Dairy Industry Ordinance No. 61 Cap. 456 of the laws of Tanganyika in 1961. The law established Zonal Dairy Boards in areas that were producing sufficient milk that could warrant the establishment of a dairy plant. The Zonal Dairy Boards were mandated to: open and run dairy farms and milk processing plants; collect, cool, and market milk and milk products from farmers; strengthen the links between farmers, milk producers, and distributors; conduct market research and education relevant to specialized groups within the dairy industry; and provide essential services to dairy farmers and processors including registration, licensing, veterinary services, livestock input, and testing and grading of milk (Sumberg, 1997). During this period, farmers owned between 15 percent and 40 percent of the share capital in the processing plants.

The two five-year development plans (1964-1969, and 1969-1974) revealed a growing gap between domestic milk production and national milk demand. This impelled the Dairy Industry Ordinance No.61 Cap.456 and the Zonal Dairy Boards to be scrapped. Instead, the 1965 Dairy Industry Act No.32 Cap.590 of the Laws of Tanzania recommended the establishment of a government controlled National Dairy Board (NDB). The National Dairy Board had eleven members, of which, seven were representatives of the dairy industry. The National Dairy Board was mandated with: advising the government on issues affecting the dairy sector; establishing and running dairy farms and milk processing plants; fixing milk prices; making by-laws for safeguarding the dairy industry; promoting, organizing, regulating, and developing the production, processing, marketing, and distribution of milk and milk products; improving the quality of milk and milk products; promoting market research related

to milk and milk products; and registering and licensing all dairy industry players. Between 1965 and 1970, there was marked nationalization of large-scale dairy farms previously owned by European settlers and processing plants. Consequently, farmers lost their shareholding in milk processing plants while the plants lost their partnerships with farmers.

The National Dairy Board became defunct in 1973, whereby, upon the expiry of board members' tenure, the Minister of Agriculture did not appoint new board members. Instead, the Livestock Development Authority (LIDA) was established in 1974 to oversee two subsidiary companies – the Dairy Farming Company (DAFCO), and Tanzanian Dairies Limited (TDL) - both established in 1975. DAFCO focused on milk production while TDL focused on milk processing and marketing. The two dairy parastatals were unsuccessful and their failure was attributed to poor governance, mismanagement, foreign currency shortages, and unavailability of suitable dairy cattle to increase milk production. Consequently, following policy changes, the two dairy parastatals were privatized in 1995.

In the 1980s, dairy industry stakeholders realized the need to transform the dairy sector as a means of alleviating poverty in rural households and attain national sufficiency in milk and milk products. This was to be pursued through encouragement of smallholder production. From the mid-1980s, the Tanzania dairy industry started receiving support from different dairy development partners supporting smallholder dairy development through a variety of projects. These included AustroProject Association (APA) supporting pastoral communities in the coast regions of Tanzania to access milk markets in Dar es Salaam, Dutch government supporting Kagera Dairy Development Project (KALIDEP) and the Tanga Dairy Development Project, Swiss government funding the Southern Highlands Dairy Development (SHDDP), and heifer-in-trust scheme initiated by Heifer project international (Kurwijila, 2002).

The presence of multiple dairy development partners in Tanzania was a welcome opportunity to grow the dairy industry. However, the partners were uncoordinated and there were issues of replication of efforts and a necessity for a coordination mechanism amongst dairy development partners. The dairy development partners acknowledged this need and initiated a National Dairy Development Conference (NDDC) in 1996. Specifically, the National Dairy Development Conference (NDDC) was a consultative conference where the partners could report on their progress, share challenges they had encountered in their activities, and discuss their future plans (Land O'Lakes, 2007).

The need for a national coordination mechanism was prominent during the 2004 National Dairy Development Conference when Southern Highlands Dairy Development (SHDDP) did not attend the conference after winding up its projects. Further, AustroProject Association (APA) and Smallholder Dairy Support Programme (SDSP) were winding up their activities within a year. Consequently, progress reports were not presented during the conference and no National Dairy Development Conference (NDDC) was held again until 2012 due to closure of most organizations. However, by the time of collapse of the National Dairy Development Conference, the conference has managed to institute changes in the dairy industry through drafting a dairy industry bill that was enacted in the Tanzania laws in 2004 as Dairy Industry Act, 2004 (CAP 262) (Tanzania Dairy Board, 2013). In 2012, National Dairy Development Conference (NDDC) convened and proposed the establishment of a dairy development forum.

2.3.1 History of Innovation platforms in Tanzania

Innovation platforms were introduced in Tanzania by Research Into Use (RIU) funded by DFID in 2007. Through a consultancy report, RIU selected the eastern zone of Tanzania because it had a good representation of all Tanzanian agro ecological zones. Consequently, three regions from the eastern zone were selected including Tanga, Pwani, and Morogoro. Regional authorities were consulted to outline the agricultural priorities of their regions. Morogoro prioritized access to draught power and management of post-harvest losses. Tanga prioritized fishing, fruit, and dairy processing. In Pwani, the lack of entrepreneurship skills was highlighted as key driver of project failures (Nederlof *et al.*, 2011).

After conducting initial stakeholder platform meetings, RIU was able to identify key challenges for each region. In Morogoro region, both mechanization and post-harvest management were selected for implementation with focus on maize and rice crops. However, for Tanga, only dairy was selected due to immense investments that had already been made and RIU management considered that some re-organizations of the Tanga dairy sector would make the dairy value chain there more efficient. Pwani region retained entrepreneurship but specifically focused on poultry, particularly local breeds of chicken (Hall, 2011).

The three innovation platforms were designed anticipating interaction of the stakeholders at three levels; National level, middle level and local level. The National Innovation Coalition provided national level stakeholder interaction and its roles were to advise the RIU Programme and prompt institutional change at the national level. At the middle level,

innovation platforms facilitated the implementation of specific topics by stakeholders. At the local level, interaction between stakeholders, usually farmers were being coordinated by farmer champions. Interestingly, the National Innovation Coalition was discontinued after supporting the initial decisions (Nederlof *et al.*, 2011).

The National Innovation Coalition is comparable to the Dairy Development Forum, though the National Innovation Coalition supported innovation platforms dealing with different agricultural enterprises while the Dairy Development Forum specializes in the dairy industry.

2.3.2 Tanzania Dairy Development Forum

The establishment of the Tanzania Dairy Development Forum (DDF) was the culmination of efforts by the National Dairy Development Conference (NDDC) stakeholders (ILRI, CIAT, & SUA, 2012). The Dairy Development Forum was initiated in February 2013 to facilitate nurturing of smaller innovation platforms; act as a non-formal consultative forum in which dairy industry stakeholders could come together for knowledge and information sharing; convene periodically as a national innovation platform that would aggregate dairy industry information, synthesize it, and disseminate it; promote evidence-based information sharing to attract public and private sector investments; and promote professionalization of Tanzania dairy industry through adoption of best practices and standards(Tanzania Dairy Board, 2013). Currently, the DDF is usually co-hosted by the Tanzania Dairy Board (TDB), Sokoine University of Agriculture (SUA), the International Livestock and Research Institute (ILRI), International Center for Tropical Agriculture (CIAT), Heifer Project International (HPI), The Netherlands Development Organization (SNV), Land O' Lakes, and the Tanzania Ministry of Livestock and Fisheries Development (MLDF) (Maziwa Zaidi R4D, 2014).

The Dairy Development Forum brings together varied dairy value chain actors and stakeholders involved in various dairy development projects to grow the dairy industry. The forum operates under the umbrella of the Tanzania Dairy Board and through its annual meetings, enables dairy sector stakeholders to share experiences, get challenged, learn from the forum, build consensus, and develop a common purpose that guides the direction of growth for the Tanzania dairy sector. Ideally, the DDF is intended to outlive dairy development projects initiated by development partners. To ensure that the DDF is not affected by the exit of dairy development partners, the secretariat of DDF is maintained and run by the Tanzania Dairy Board (Tanzania Dairy Board, 2013).

During the second DDF meeting on 22 August 2013, discussions entailed how the DDF could make its input in expanding and improving the national dairy herd, enacting business solutions to ensure feed supply throughout the year, and build capacity for dairy technologies while expanding agribusiness for inputs and services. This was followed by a third DDF meeting on 6 February 2014 that re-emphasized the need to fill gaps in dairy technology, expand the national dairy herd, and identify business solutions for ensuring year-round feed availability. The third DDF meeting also identified the need for facilitation of innovation platforms as a major issue. To pursue this objective, the meeting resolved that DDF would assist to develop the capacity and skills to facilitate innovation platforms in the dairy industry, provide leadership for coordinated capacity development on facilitation skills, and ensure the creation of optimal structures and skills at the national, regional, district, and village levels (Tanzania Dairy Board, 2013).

The structure of the Dairy Development Forum can be depicted as illustrated in Figure 1;

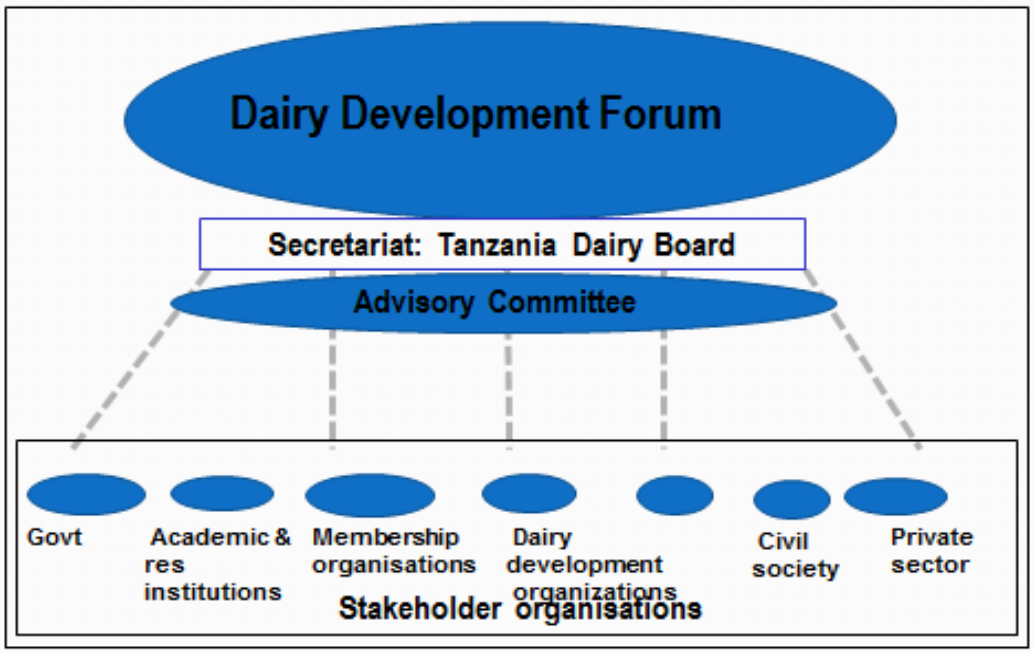

Figure 1: Structure of Dairy Development Forum,

Source: (Tanzania Dairy Board, 2013)

DDF is run by the Tanzania Dairy Board to ensure its stability even when projects by some of the most supportive development partners cease. It further draws its participants from government representatives particularly from livestock agencies, academic institutions

involved in agricultural courses, interested civil society parties, the private sector such as dairy processors and value addition agents.

2.4 Information sharing

Sun and Yen, (2005) regard information sharing as a plethora of activities that enable distribution of useful information in an open environment among multiple entities that may include people, organizational units, and systems. Effective sharing of information entails considerations of what to share, whom to share with, how to share it, and when to share thus managing costs while avoiding information overload or deficiency to recipients.

The need for information sharing stems from the high costs of information asymmetry in a value chain. Simatupang and Sridharan, (2001) regard information as the existence of different states of private information in a supply chain, particularly in relation to resources, chain operations, and data related to costs, market conditions, and performance status. As a result, value chain actors hoarding private information from other value chain actors practice opportunistic behaviour and the other actors make sub-optimal decisions due to difficulties of dealing with market uncertainty.

According to Kaipia and Hartiala, (2006) information sharing within a value chain does not necessarily entail sharing all information with every actor in the value chain. Instead, information sharing entails disseminating relevant and meaningful information capable of being acted upon by other value chain actors to improve the performance of the value chain. Fundamentally, information sharing is supposed to occur within useful timelines to ensure that it does not become obsolete by the time of access by targeted recipients.

Wu *et al.* (2004) argue that the flow of information in a value chain influences productivity and innovation because timely information enables the actors to act and plan their future activities appropriately. This is supported by Maurer (2011), who adds that delays in transmitting or responding to shared information negatively affects the efficiency of the value chain. Croom *et al.* (2007) concur with this view and add that the impact on performance of the value chain depends on what information is shared, how it is shared, and with whom.

Ibrahim and Ogunyemi, (2012) identify various factors that influence the value of information sharing. These include timeliness and accuracy of the information, the source of the information, the extent of information shared, and the predictive power of the shared information. Further, there are costs to members who share information including increased

vulnerability to opportunistic behaviours, potential deleterious channel network effects, and loss of expert power.

According to Yu *et al.* (2001), every actor in a value chain have perfect information about themselves. However, due to lack of perfect information about other members, uncertainties arise in the value chain resulting in inefficiencies along the value chain. These uncertainties can be reduced by ensuring vertical information sharing to ensure that each actor has more information about other actors. This results in improvements in performance of the whole value chain because each actor can gain improvement from information sharing.

Actors in the value chain must be prepared to share data free of charge. Sharing information between value chain trading partners results in improved information flow, and consequently, improved collaboration to serve consumers better. Simatupang and Sridharan, (2001) consequently regard mutual collaboration in information sharing as a major commitment towards eliminating information asymmetry amongst value chain actors. This eases opportunism and uncertainty in the market and enables the actors to create competitive advantages.

Stringfellow *et al.* (1997) ascertained through their study in Sub-Saharan Africa that collaboration among actors in the agricultural value chain resulted in improved access to agricultural services, markets, and higher prevalence of value addition. These findings are consistent with those of Chau *et al.,* (2004) whose study in Vietnam amongst farmers collaborating through cooperatives showed increased access to market information, training, technical information, increased sharing of knowledge and experiences, easier access to inputs at lower prices, increased insight in markets, and deeper insight in the value chain. However, Simatupang and Sridharan, (2001) warn that the benefits arising from information sharing must be fairly distributed in accordance with the contribution of each member. Failure to achieve fair distribution of information sharing benefits demoralizes actors with superior information or higher economic value.

Karamagi and Nakirya, (n.d.) opine that farmers harbour immense information capable of improving their livelihoods. However, they often lack platforms and resources to enable them to disseminate this information to others. In Uganda, Busoga Rural Open Source and Development Initiative (BROSDI) uses village knowledge brokers to collect, store, analyse and disseminate agricultural information within agricultural communities. This sharing of indigenous knowledge has made a significant impact in resolving agricultural problems at the

household level. However, in Tanzania, Chilimo (2008) found that 93% of rural smallholder farmers made efforts to seek information. These farmers reported the unavailability of service providers, inability to access required information, receipt of inadequate information, lack of time to seek information extensively, and sometimes unfamiliarity of where to find information.

A study by Mäki *et al.,* (2013) on the influence of decentralization of members sharing common information databases revealed a varied ability to locate and access information and knowledge from the common information databases. Further, the researchers recorded complaints by members that the databases contained too much information and it was therefore tedious locating the required information and knowledge. As a result, there was difficulty to maintain mutual knowledge and understanding thus causing distrust, misunderstanding, and frustration among members. These findings highlight the need for targeted information sharing.

2.4.1 Influence of communication methods on information sharing

Sahin and Robinson (2002), argued that communication methods are enabling technologies for information sharing and therefore have a relatively straightforward influence. Wognum *et al.,* (2002) considered that despite great advances in communication technologies, face-to-face communication is still highly regarded as the most effective method of communicating information. Consequently, the advances in communication technologies provide just additional opportunities to facilitate timely and accurate exchange of information. This is upheld by Cadilhon, (2013) that, physical interactions enable the building of strong and stable inter-personal relationships. Further, Badibanga *et al.,* (2013) have shown in their findings that physical participation by stakeholders in multi-stakeholder platform assemblies in the Democratic Republic of Congo has a positive impact on the effectiveness of the platform.

According to Smit (2006), face-to-face interactions create better relationships and raise the level of information sharing. As such, technology is supposed to augment and promote information sharing and collaboration but not replace these face-to-face interactions. This is a great pointer that the agglomeration of members of innovation platforms is the most effective method for fruitful interactions. Innovation platforms provide a formalized network through which its members can freely engage in information sharing. Elsenhardt and Martin, (2000) contend that formal networks between members initiate informal networks that enhance collaboration competencies. This is because individual expectations of other collaborative members are diverse and therefore cannot be completely formalized within the platforms. As

a result, formal and informal networks are both complementary in reducing information asymmetry.

2.4.2 Benefits of information sharing

The need for ensuring availability and easy access of information to those reliant on it is fundamental. According to Maru, (n.d.), there is need to create agricultural open data repositories that are globally linked using agreed ontologies for the data to be understandable to everyone. Essentially, information sharing ensures localization of globally available information and knowledge in solving local agricultural issues. Further, it contributes to generation of new information and knowledge, reduces replication of research efforts, enhances equity in access and use of available agricultural knowledge across communities, and attracts specialized skills into agricultural research. Overall, this increases the effectiveness and efficiency of research outputs through cost, human effort, time, and quality (Pali & Swaans, 2013).

Ibrahim and Ogunyemi, (2012) while testing the impact of linkages and information sharing on the performance of supply chain and exports ascertained that stronger linkages and higher levels of information sharing between actors along the supply chain had a strong positive correlation to the performance of the supply chain and exports.

2.4.3 Barriers to information sharing

Information asymmetries amongst value chain actors results in adverse selection and moral hazards. Adverse selection refers to whenever lack of adequate information results in undesired results, while moral hazard means that some actors in the value chain, driven by lack of information act less carefully and leave others to bear the costs of their actions (Akerlof, 1970). However, despite these risks, Fawcett *et al.* (2005) highlight that most organizations are unwilling to share information that may put them at a competitive disadvantage. As a result, tremendous amounts of information remain inaccessible to other value chain actors. However, Mendelson, (2000) states that the extent of information sharing in a value chain is entirely dependent on the willingness of individual organizations to share information openly, honestly and frequently. Consequently, for a value chain to attain efficiency through information sharing, the diverse firms comprising it must embrace a high degree of information sharing.

According to a study conducted in Kirinyaga – Kenya by Munyua and Stilwell, (2010), farmers and farmers groups in several parts of Kirinyaga County encountered similar barriers

and constraints in accessing and sharing agricultural information and knowledge. Specifically, farmers reported unavailability of information providers, low awareness of available information and sources, mistrust of information quality due to poor coordination, inadequate resources to enhance information sharing, poor communication networks for channelling information, and illiteracy thus limiting their understanding of shared information.

2.5 Nurturing smaller innovation platforms

In the context of this study, smaller innovation platforms are those not on a national level like DDF. For example, innovation platforms at the regional, district, or village levels. Anandajayasekeram *et al.,* (2009) identify various levels of supporting smaller innovation platforms to achieve their objectives. These levels include; nurturing, developing, commercializing, and managing their processes. During the nurturing stage, the purpose is to create an environment for innovation that is defined by openness, trust, security, and honesty among other values. Thus, activities during the nurturing stage entail promoting organizational values, communication, information sharing, and developing of personal and institutional values.

According to Thiele *et al.* (2011), the complex membership and potential conflict necessitates the need for facilitation during the initial stages of establishment. This is because the establishment phase of an innovation platform can be lengthy during mutual learning and definition of roles can be challenging to have a consensus among all members.

According to Pali and Swaans, (2013), facilitators of innovation platforms should focus on building on existing structures and activities, maintain a participatory approach and local ownership, build capacity for facilitating IP formation and functioning, create linkages for communication between innovation platforms at the village and regional levels and put structures in place for monitoring and evaluation. Monitoring and evaluation of innovation platforms is a key component that is critical in ascertaining the level of accomplishment of planned outcomes.

Ayele *et al.,* (2012) argue that it is important to recognize that co-evolution is a critical factor in promoting smallholder agricultural development. Consequently, interventions should focus on supporting interaction between multiple actors at different levels of value chains and production systems to trigger innovation and enhance livelihoods. The view for supporting innovation platforms is shared by Leeuwis, (2013), with views that innovation platforms do

not just merge autonomously. Instead, there is need for guidance and facilitation from experienced consultants in forging connections between members and coordinating their interactions during the initial establishment phases to streamline the multi-actor configurations.

In assisting on the formation, it is important to acknowledge the challenges of inclusive and participatory change processes in specific consideration of individuals, relationships, culture, and institutions and systems. Individual challenges entail competencies in problem solving, communication, dissociation from problems identified by innovation platform participants, and dishonesty in expressing opinions. Relationships between innovation platform members are likely to suffer from lack of trust, power asymmetries, competition, poor communication, and dysfunctional relationships. On culture, challenges are likely to entail weak culture of civic engagement, collision of social norms, and patterns of exclusion. Similarly, institutions and systems are likely to have weak or lacking structures, existence of inadequate policies and mechanisms, and structural violence. These attributes are very crucial to observe while nurturing smaller innovation platforms (Raelin, 2008).

On the premise of the above challenges, it is evident that instituting change among smallholder farmers interacting through participation in innovation platforms with other value chain stakeholders requires a focus on individual members, relationship networks, cultural practices, and institutions and systems in place. For individuals, it is important to institute personal transformation by helping them grow and develop greater self-awareness. Further, assisting individuals to build their knowledge and skills through training is critical in capacity building. In regard to relationships, facilitators nurturing smaller innovation platforms should focus on building trust, promoting respect and equality, reconciliation and resolution of conflict, and changing patterns of dysfunctional relations. Similarly, culture is a key variant in the success of innovation platforms. Therefore, it is fundamental to promote a culture of civic engagement, and transform patterns that are overly simplistic or that encourage distorted discourse. Lastly, institutions and systems have to be reformed to ensure redistribution of resources, and greater level of lobbying to ensure greater transparency and accountability (Beck & Purcell, 2013).

According to Prato *et al.,* (2012) the best way for development partners to ensure that positive change is witnessed is through supporting participatory and accountable knowledge and advisory processes, and through participation in policy and governance processes. This can be easily attained through strengthening the capability of the rural poor through their own

organizations and through adoption of flexible mechanisms like innovation platforms as stated by Cadilhon *et al.* (2013).

Acknowledging the challenges that belabour the initiation phase of innovation platforms, it is critical to involve experienced facilitators or existing platforms to offer guidance and nurture capacity of young innovation platforms. Such nurturing efforts must be wholesome ranging from the planning of platform initiation meetings, management of competing or conflicting interests between value chain actors, co-identification of key value chain challenges and co-resolving them, and the progression of focus topics and dynamism of membership depending on platform focus. Summarily therefore, nurturing of innovation platforms entails the facilitation of the establishment phase of an innovation platform and provision of guidance to platform members during the joint identification of value chain challenges, co-creation of solutions, and change of focus to new issues whenever prior problems are resolved.

2.6 Theoretical Framework

2.6.1 New Institutional Economics (NIE)

The failure of neoclassical theory to provide adequate explanations of how markets work provides a foundation for the new institutional economics. Particularly, the quest to explain individual and organizational choices unexplained by the neoclassical economics that posits prefect rationality and foresight has greatly influenced the growth of new institutional economics. NIE envisions much less perfect markets driven by bounded rational actors with imperfect foresight and positive transaction costs (Arnsperger & Varoufakis, 2006).

Williamson, (2000) discusses that the new institutional economics views institutions as outcomes of decisions of agents whom are both rational, and interested in maximization of utility. As a result, NIE thus becomes more interested in the processes of structural transformation through emergence and change of institutions. Scott, (2001) adds that whereas much emphasis of institutional theory is on convergent change drivers giving rise to institutions, deinstitutionalization is an equally important process since the weakening and disappearance of institutions may signal changes in beliefs and practices thus also resulting in institutional change.

Different sources of pressure influence institutions to change. Mahoney and Thelen, (2009) categorize these pressurizing sources into political, social, or functional pressures. Therefore, besides institutional change being motivated politically and socially, it may be functionally instigated due to observed weaknesses in the institutional systems.

2.6.2 Structural – Conduct – Performance Paradigm

The structural-conduct-performance paradigm (SCP) is the foundation of industrial organization theory. The principle ideas of SCP paradigm were introduced by Mason in the 1930s, though the paradigm was formulated by Bain in the 1950s.

The SCP paradigm hypothesizes that the overall performance of an industry is influenced by the conduct of the firms within the industry, which in turn is determined by the structure of the industry (Grigorova & Hüschelrath, 2008). SCP paradigm is widely used because it allows the breakdown of complex industry-level data into meaningful categories.

The SCP paradigm has been elaborated and modified to reflect the specificities of the Tanzania dairy industry. The use of SCP paradigm in this study does not apply in the context of neoclassical economics, but rather, only the logic of influences between structure, conduct, and performance elements. Despite the SCP paradigm application in innovation platforms as in this study being incompatible with neoclassical economics, it is much relevant in the context of New Institutional Economics. Basically, structure, conduct and performance categories have been co-opted in examining how the structure of the Tanzania Dairy Development Forum influence the conduct of its members, and how this conduct impacts on the performance of the dairy value chain actors in Tanzania.

The elements of conduct of this framework are based on Cadilhon (2013) whose conceptual framework for evaluating the impact of innovation platforms identifies five elements of conduct in innovation platforms namely; information sharing, trust, coordination, communication, and joint planning. The author identifies these elements from the literature on marketing relationships as key components of value chain actors' conduct, and which also fit the context of multi-stakeholder groups like innovation platforms.

The performance elements have been derived from the functions and objectives of the DDF that include; facilitating the nurturing of smaller innovation platforms; acting as a non-formal consultative forum for knowledge and information sharing; convening periodically as a national innovation platform to aggregate dairy industry information, synthesize it, and disseminate it; promoting evidence-based information sharing to attract public and private sector investments; and promoting the professionalization of the Tanzania dairy industry through adoption of best practices and standards to enhance market access (Tanzania Dairy Board, 2013). It is notable that out of the five objectives, three of them are related to

information sharing while the remaining two focus on nurturing smaller innovation platforms and promoting professionalizing of the dairy industry.

Structural elements

In S-C-P analysis, structure is deemed to refer to relatively stable attributes that influence the behaviour among buyers and sellers within a market. Elements of structure that were normally applied in industrial organization theory include the number of competitors, degree of product differentiation, degree of vertical integration, conditions for entry and exit, cost structure and the degree of rivalry among them. The market structure was assumed to be exogenously influenced by elements of supply and demand (Cabral, 2000).

The concepts of SCP paradigm on market structure are modified in this study to make them applicable to the Tanzania Dairy Development Forum. Consequently, elements of innovation platform structure will be defined by;

i. Type of organizations
ii. Type of chain stakeholders participating
iii. Frequency of participation in innovation platforms meetings
iv. Geographical location
v. Gender
vi. Education

Conduct elements

Conduct elements in the SCP model are defined by behaviours of market participants aimed at adapting to, or to influence the market structures. Elements of conduct include prices, product designs, research and development, investments, promotions and advertising, collusion, and mergers. However, given the literature on the components of successful business-to-business relationships also relevant to the purpose of this study on innovation platforms for value chains development (Cadilhon 2013), elements of conduct will be modified to include;

i. Information sharing
ii. Joint planning
iii. Coordination
iv. Trust, and
v. Communication

Performance elements

Market performance in the SCP paradigm refers to the extent to which market outcomes influence the degree of economic efficiency. Importantly, market performance entails all the interacting market actors collectively instead of individual actors. The performance elements include profitability, productive efficiency, allocative efficiency, quality of products and services, growth, and technological progress (Fu, 2003). In this study however, elements of market performance were redefined to relate more closely to the objectives of the DDF. These objectives included nurturing of smaller innovation platforms.

2.7 Conceptual Framework

The conceptual framework of this study is based on a previous framework developed by Cadilhon that is grounded on the neoclassical theory of the firm that assumes direct links between the market structure, conduct of the firm, and performance (Cadilhon & Dedieu, 2011). In this study, it is hypothesized that the structure of the DDF has a direct influence on the conduct of its members who are actors in the dairy value chain, and this conduct influences the performance of the dairy industry in Tanzania. The Figure 2 therefore illustrates the conceptual framework on the basis of the SCP paradigm;

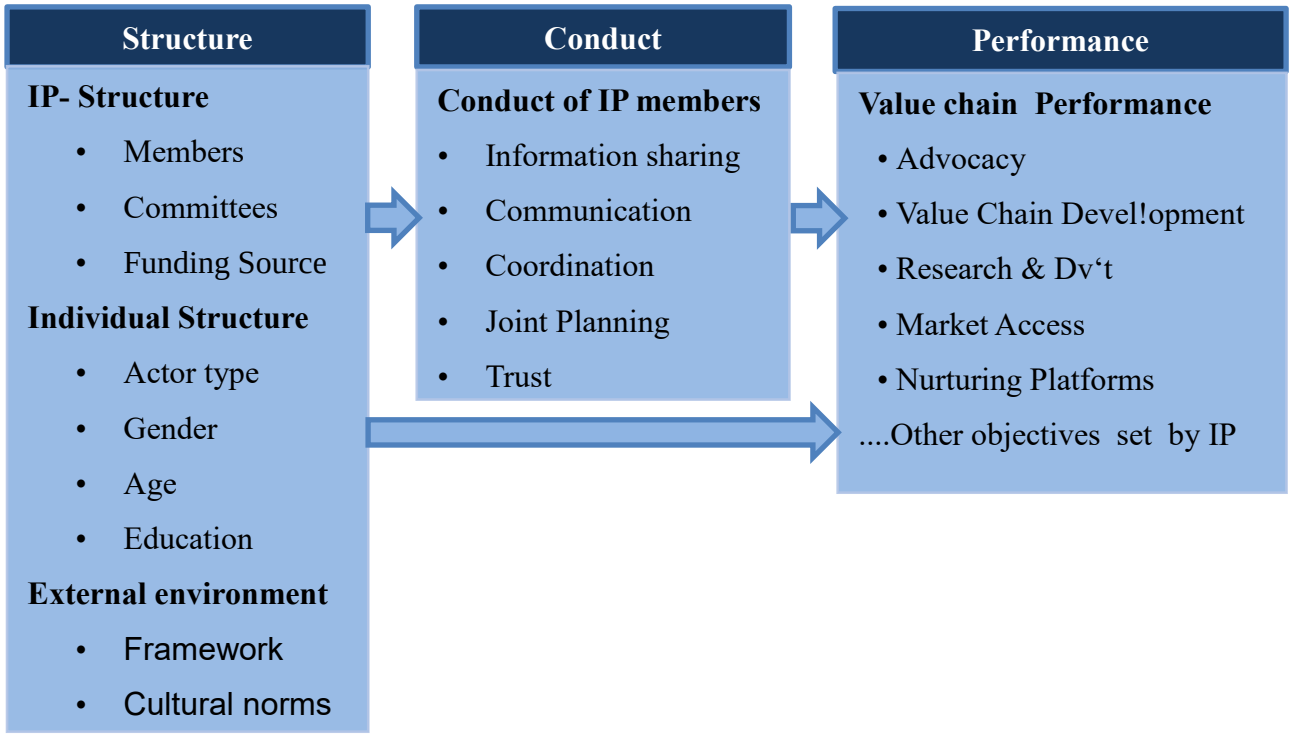

Figure 2: Conceptual Framework

The use of this conceptual framework acknowledges the criticism that causality between structure and conduct can also run the other way around. That is, the conduct of an actor can shape the market structure within which the actor operates thus implying that the market structure can be endogenously determined:

Structure $\longleftrightarrow$ Conduct $\longrightarrow$ Performance

The model also acknowledges the contentions that the relationship between conduct and performance may also be weak, whereby performance can also affect conduct:

Structure $\longleftrightarrow$ Conduct $\longleftrightarrow$ Performance

Nevertheless, the structure, conduct, and performance elements identified for investigation in this study will determine the essential relationships between them to deepen understanding of the Tanzania dairy industry (Papatheodorou, 2006).

CHAPTER THREE
METHODOLOGY

3.1 Study Area

Tanzania is one of the 54 African countries and has a total land area of 945,203 KM² with human population estimated at 49.1 million (Woods, 2007). It is located in the East Africa region, south of equator and lies between South latitudes 1^0 and 12^0 and longitudes 29^0 and 41^0 to the East. It shares borders with Kenya, Uganda, Burundi, Rwanda, Malawi, Democratic Republic of Congo, and Mozambique. It also has a frontier to the Indian Ocean. The areas covered in this study are as highlighted in the map ;

Figure 3: Map of Tanzania

The major economic activity is agriculture that provides livelihood to 75 per cent of the population and contributes an estimated 28 per cent to the GDP. The climate ranges from temperate in the highlands to tropical along the coast. Most of the country lies above 200 m

above sea level with 5000 m being the highest altitude on top of Mount Kilimanjaro, the highest point in Africa. In this study, most of the DDF respondents were within Dar es Salaam region because most of the DDF meetings have been held in Dar es Salaam.

3.2 Sampling Design

In sampling individual respondents, a listing of all participants during previous Dairy Development Forum meetings was done. All DDF participants who were either Tanzania citizens or residents formed the target population of this study. A sample of 88 (determined as adequate as shown in the formula below) respondents was then drawn from a population of 114 DDF participants. The population was stratified such that input suppliers, producers, processors, development partners, policy makers, and research and academic institutions were represented proportionately to their participation in the DDF meetings. The formula used to determine the sample size is as recommended by Bartlett *et al.,* (2001) and is calculated as;

$$Sample\ size = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \frac{z^2 \times p(1-p)}{e^2 N}}$$

Where;

N = population size

e =margin of error / confidence interval (0.05)

z = z-score (at 95% confidence level use 1.96)

p = percentage of picking a choice, expressed as decimal (Assuming normal distribution, 0.5 is adequate).

Based on the above formula, a sample size was determined through the following computation;

$$n = \frac{\frac{z^2 \times p(1-p)}{e^2}}{1 + \frac{z^2 \times p(1-p)}{e^2 N}} = \frac{\frac{1.96^2 \times 0.5(1-0.5)}{0.05^2}}{1 + \frac{1.96^2 \times 0.5\ (1-0.5\ )}{0.05^2 (114)}} = 87.912$$

Cognizant that the DDF participants presented different nodes of the dairy value chain, stratified random sampling was done to ensure proportional representation of each value chain actor in the sample. The strata included; input suppliers, producers, processors, development partners, policy makers, and research and academic institutions. A proportionate random sample was then drawn from each stratum. The total selected respondents from all the strata therefore made up the stratified random sample, equivalent to the sample size of 88 as determined by the Bartlett *et al.,* (2001) formula above .

The size of each stratum sample was determined by the fraction of the strata to the total DDF population multiplied by the strata size as outlined by Jani, (2014), such that;

$$f = \frac{x}{N} \times 88$$

Where x = strata population

N = Population size (The DDF population comprised of all Tanzanian nationals and residents who had participated in at least one DDF meeting)

f = strata sample size

Table 1: Determination of sample size for the DDF Strata

Value Chain Actor		Population Size (N)	Sample size (n) $\mathbf{f = x/N \times 88}$
1.	Input suppliers	24	18
2.	Producers / Producer groups	19	14
3.	Processors / Processor Groups	10	8
4.	Traders (Trader groups / individuals)	1	2
5.	Academic / research organizations	8	6
6.	Development partners	16	12
7.	Policy making	36	28
Total		114	88

Since the target population was both DDF participants and non-DDF participants, 44 DDF participants were targeted, and a matching number of 44 non-DDF participants identified through paired sampling. Paired sampling was carried out by requesting the interviewed DDF participants to suggest two or three names of non-DDF participants within the same dairy value chain category with similar or almost similar scale of operations as the DDF participant interviewee. From the provided names, one non-DDF participant was randomly selected from the suggested names and an interview arranged. The selection of a control group through paired sampling was most suited because the recommended non-DDF participants were within the same geographical proximity and were engaged in the dairy industry at similar value chain nodes at almost equal scales with the DDF members thus making them comparable.

Purposive sampling was used to select key informants. This was necessary to ensure that each actor in the value chain was represented in the survey. Five key informant interviews

were conducted. The key informant interviews were helpful in gathering data on the structure of the platform and gave insight on how the structure of the DDF influenced conduct and performance of the participants.

3.3 Data Collection Procedure

Primary data was collected from both DDF participants and non-DDF participants in the Tanzania dairy industry over duration of three months. Half of the sampled respondents were Dairy Development Forum participants and the rest were non-participants of the forum. Qualitative and quantitative data were collected through three direct methods including conducting focus group discussions, holding key informant interviews, and administering individual questionnaires to DDF participants and non-DDF participants.

A five-point Likert scale (1= strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree) was used in collecting qualitative data from individual stakeholders and key informants regarding their agreement levels to certain statements representing elements of Conduct (information sharing), and Performance (nurturing innovation platforms). The statements on Conduct, and Performance elements were identified through literature review, while some had been used in previous studies that had contributed to the separate testing and refining of the SCP conceptual framework. Data on structure included participation in DDF meetings, age of respondents, education levels, actor type in value chain, and regions that the respondents operated from.

3.4 Data Analysis

Descriptive and inferential statistics were used to characterize trends in information sharing and nurturing of smaller innovation platforms among Tanzania Dairy Development Forum members and non-members. For inference, factor analysis and Structural Equation Modelling (SEM) was conducted to identify linkages between structures, conduct (information sharing) and performance (nurturing smaller platforms) of the DDF. Equally, descriptive statistics included frequency distributions, measures of central tendency, and charts.

The qualitative data from key informant interviews was invaluable in understanding the Dairy Development Forum. Similarly, the focus group discussions provided qualitative data that was fundamental in understanding the interactions and relationships between the DDF stakeholders, and how this influenced nurturing of smaller innovation platforms. This

qualitative data was further used for triangulation of the quantitative data that was collected through the individual questionnaires.

3.4.1 Factor Analysis

Statements were used to determine the level and willingness to share information on a five-point Likert scale; Strongly Disagree, Disagree, Undecided, Agree, and Strongly Agree. On this scale, respondents indicated the extent that they agreed or disagreed with items describing information sharing within and outside of the Dairy Development Forum, and nurturing of smaller innovation platforms. To ease the interpretation of the responses, the relatively large number of variables was reduced to a manageable number of underlying factors using the statistical method factor analysis.

Factor analysis attempts to identify underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. Factor analysis is usually used to reduce data and ease the identification of a small number of factors that explain most of the variance observed in a much larger number of manifest variables. In addition, the formed factors are relatively independent of one another by removing redundancy for a set of correlated variables (Maier, 2007).

To test the suitability of the data for factor analysis, a correlation matrix was computed and examined. A Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy index between 0.5 and 1.0 is popularly used as the benchmark for indicating the suitability of going ahead with factor analysis (Hutcheson & Sofroniou, 1999).

Essentially, factor analysis is founded on a Gaussian hidden variable model with p observed variables $X_{i,}$ whereby, i$\sum$ [p] = {1…….,p}, and m hidden variables $Y_{j,}$ where j $\sum$ [m] = {1,…..,m}. It is assumed that (X,Y) follow a joint multivariate normal distribution with positive definite covariance matrix. The factor analysis model $F_{p,m}$ is defined by the requirement that the observed variables $X_{i,}$i$\sum$ [p], are conditionally independent given the hidden variables $Y_{j,}$ j $\sum$ [m] (Drton *et al.*, 2007).

According to Drton *et al.*,, (2007) the basic factor model can be derived as follows;

Assuming a column vector $\boldsymbol{y}$ of scores on ρ measured variables for a random individual, the common factor model can be represented as;

$$\boldsymbol{y} = \boldsymbol{\Lambda x_c} + \varepsilon x_u$$

Where;

Λ is a p × r matrix of loadings for p measured variables on r common factors

ε is a p × p diagonal matrix of unique factor loadings

$\boldsymbol{x_c}$ is a vector of scores on the r common factors for the random individual, and,

x_u is a vector of scores on the p unique factors for the random individual.

All variables are assumed to have zero means.

3.5 Model specification

Most statistical analyses often entail a direct relationship between one dependent variable and multiple independent variables. In this study however, the interest is on direct and indirect causal relationships between Structure, Conduct, and Performance elements of the DDF and its participants. Essentially, these typical statistical analyses do not suffice for the purposes of this study.

Consequently, a multivariate data analysis technique called Structural Equation Modelling (SEM) will be applied to facilitate the detection of patterns between structure, conduct, and performance of DDF within Tanzania dairy industry (Hair *et al.*, 2013).

Structural Equation Model (SEM) was proposed by Joereskog and Goldberger in 1975 to address errors that occur in variables mostly measured in social sciences. Consequently, it is a relatively new statistical technique and it is not until the late 1970s that a computer program that could perform SEM was developed. It is also referred to as covariance structure modelling, because covariance, instead of correlation, is analysed.

SEM is regarded to give better estimates because it can measure direct, indirect, and total influences of variables on each other devoid of biases inherent in ordinary least squares methods (Hair *et al.*, 2013). SEM is particularly recommended in analysing causal relationships among endogenous variables, and between endogenous and exogenous variables. Relationships between endogenous variables represent the structural model in SEM while those between endogenous and exogenous variables comprise a measurement model (Choo & Mokhtarian, 2007). Particularly, the SEM is useful in constructing a data-driven measure for performance that is not based on arbitrary combination of variables or a single measure (Pagoulatos & Sorensen, 1981).

Structural equation model has been widely used to analyse data in behavioural and social sciences in several studies based on the structure – conduct –performance paradigm. Delorm *et al.*, (2002) contends that empirical applications for SCP paradigm have often

neglected the simultaneity of the framework. To address the neglect, they used a structural equation model with three equations on a structure-conduct-performance framework. Belkhaoui *et al.* (2014) also used SEM to study market structure, and bank performance due to its superiority in observing direct and indirect effects of structure on bank performance. In studying the structure-conduct-performance of the Malaysian poultry industry, Abdulrazak *et al.*, (2013) considered the structure equation model as a superior econometric model in determining causal relationships between SCP components. Consequently, this research adopts Structural Equation Modelling (SEM) by leveraging on the SCP paradigm.

The structural equation model is conveniently divided into two parts: the measurement model, and the structural (latent variable) model. In its general form, the latent variable (structural) model presupposes any number of endogenous or exogenous latent variables. The structural model, also called latent variable model is;

$$\eta_i = \propto_\eta + \boldsymbol{B}\eta_i + +\Gamma\xi_i + \zeta_{i,}$$

Where;

η_i- is a vector of latent endogenous variables for unit i,

η_i- is a vector of intercept terms for equations,

B - is the matrix of coefficients giving the expected effects of the latent endogenous variables (ŋ)on each other,

Γ - is the coefficient matrix giving the expected effects of the latent exogenous variables (ξ) on the latent endogenous variables (ŋ),

ξ_i- is the vector of latent exogenous variables, and

$\zeta_{i,}$ - is the vector of disturbances.

The i subscript indexes the $_i$th case in the sample.

There is an assumption that E (ζi) = 0, and COV (ξi′, ζi) = 0

The measurement model links the latent variables to the observed variables. The measurement model has two equations;yi

$$y_i = \propto_y + \Lambda_y\eta_i + \varepsilon_i$$

$$x_i = \propto_x + \Lambda_x\xi_i + \delta_i$$

Where,

$y_i$and$x_i$are vectors of the observed indicators of η_i and ξ_i respectively

$\propto_y$and$\propto_x$ are intercept vectors

$\Lambda_y$andΛ_x are matrices of factor loadings or regression coefficients giving the impact on the latent η_i and $\xi_i$on y_i and x_i respectively

y_i and x_{i_i} and δ_i are the unique factors of y_i and x_i

There is an assumption that the unique factors have expected values of zero, and have covariance matrices of $\Sigma_{\varepsilon\varepsilon}$ and $\Sigma_{\delta\delta}$ respectively and are uncorrelated with each other and with $\xi_i$and ζ_i.

Leveraging on the SCP paradigm to provide the theoretical foundation for this model, structural equation model was applied on DDF structure, conduct, and performance using equations and path analysis diagrams as illustrated below:

Objective 1: **Structure – Information Sharing**

To test the first hypothesis that the structure of the Dairy Development Forum positively influences information sharing between dairy value chain actors within the Tanzania dairy industry, the path analysis illustration below will be used;

The regression model that will be inputted in the SEM path analysis can be presented as;

$$Information\ Sharing\ F1 = \beta_0 + \beta_1 Region + \beta_2 Gender + \beta_3 Age + \beta_4 Education + \beta_5 DDF\ Membership + \beta_6 Other\ Groups + \beta_7\ Activity + \beta_8 Organization\ type + \beta_9\ Funding\ source + e_i \quad \ldots\ldots\ldots (i)$$

$$Information\ Sharing\ F2 = \beta_0 + \beta_1 Region + \beta_2 Gender + \beta_3 Age + \beta_4 Education + \beta_5 DDF\ Membership + \beta_6 Other\ Groups + \beta_7\ Activity + \beta_8 Organization\ type + \beta_9\ Funding\ source + e_i \quad \ldots\ldots (ii)$$

$$Information\ Sharing\ F3 = \beta_0 + \beta_1 Region + \beta_2 Gender + \beta_3 Age + \beta_4 Education + \beta_5 DDF\ Membership + \beta_6 Other\ Groups + \beta_7\ Activity + \beta_8 Organization\ type + \beta_9\ Funding\ source + e \quad \ldots\ldots\ldots (iii)$$

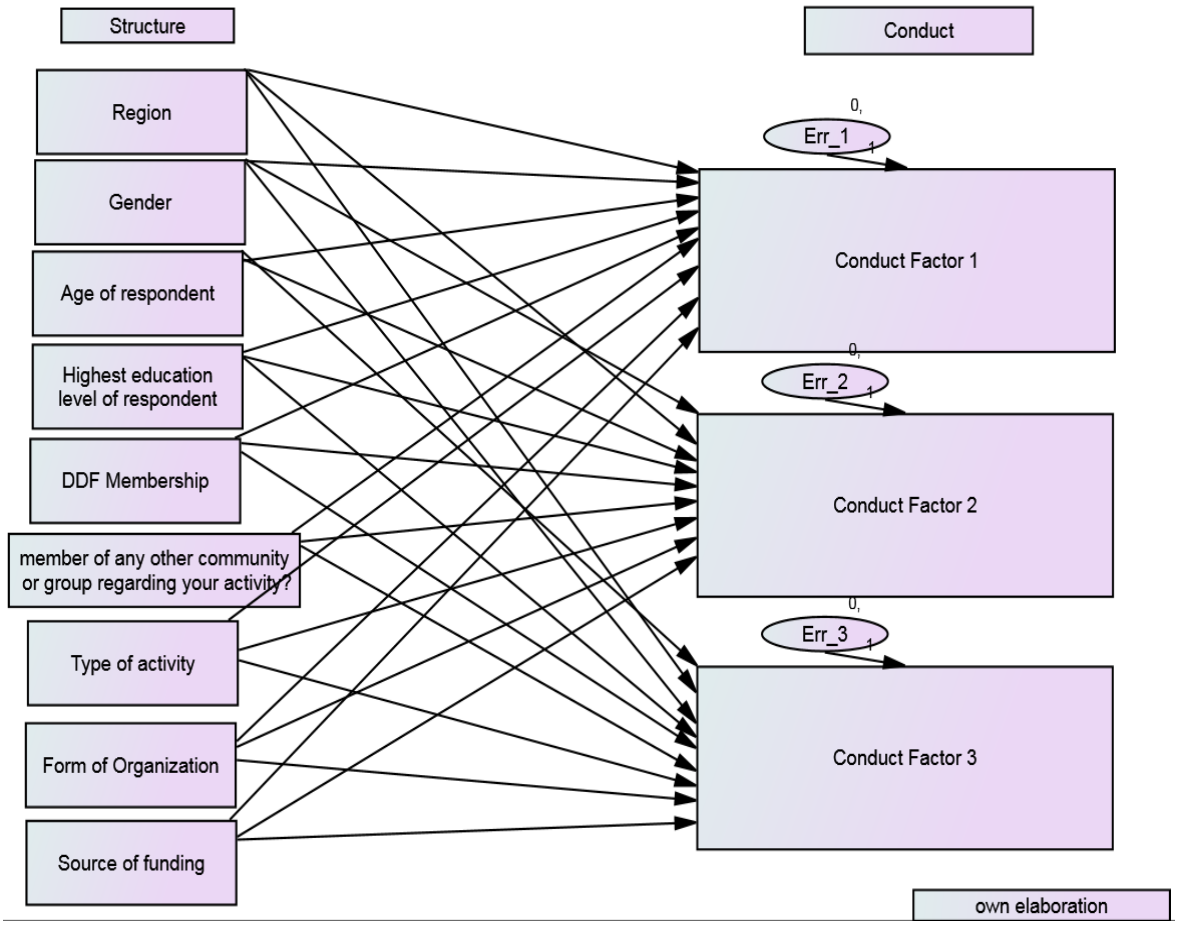

Figure 4: Structure - Information Sharing

Objective 2: **Information Sharing – Nurturing smaller innovation platforms**

To test the second hypothesis that the Information sharing within and outside of the Dairy Development Forum positively contributes to the nurturing of regional innovation platforms, the path analysis illustration below was be used;

$$Nurturing\ smaller\ innovation\ platforms\ \ F1 = \beta_0 + \beta_1 Conduct\ F1 + \beta_2 Conduct\ F2 + \beta_3 Conduct\ F3 + e_i \quad \text{..... (i)}$$

$$Nurturing\ smaller\ innovation\ platforms\ \ F2 = \beta_0 + \beta_1 Conduct\ F1 + \beta_2 Conduct\ F2 + \beta_3 Conduct\ F3 + e_i \quad \text{..... (ii)}$$

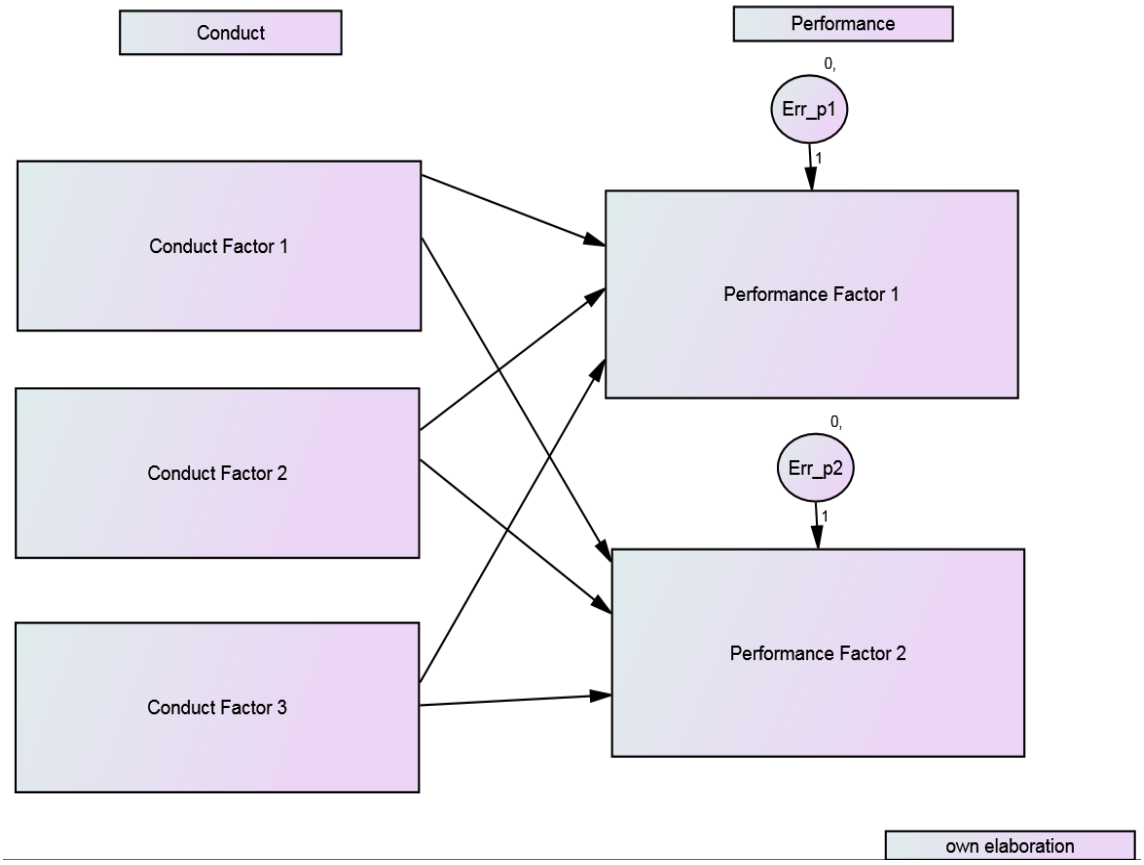

Figure 5: Information Sharing - Nurturing Smaller Innovation Platforms

Objective 3: **Structure – Nurturing smaller innovation platforms**

To test the third hypothesis that the structure of Dairy Development Forum positively contributes to the nurturing of regional innovation platforms, the path analysis illustration below was be used;

$$Nurturing\ smaller\ innovation\ platforms\ \ F1 = \ \beta_0 + \beta_1 Region + \beta_2 Gender + \beta_3 Age + \beta_4 Education + \beta_5 DDF\ Membership + \beta_6 Other\ Groups + \beta_7\ Activity + \beta_8 Organization\ type + \beta_9\ Funding\ source + e_i \quad \text{..... (i)}$$

$$Nurturing\ smaller\ innovation\ platforms\ F2 = \beta_0 + \beta_1 Region + \beta_2 Gender + \beta_3 Age + \beta_4 Education + \beta_5 DDF\ Membership + \beta_6 Other\ Groups + \beta_7\ Activity + \beta_8 Organization\ type + \beta_9\ Funding\ source + e_i \quad \text{..... (ii)}$$

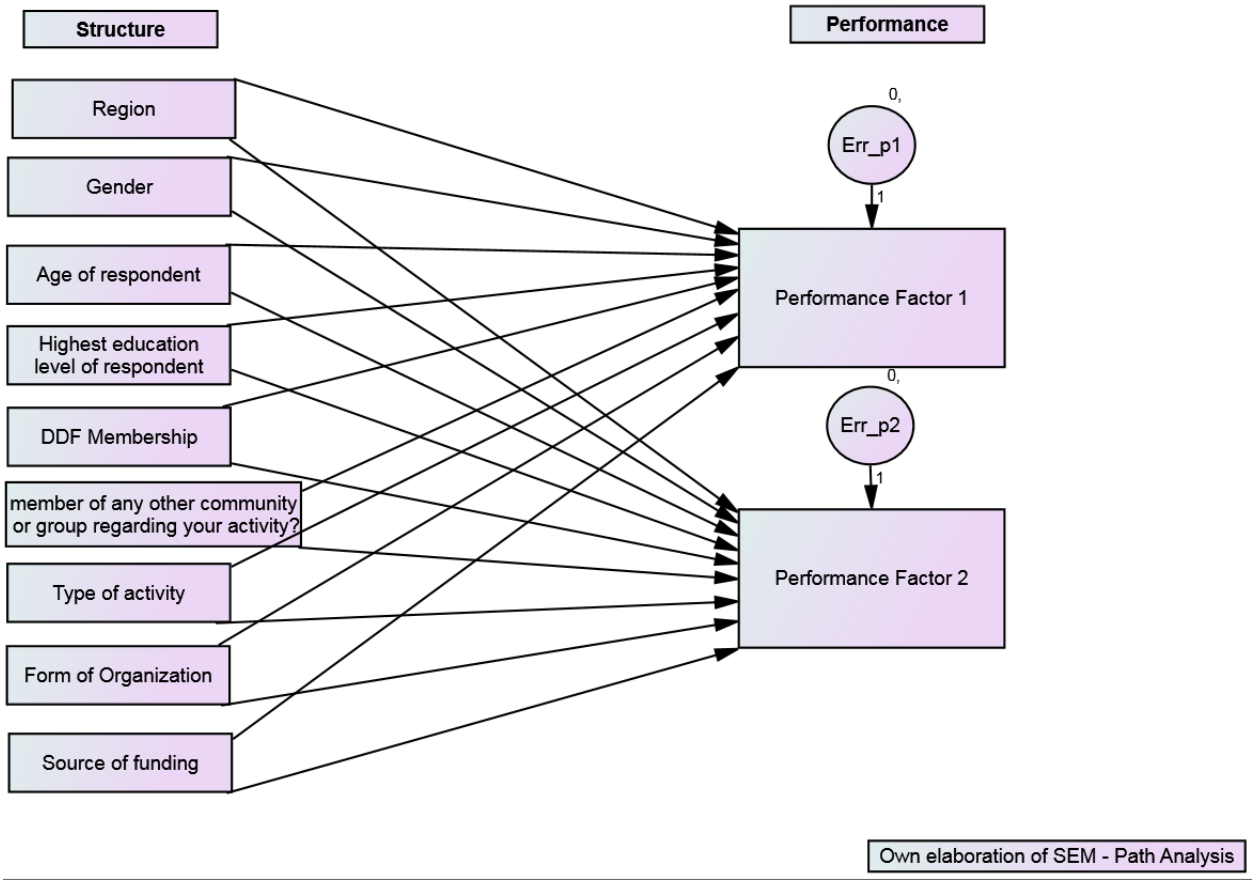

Figure 6: Structure and Nurturing Smaller Innovation Platforms

CHAPTER FOUR
RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the research results and discusses the findings of the study. The results and discussions have been outlined with reference to the research objectives of the study. The main objective of the study was; to understand how the structure of the Dairy Development Forum influences information sharing among dairy value chain actors and how this impacts on nurturing of smaller innovation platforms in the Tanzania dairy industry. The specific objectives were; to evaluate the extent that the structure of the Dairy Development Forum influences information sharing between dairy value chain actors within the Tanzania dairy industry, to examine the influence of information sharing within Dairy Development Forum on nurturing of smaller innovation platforms in the Tanzania dairy industry, and to examine how the structure of Tanzania dairy development forum influences nurturing of smaller innovation platforms in the Tanzania dairy industry. Custom tables and figures have been used to summarize descriptive statistics for this study. Conversely, for inferential statistics, factor analysis and Structural Equation Modelling have been used to characterize causal relationships between structure, conduct, and performance variables.

4.2 Descriptive analysis of socio-economic characteristics

Demographics of the DDF members and Non-members

Gender: 74.7% of the interviewed respondents were men, highlighting a skew in gender composition of dairy value chain actors towards male dominance. For DDF members, males accounted for 75.6% while for non-DDF members, men accounted for 73.8%. The low representation of women in DDF is consistent with the findings of Lema & Nederlof, (2013) who indicated that women participation in innovation platforms was often dependent on timing and location of meetings due to the multiple demands on women's time alongside social expectations.

Age: the ages of the respondents ranged from 22 to 71 years, with an average age of 48.48 years. Specifically, DDF members had an average age of 51.41 while non-DDF members had an average age of 45.62.

Education: A majority of the respondents had a bachelor's degree at 36.1%, closely followed by postgraduates at 33.7%. Notably, there were no DDF members with primary

school and high school education levels. Rather, majority of DDF members were postgraduates, 48.8%. Similarly, majority of non-DDF members were graduates accounting for 40.5%. The high levels of education among the respondents are attributable to the fact that, the respondents were participants at a national level innovation platform. More details on demographics are detailed in Table **2**;

Table 2: Demographics of DDF and non-DDF members

		DDF Membership										
		Yes, N - 41			No, N = 42				Total			
		Frequency	% of Total	Table Sum %	Mean Age	Count	Column N %	Table Sum %	Mean Age	Count	Column N %	Table Sum %	Mean Age
Gender	Men	31	75.6			31	73.8			62	74.7		
	Women	10	24.4			11	26.2			21	25.3		
	Total	41	100.0	49.0		42	100.0	51.0		83	100.0	100.0	
Age of respondents					51.41				45.62				48.48
Highest education level of respondent	Primary School	0	0.0			3	7.1			3	3.6		
	High School	0	0.0			6	14.3			6	7.2		
	Certificate	4	9.8			6	14.3			10	12.0		
	University	13	31.7			17	40.5			30	36.1		
	Post Graduate	20	48.8			8	19.0			28	33.7		
	PHD	3	7.3			2	4.8			5	6.0		
	Other	1	2.4			0	0.0			1	1.2		
	Total	41	100.0	55.3		42	100.0	44.7		83	100.0	100.0	

Distribution of DDF and non-DDF members by Regions

Dar es Salaam accounted for majority of the respondents accounting for 21.7%. This is attributed to the hosting of previous meetings within the Capital thus easing access to DDF meetings for dairy value chain actors within close proximity of Dar es Salaam. Tanga had a representation of 15.7% in DDF followed by Morogoro and Arusha that accounted for 12% of the members each.

Table 3: Distribution of DDF and non-DDF members by Regions

Regions	Yes		No	
	Count	N %	Count	N %
Arusha	4	9.8	6	14.3
Dar es Salaam	16	39.0	2	4.8
Iringa	2	4.9	3	7.1
Kilimanjaro	0	0.0	8	19.0
Mara	1	2.4	0	0.0
Mbeya	2	4.9	4	9.5
Morogoro	5	12.2	5	11.9
Mwanza	2	4.9	7	16.7
Njombe	0	0.0	2	4.8
Pwani	1	2.4	0	0.0
Tanga	8	19.5	5	11.9

Actor type characterization

From the interviewed respondents, 27.7 of them were policy makers affiliated to government agencies while input suppliers rated second at 22.9. Producers accounted for 16.9 while development partners accounted for 10.8 of DDF membership.

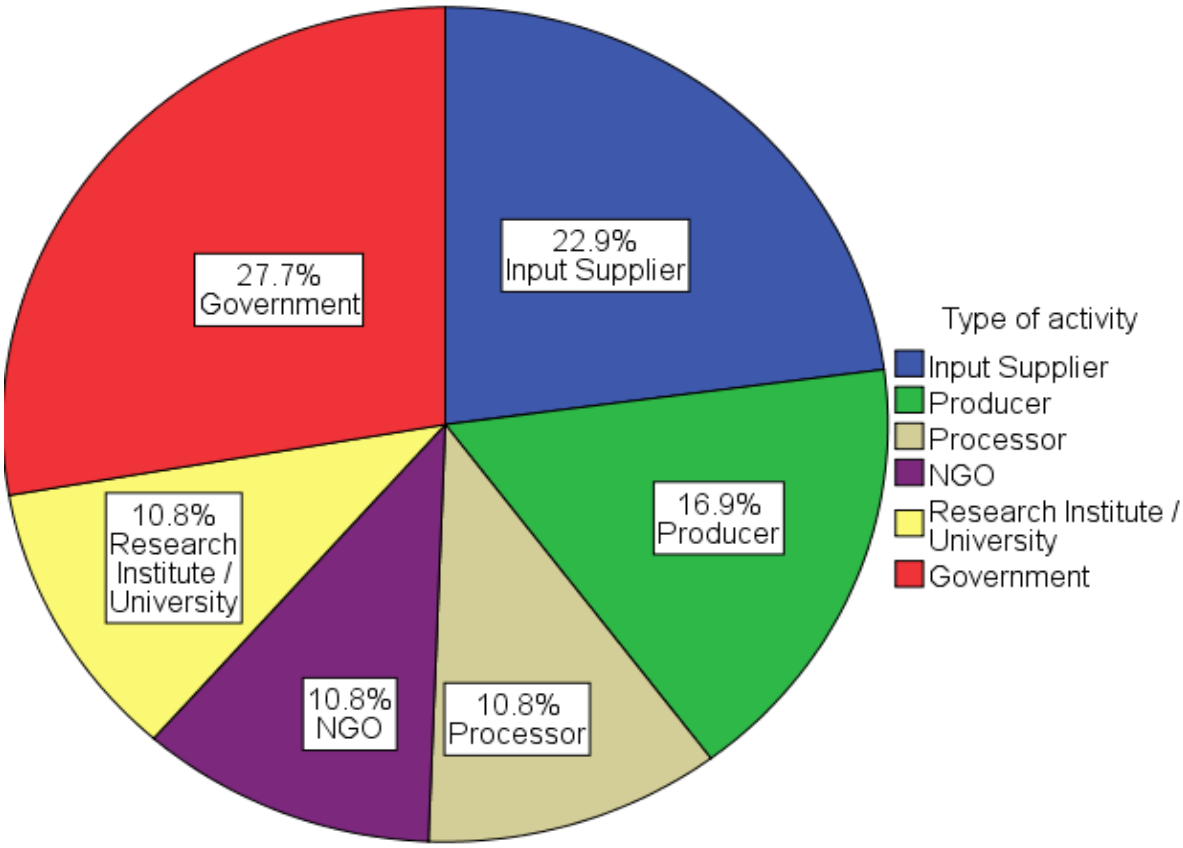

Figure 7: Actor type characterization

Actor Type Versus Education

No DDF participant across all the value chain nodes had either primary or high school level education, while Non-DDF participants had 7.1 and 14.3 respectively. For DDF participants dealing with input supplies, 60 of them had postgraduate qualifications as opposed to 11.1 of Non-DDF participants. This is because input suppliers who had participated in DDF were involved in technical services like heifer breeding, semen production, artificial insemination services, and large-scale input stockists and suppliers. On the other hand, most input suppliers who had not participated in DDF engaged in retail input supplies.

Amongst producers, 42.9 of DDF participants had post-graduate level education, while for non-DDF participant producers, 42.9 of them had high-school level education. This is attributable to the fact that most of the producers who had participated in DDF meetings represented farms engaged in large-scale dairy production, while producers who had not participated in DDF were small scale producers. As a result, large-scale dairy farms were owned or managed by highly educated personnel. Overall, dairy value chain actors

participating in DDF had higher levels of education than those not participating. The levels of education for all dairy value chain actors interviewed are summarized in table 4.

Actor type Versus Region

Dar es Salaam had the highest concentration of policy makers affiliated to government agencies at 39.1. However, input suppliers were also highest in Arusha and Dar es Salaam that tied at 26.3. Producers were mostly concentrated in Tanga and Kilimanjaro at 21.4 and 35.7 respectively. While Tanga had an active regional dairy innovation platform, Kilimanjaro is a highland area suitable for milk production and had the several cooperative societies for milk producers. Lastly, Morogoro had the highest concentration of actors affiliated to research institutions and universities. This is attributable to the Sokoine University, the only university in Tanzania offering agricultural courses on dairying activities and support services like veterinary. Table 4 details all the regions and the dairy value chain actors in every region;

Table 4: **Actor type Versus Education**

			Actor type													
			Input Supplier		Producer		Processor		Development partners		Research Institute / University		Government		**Subtotal**	
			DDF Membership		DDF Membership		DDF Membership		DDF Membership		DDF Membership		DDF Membership		**DDF Membership**	
			Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	**Yes**	**No**
Education level	Primary School	Count	0	1	0	2	0	0	0	0	0	0	0	0	0	3
		N	0.0	11.1	0.0	28.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**	7.1
	High School	Count	0	2	0	3	0	1	0	0	0	0	0	0	0	6
		N	0.0	22.2	0.0	**42.9**	0.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.3
	Certificate	Count	1	2	2	1	0	1	0	0	0	0	1	2	4	6
		N	10.0	22.2	28.6	14.3	0.0	25.0	0.0	0.0	0.0	0.0	11.1	14.3	9.8	14.3
	University	Count	3	3	2	1	2	2	2	3	1	1	3	7	13	17
		N	30.0	33.3	28.6	14.3	40.0	50.0	50.0	60.0	16.7	33.3	33.3	50.0	31.7	40.5
	Post Graduate	Count	6	1	3	0	2	0	2	2	2	0	5	5	20	8
		N	**60.0**	**11.1**	**42.9**	0.0	40.0	0.0	50.0	40.0	33.3	0.0	55.6	35.7	48.8	19.0
	PHD	Count	0	0	0	0	0	0	0	0	3	2	0	0	3	2
		N	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	66.7	0.0	0.0	7.3	4.8
	Other	Count	0	0	0	0	1	0	0	0	0	0	0	0	1	0
		N	0.0	0.0	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0

Table 5: Actor type Versus Region

		Type of activity													
		Input Supplier		Producer		Processor		NGO		Research Institute / University		Government		**Total**	
		Count	N	Count	N	Count	N	Count	N	Count	N	Count	N	**Count**	**N**
Region	Arusha	5	**26.3**	0	0.0	0	0.0	2	22.2	1	11.1	2	8.7	**10**	**12.0**
	Dar es Salaam	5	**26.3**	0	0.0	2	22.2	2	22.2	0	0.0	9	**39.1**	**18**	**21.7**
	Iringa	0	0.0	2	14.3	0	0.0	2	22.2	0	0.0	1	4.3	**5**	**6.0**
	Kilimanjaro	0	0.0	3	21.4	2	22.2	0	0.0	0	0.0	3	13.0	**8**	**9.6**
	Mara	0	0.0	0	0.0	1	11.1	0	0.0	0	0.0	0	0.0	**1**	**1.2**
	Mbeya	2	10.5	1	7.1	0	0.0	1	11.1	0	0.0	2	8.7	**6**	**7.2**
	Morogoro	0	0.0	2	14.3	2	22.2	0	0.0	6	**66.7**	0	0.0	**10**	**12.0**
	Mwanza	4	21.1	1	7.1	0	0.0	0	0.0	0	0.0	4	17.4	**9**	**10.8**
	Njombe	0	0.0	0	0.0	0	0.0	2	22.2	0	0.0	0	0.0	**2**	**2.4**
	Pwani	1	5.3	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	**1**	**1.2**
	Tanga	2	10.5	5	**35.7**	2	22.2	0	0.0	2	22.2	2	8.7	**13**	**15.7**
	Total	**19**	**100.0**	**14**	**100.0**	**9**	**100.0**	**9**	**100.0**	**9**	**100.0**	**23**	**100.0**	**83**	**100.0**

4.2 Factor Analysis

4.2.1 Information Sharing Elements

In order to identify the attributes that could characterize information sharing in n statements that could effectively characterize information sharing. Prior to commencement of data collection, a total of 11 Likert-based statements had been identified. A pretesting of the questionnaire was done, and 3 focus group discussions were conducted to gauge and improve the applicability of the statements in eliciting usable data characterizing information sharing and nurturing of smaller innovation platforms.

The respondents were asked to rate the 11 statements on a 5-point Likert scale between 1 and 5, whereby; 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree. Data was also screened to ensure that the minimum amount of data for factor analysis was satisfied as recommended by Comrey and Lee, (2013), with a sample of 83 (using list wise deletion), providing a ratio of over 12 cases per variable.

Cronbach's Alpha was calculated to measure internal consistency and reliability of the statements. The calculated Cronbach's Alpha for the information sharing Likert statements was 0.765 as shown in Table 6, thus validating the reliability of the statements. Cronbach's Alpha tests for the average inter-item correlation. Pallant, (2005); Streiner, (2003) recommends that a Cronbach's Alpha value greater than 0.7 is necessary in creating a reliable construct of multiple variables.

Table 6: Cronbach's Alpha

Cronbach's Alpha	N of Items
.765	11

Factor analysis was then done with Principal Component Analysis (PCA) method of extraction and Varimax rotation. Conceptually, Principal Component Analysis (PCA) transforms a set of observations with possibly correlated variables into a set of linearly uncorrelated variables. PCA analyses variance in all variables and reorganizes them to a new set of variables equal to the original set of variables (Karamizadeh *et.al*, 2013). On the other hand, Varimax rotates the loadings orthogonally thus maximizing the dispersion of loadings between factors without altering the underlying solution and consequently making the loadings easier to interpret (Abdi, 2003).

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.657, above the commonly recommended value of 0.6, and Bartlett's Test of Sphericity was significant and are illustrated in Table 7;

Table 7: KMO and Bartlett's Test

Test		**Value**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.657
Bartlett's Test of Sphericity	Approx. Chi-Square	229.154
	df	36
	Sig.	.000

Constructs that had significant cross-loadings (>0.4) were eliminated (DeVellis, 2003). Overall, factor constructs were retained based on Eigen values greater that one (Kaiser, 1960), an elbow like levelling off of scree plot test (Cattell, 1966), and a factor solution accounting for above 70 of the total variance (Stevens, 1986).

Initial Eigen value indicated that the first three factors had an Eigen value greater than 1 and explained 80.971 of variance. This was preferred because of the “levelling off” of Eigen values on the Scree plot after the three factors. Table 8 comprehensively presents the total variances explained and their matching Eigen values.

Table 8: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	Variance	Cumu-lative	Total	of Variance	Cumu-lative	Total	Variance	Cumu-lative
1	3.263	40.783	40.783	3.263	40.783	40.783	2.523	31.535	31.535
2	1.940	24.246	65.029	1.940	24.246	65.029	2.154	26.923	58.458
3	1.275	15.942	80.971	1.275	15.942	80.971	1.801	22.513	80.971
4	.586	7.322	88.294						
5	.356	4.452	92.746						
6	.288	3.605	96.351						
7	.202	2.522	98.872						
8	.090	1.128	100.000						

Extraction Method: Principal Component Analysis.

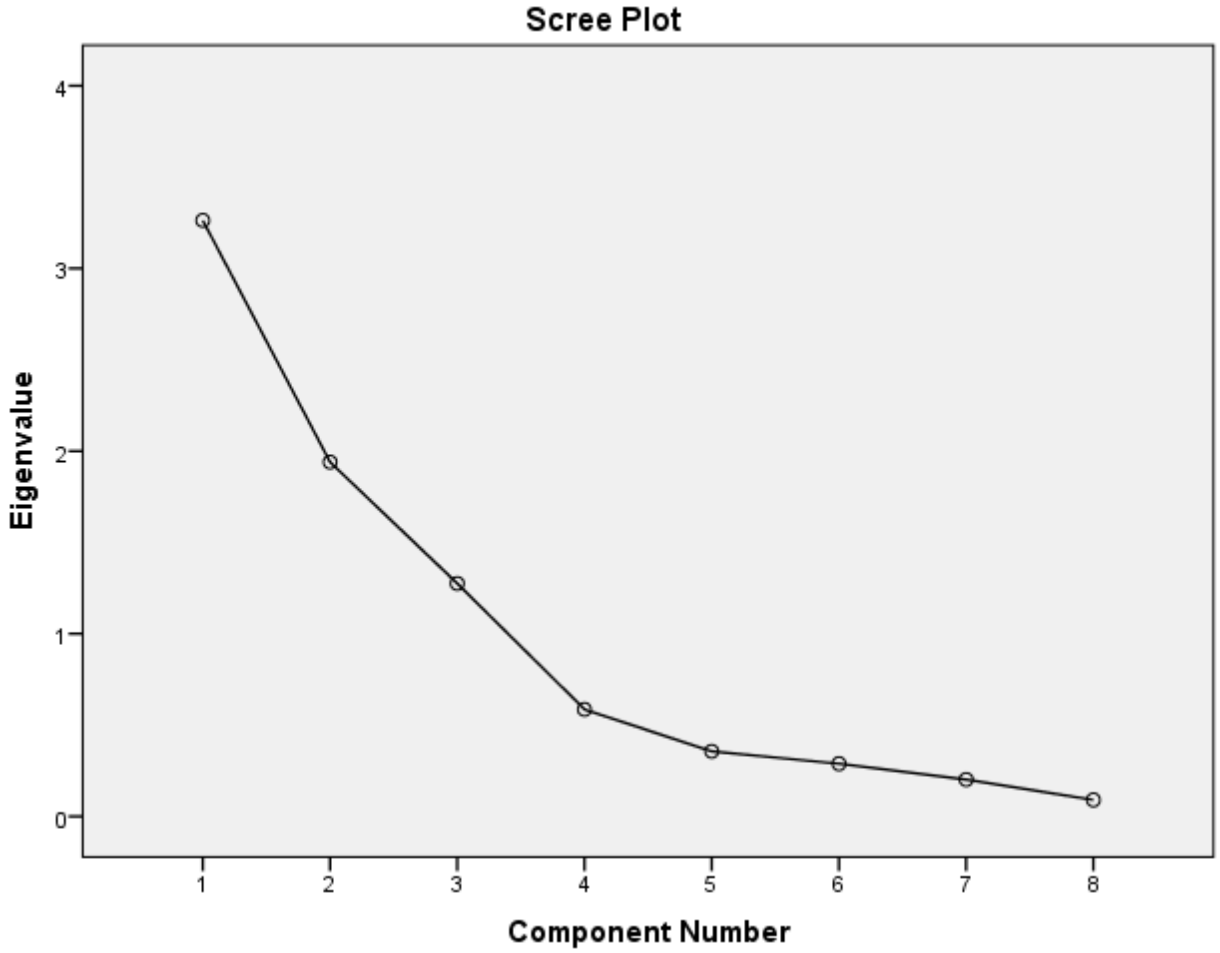

Figure 8: Information sharing scree plot

According to DeVellis, (2003), factor loadings should be more than 0.4 on the main factor construct, while cross-loadings should be less than 0.4. Further, to assure sufficient discriminance, the difference between the indicator loading and the maximum cross-loading should be more than 0.2. If these thresholds are not met, the indicators should be eliminated for further analysis. Consequently, three statements were eliminated during the factor analysis because they did not contribute to the factor structure through meeting the minimum criteria of having a primary factor loading of 0.4 or for cross-loadings of above 0.4. No substantial increases in alpha, KMO, or explained total variance could be achieved by eliminating more statements. Factor labels were therefore assigned to describe the underlying constructs after examining the statements that were loading on each factor. Table 9 summarizes the factor loadings based on a Principal Component Analysis with Varimax rotation for seven statements on information sharing.

Table 9: Rotated Component Matrix for Information sharing

		Component		
		1	2	3
Information sharing between actors	We usually share information about our activities with other stakeholders.	.257	.170	**.854**
	The information we get from the other platform/ organization -partners is useful.	.020	.172	**.908**
Information Dependability	The information we get from the other platform partners/ organization is reliable.	-.163	**.798**	.335
	We are satisfied with the quality of information we get from value chain partners	.371	**.729**	.048
	The information we get from value chain partners is reliable	.067	**.929**	.091
Information sharing through DDF	We get enough information from DDF	**.765**	-.122	.349
	The DDF facilitates flow of dairy industry information to regional innovation platforms	**.905**	.198	.013
	DDF facilitates information sharing on establishment and management of regional innovation platforms	**.940**	.104	.046

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

4.2.2 Nurturing Smaller Innovation Platforms Elements

Similar to factor analysis for information sharing, only perceptive opinions of the respondents were included for factor analysis. This was necessary for creating constructs from the 15 variables subjectively measured by the 5-point Likert scale. For factor analysis, Tinsley and Kass, (1979) opined that credible factor analysis should have 5 to 10 participants for every variable measured. For statements on nurturing innovation platforms, there were 15 variables meaning that the analysis has 83/15 = 5.5 respondents per variable, thus satisfying Kass and Tinsley's recommendation.

Cronbach's Alpha was calculated to measure internal consistency and reliability of the statements. The calculated Cronbach's Alpha for the nurturing regional platforms Likert

statements was 0.747, thus validating the reliability of the instrument. The results are presented in Table 10;

Table 10: Reliability Statistics for nurturing regional platforms

Cronbach's Alpha	N of Items
.747	9

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy tests whether partial correlations among variables is small (Field, 2000). A KMO measure of below 0.5 is hardly acceptable, measures between 0.5 and 0.7 are average, measures between 0.7 and 0.8 are good, while values between 0.8 and 0.9 are great, and values above 0.9 are considered superb (Hutcheson & Sofroniou, 1999). For this study, the KMO for nurturing regional platforms was 0.719 (Table 11), which is indicative of reliability of continuing with factor analysis.

Table 11: KMO and Bartlett's Test for nurturing regional platforms

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.719
Bartlett's Test of Sphericity	Approx. Chi-Square	241.400
	df	36
	Sig.	.000

Before proceeding with factor analysis, Bartlett's Test of Sphericity was also tested to ensure that it met the recommended significance level of above 0.05. Bartlett's Test of Sphericity measures if there are correlations between variables that are sufficiently large for conducting an appropriate factor analysis (Field, 2009). In Table 12 above, the Bartlett's Test of Sphericity is highly significant ($p<0.001$) and therefore adequate for factor analysis. Preliminary tests for adequacy of factor analysis are therefore satisfactory.

After conducting the factor analysis with PCA extraction method and Varimax rotation, three underlying factors were retained based on Kaiser's criterion of retaining Eigen values that are greater than 1.0 (Field, 2009). The three retained factors account for total explained variance of 71.967. Table 12 summarizes results for total variance explained.

Table 12: Total Variance Explained for nurturing regional platforms

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	of Variance	Cumulative	Total	Variance	Cumulative	Total	Variance	Cumulative
1	3.32	36.93	36.93	3.32	36.93	36.93	3.16	35.11	35.11
2	2.11	23.49	60.42	2.11	23.49	60.42	1.77	19.69	54.80
3	1.04	11.55	71.97	1.04	11.55	71.97	1.55	17.17	71.97
4	0.79	8.73	80.70						
5	0.54	6.02	86.72						
6	0.44	4.90	91.62						
7	0.40	4.49	96.12						
8	0.18	2.04	98.16						
9	0.17	1.84	100.00						

Extraction Method: Principal Component Analysis.

Based on the total variance explained (71.97) by the Rotation Sums of Squared Loadings in Table 12 and an evaluation of the scree plot illustrated in Figure 6, three factors were retained and six factors that did not make significant contributions were discarded from the factor analysis.

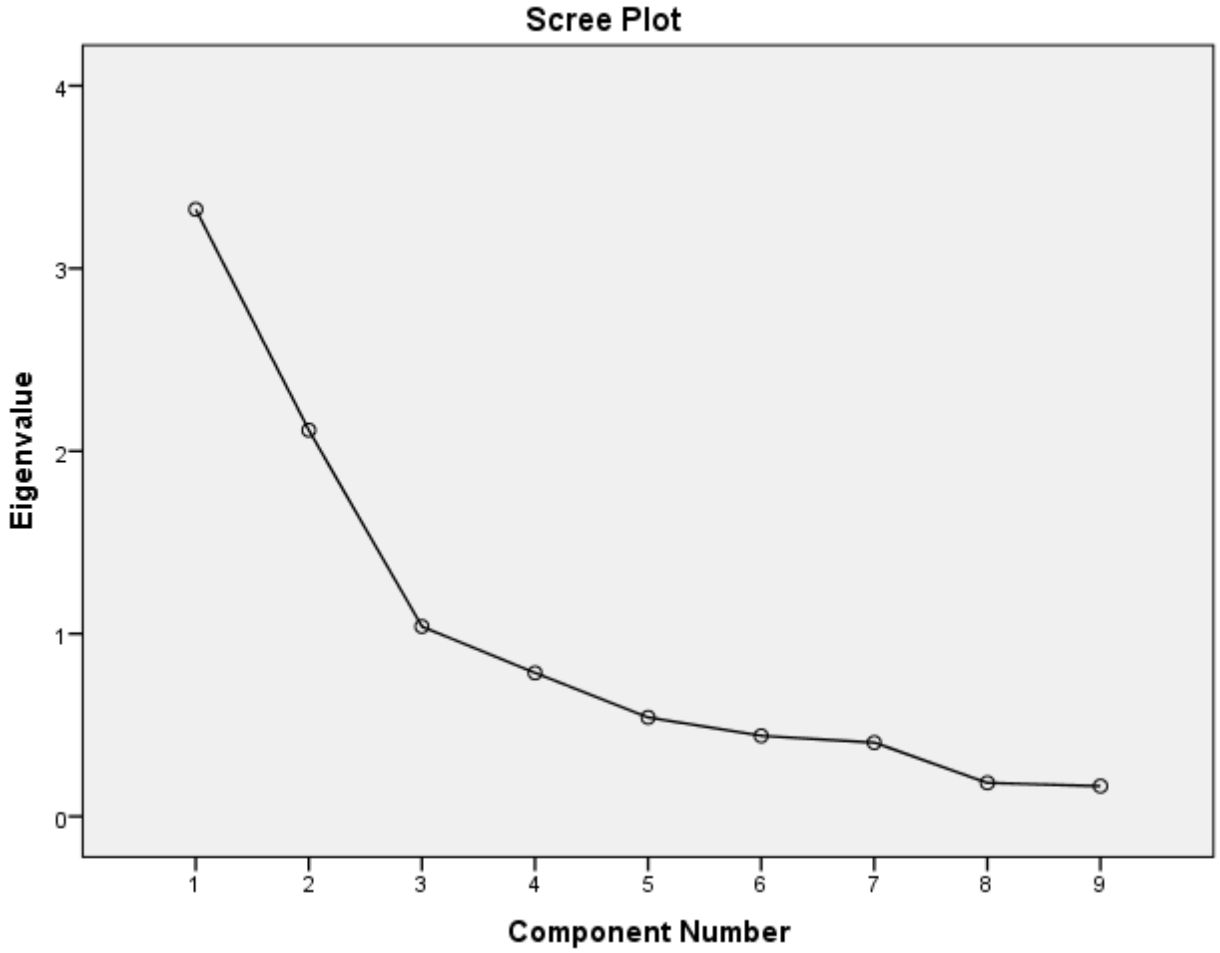

Figure 9: Scree plot for nurturing regional platforms

The rotated component matrix in Table 13 shows the relative contributions made by the variables to the three retained factors. The factors were rotated through Varimax method to represent the loadings orthogonally in a way that was easier to interpret. Varimax rotation method maximizes the dispersion of loadings between factors without altering the underlying solution. Field, (2000); Sharma and Kumar, (2006) recommends interpretation of factors whose absolute value of loading is greater than 0.4.

Table 13: Rotated Component Matrix for nurturing regional platforms

		Component		
		1	2	3
DDF Facilitation	5. DDF assists to advocate concerns of regional innovation platforms at the national level	0.853		
	6. DDF encourages regional platforms to change their focus of discussion from time to time	0.796		
	7. DDF provides a platform for regional innovation platforms to learn from other successful examples of working IPs	0.916		
	8. DDF enables regional innovation platforms to expand their knowledge of dairy innovations.	0.897		
Capacity development	3. The DDF is involved in capacity development of members involved in managing working groups and taskforces		0.846	
	9. DDF guides working groups and task forces on solving funding challenges		0.754	
	10. DDF guides regional innovation platforms on solving funding challenges		0.618	
Platform Autonomy	11. The DDF remains neutral in its interactions with the activities of regional IPs to ensure they achieve their goals democratically			0.859
	12. The DDF remains neutral in its interactions with the activities of working groups and taskforces to ensure they achieve their goals democratically			0.72

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

4.3 Structural Equation Modelling

In this study, a two-step Structural Equation Modelling (SEM) analysis was applied. The first step, called measurement model, examines the reliability, validity, and unidimensionality of the latent (factor) constructs using Confirmatory Factor Analysis (CFA). The second step, the structural model, then examines the hypothesized causal relationships between the latent constructs through a path diagram analysis (James *et al.,* 1982). The CFA for the measurement model and the path analysis for structural model was performed using SPSS AMOS V.22, a specialized SPPS plugin for conducting structural equation modelling. The use of SEM was warranted because of SEM's ability to model latent variables, avoid multi-collinearity, while specifying measurement errors and correcting them, and delineating the covariance structure of the constructs. These are challenges inherent in other statistical techniques like multiple regressions (Henseler, 2011).

Model Estimation

Maximum likelihood estimation method was used within SEM. Maximum likelihood results in estimates for the parameters that maximize the likelihood that the empirical co variance matrix is drawn from a population for which the model-implied covariance matrix is valid. Maximum Likelihood estimation method assumes multivariate normal distribution of all the variables in the model, including the observed variables. The parameter estimates and standard errors provided by Maximum likelihood method are consistent, efficient, and asymptotically unbiased (Schermelleh-Engel & Moosbrugger, 2003).

A key advantage of Maximum likelihood is that it allows for a formal statistical test of overall model fit for over identified models, and that its estimates are in general scale invariant and scale free (Bollen, 1989). As a result, the fit function values do not depend on whether correlation or covariance matrices are analysed, or whether original or transformed data are used. However, the strong assumption of multivariate normality is often criticized because violations of distribution assumptions are common and often unavoidable in practice. This could result in potentially misleading results (Muthén & Muthén, 1998). Despite this limitation, Maximum likelihood is quite robust against the violation of the normality assumption (Boomsma, 1985). This attribute of maximum livelihood make it best suited for this study in comparison with other methods of estimation including generalized and ungeneralised least squares, as well as 2 stage and 3 stage least squares.

Goodness of Fit (GOF) Indices

There are several goodness-of-fit indices that are applied in SEM to evaluate how well the structural model fits the data. The Chi-square goodness-of-fit is among the most commonly used indices. In SEM, a non-significant Chi-square is a positive indication of goodness-of-fit. However, whereas Chi-Square test is very popular as a fit statistic, there are a number of severe limitations in its use. Firstly, the test assumes multivariate normality and therefore severe deviations from normality may result in model rejections even when the model is properly specified (McIntosh, 2007). Secondly, because the Chi-Square statistic is essentially a statistical significance test, it is sensitive to sample size which means that the Chi-square statistic nearly always rejects the model whenever large samples are used (Bentler & Bonett, 1980). Conversely, when small samples are used, the chi-square statistic lacks power and may as a result be unable to discriminate between good fitting models and poor fitting models (Kenny & McCoach, 2003). Due to this restrictiveness of the Chi-square statistic, and the small sample used in this study, alternative goodness-of-fit indices that adjust for the effect of the sample size will also be used. These will include absolute, incremental, and parsimonious goodness-of-fit indices as identified by Bollen, (1989); Hu and Bentler, (1999).

Absolute fit indices evaluate the extent that the specified model reproduces the covariance matrix. Absolute fit indices that will be evaluated in this study include Normed chi-square (χ^2/df) and Root Mean Square Error (RMSEA). RMSEA was recommended by Steiger & Lind, (1980) and a RMSEA value of about 0.08 or less is recommended to indicate a reasonable error of approximation (Browne & Cudeck, 1993).

Incremental fit indices evaluate the increase in fit relative to a baseline model. In this study, Normed Fit Index (NFI), Comparative Fit Index (CFI) and Tucker-Lewis index (TLI) will be used as incremental measures consistently with recommendations of Bentler and Bonett, (1980).

Lastly, parsimonious fit indices investigate whether an estimated model can be improved by reducing parameter paths (Hair *et al.*, 2013). In this study, parsimonious fit indices that will be evaluated include Parsimonious Normed Fit Index (PNFI) and Parsimonious Comparative Fit Index (PCFI). PCFI and PNFI resulted from the application of parsimony adjustment to the Comparative Fit Index and Normed Fit Index by James *et al.*, (1982).

The utilization of multiple goodness of fit indices in this study is consistent with Hu and Bentler (1999) recommendation that multiple indices be considered simultaneously when

evaluating model fit to leverage on the variability of different indices under different conditions. These absolute, incremental, and parsimonious goodness of fit indices and their recommended levels are summarized in Table 14;

Table 14: SEM goodness of fit indices

Index	Abbreviation	Type of GOF index	Recommended measure	Reference
Chi square	χ^2	Model fit	χ^2, df, p>0.05	(Hair, Black, Babin, Anderson, & Tatham, 2006); (Hair et al. , 1998)
Normed Chi Square	χ^2/df	Absolute & parsimonious	1.0< χ^2/df<3.0	
Root Mean Square Error of Approximation	RMSEA	Absolute	<0.05 good <0.08 acceptable	(Browne & Cudeck, 1993)
Parsimonious Normed Fit Index	PNFI	Parsimony	>0.90	(Steiger & Lind, 1980)
Parsimonious Comparative Fit Index	PCFI	Parsimony	>0.90	(Steiger & Lind, 1980)
Normed Fit Index	NFI	Incremental	>0.90	(Bentler & Bonett, 1980)
Comparative Fit Index	CFI	Incremental	>0.90	(Bentler & Bonett, 1980)

Measurement model

The measurement model of SEM is grounded on Confirmatory Factor Analysis (CFA), and its rationale is almost similar to that of Exploratory Factor Analysis (EFA) calculated in Table 9 and Table 12 in the previous section. However, while EFA statistically reduces the observed set of variables into a subset of factor constructs based on loading values (Kline, 2014), CFA tests the factor constructs to the empirical data. Consequently, CFA follows EFA whereby after EFA explores the factor structure by evaluating variables relationships and

reducing them to factor constructs, CFA then confirms the factor constructs extracted by EFA, and in some instances modifies the structure (Hair, *et al.* 2006). Consequently, this section will use the factor constructs derived from exploratory factor analysis in the section above to scrutinize the model fit.

Confirmatory factor analysis defines the relationships between the latent variables (factors) and the manifest variables that were directly observed during the data collection. In confirmatory factor analysis, there is undetermined covariance between each possible pair of latent variables. In performing the confirmatory factor analysis, two approaches were employed to assess the measurement model. First, the goodness of fit criteria was used, and then validity and reliability of the measurement model was evaluated.

Confirmatory factor analysis was run on the measurement model that comprised of six latent constructs that included; Information sharing between actors; Information sharing through DDF; Information Dependability; DDF Facilitation; Capacity development; and Platform Autonomy. The six latent constructs were measured by 17 observed variables that were codenamed INF1, INF2, INF3, INF4, INF5, INF9, INF10, INF11, NUR8, NUR9, NUR10, NUR11, NUR6, NUR12, NUR13, NUR14, and NUR15. Maximum Likelihood estimation technique was used to estimate the measurement model. The results indicated that chi square statistics ($\chi^2 = 191.584,\ \mathrm{df} = 104$,) was significant at $p<0.05$ thus indicating a poor fit of the data to the model indicating a rejection of the model. However, cognizant that chi square is an inefficient indicator due to its sensitivity to sample size and therefore can be possibly misleading, other indices were also considered in assessing the model fit (Hooper, Coughlan, & Mullen, 2008).

The other indices, as summarized in Table 14 were RMSEA =.101, PNFI = .522, PCFI = .591, NFI = .768, CFI = .870, χ^2/df = 1.842154. It is notable that the normed chi-square adjustment was within the recommended assessment criterion. All the GOF indices, except the normed chi-square adjustment, indicated poor model fit thus requiring a further refinement of the model.

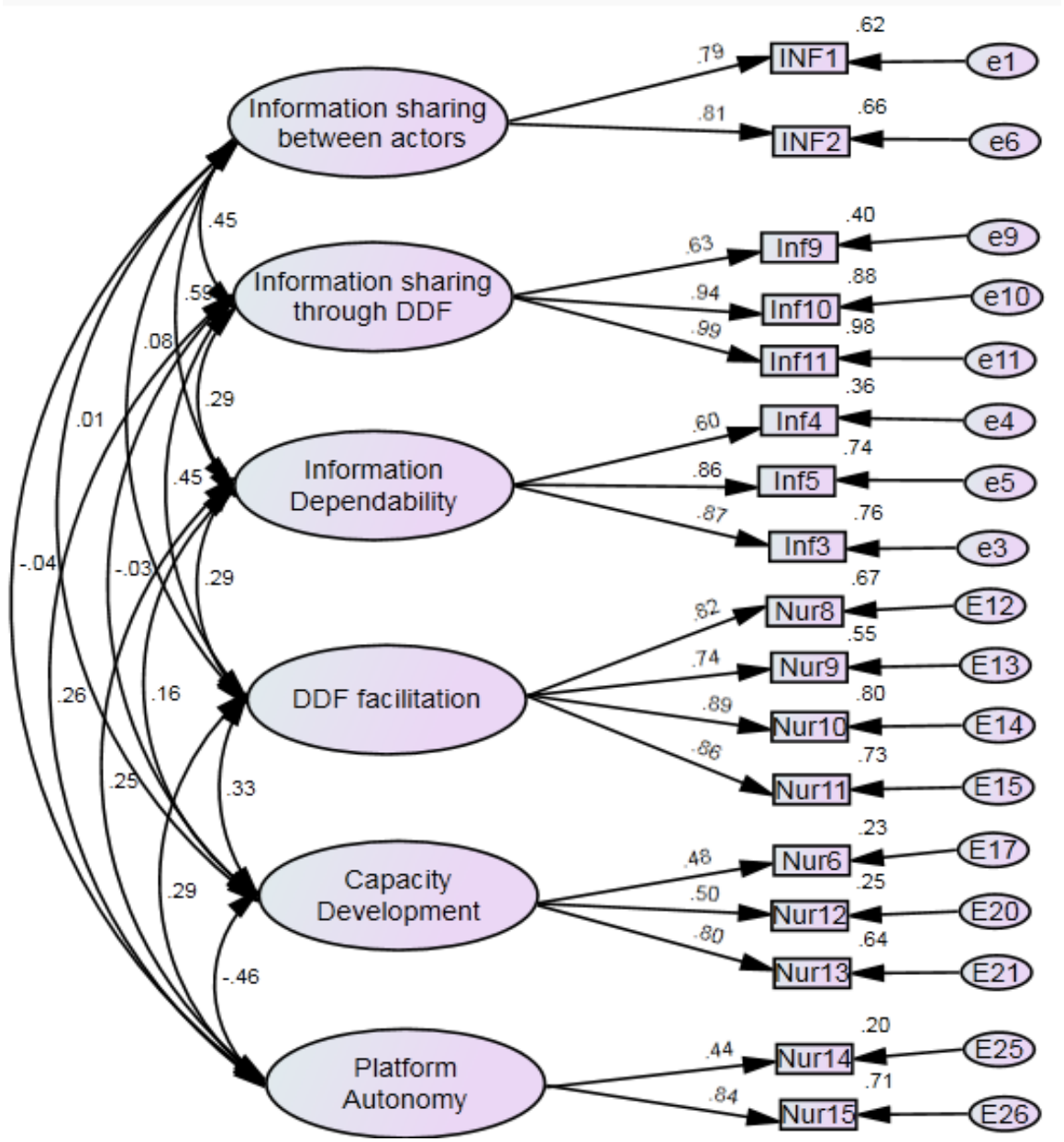

Figure 10: Initial CFA derived from EFA

Table 15: Initial CFA goodness of fit indices

	Absolute fit measures			Parsimony measures		Incremental measures	
Index	χ^2	χ^2/df	**RMSEA**	**PNFI**	**PCFI**	**NFI**	**CFI**
Recommended	χ^2, df, p>0.05	1.0< χ^2/df<3.0	<0.05 good, <0.08 acceptable	>0.90	>0.90	>0.90	>0.90
Obtained	χ^2= 191.584, df = 104	1.842154	0.101	0.522	0.591	0.768	0.87

χ^2= Chi square; df = Degrees of freedom, χ^2/df = Normed Chi Square, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimonious Normed Fit Index, PCFI = Parsimonious Comparative Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index

Noting that most goodness of fit indices indicated poor model fit after the confirmatory factor analysis, a further refinement of the model was undertaken. This was necessary for improving the discriminant validity and attaining a better fit of the model. While refining and re-specifying the model, a criterion recommended by Hair *et al.* (2006) that the squared multiple correlations (SMC) values should be greater than the cut-off point 0.5 and the standard regression weight from the path analysis should be greater than 0.5 or higher, ideally 0.7 or higher was applied.

After applying the recommended criteria in re-specifying the initial measurement model output, a CFA was re-run to evaluate whether the model fit would improve. As a result, the recommended minimum of 0.5 loading for standard regression weights was achieved. Most notably, the Platform autonomy construct was dropped from the model because every construct must have a minimum of two variable indicators. The exclusion of NUR14 from the model therefore disqualified the Platform autonomy construct from the model because it was left with only one indicator, NUR 15, though the indicator was loading strongly at 0.84. Despite re-running the model, there was no significant improvement in fit. The modified final CFA model is illustrated in Figure 6 and its results outlined in Table 16.

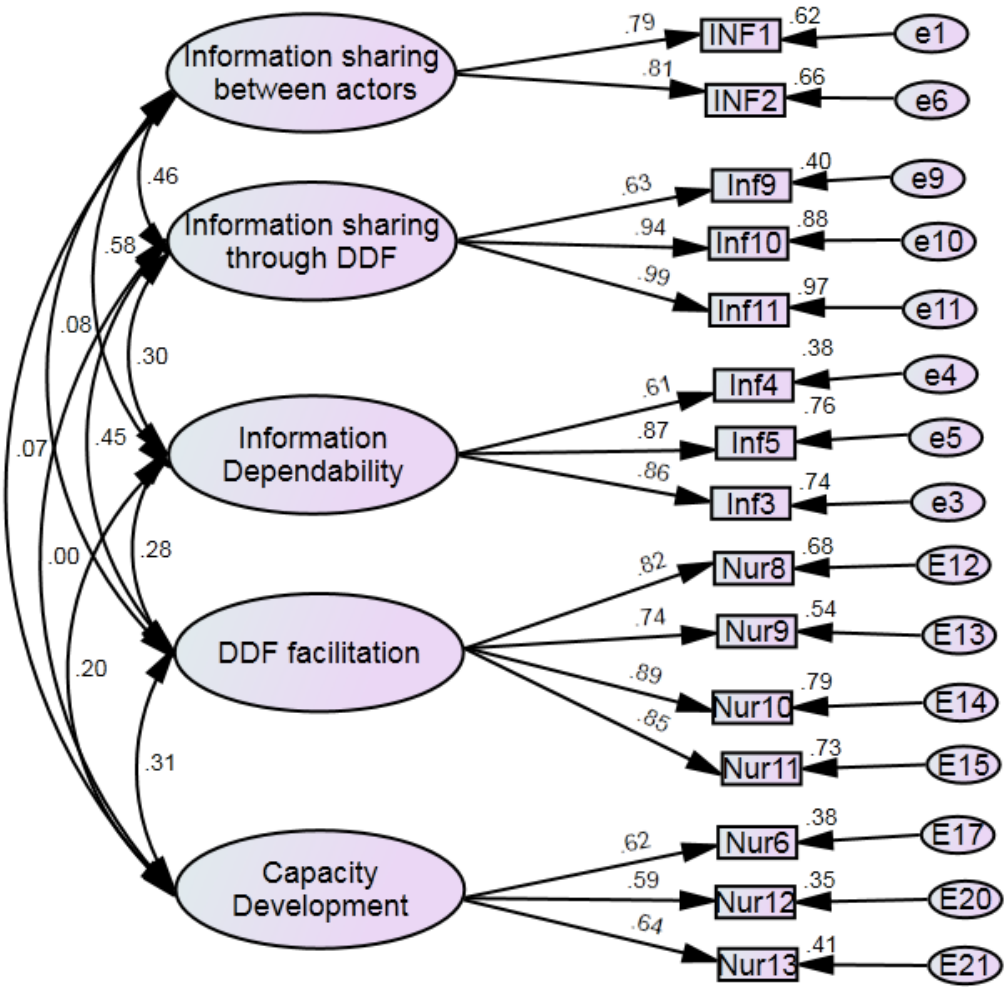

Figure 11: Modified CFA model

Table 16: Modified CFA goodness of fit indices

	Absolute fit measures			**Parsimony measures**		**Incremental measures**	
Index	χ^2	χ^2**/df**	**RMSEA**	**PNFI**	**PCFI**	**NFI**	**CFI**
Recommended	χ^2, df, p>0.05	1.0< χ^2/df<3.0	<0.05 good, <0.08 acceptable	>0.90	>0.90	>0.90	>0.90
Obtained	χ^2= 153.8, df = 80	1.923225	0.106	0.531	0.589	0.797	0.886

χ^2= Chi square; df = Degrees of freedom, χ^2/df = Normed Chi Square, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimonious Normed Fit Index, PCFI = Parsimonious Comparative Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index

A review of the results indicates a slight improvement of model fit with a Normed chi square ratio of 1.923 being within the acceptable threshold ($1.0< \chi^2/df<3.0$). Further, an CFI of 0.886 is admissible due to its close proximity to the cut-off (>0.90) which is attainable by rounding off. The other fit measures still indicated poor fit RMSEA= 0.106, PNFI = 0.531, PCFI = 0.589, and NFI = 0.797. However, other estimation criteria indicated acceptable model fit, such that, standard regression weights were all above 0.59, and all critical ratio values were above 1.96. Consequently, despite the indications of poor model fit, and being no further re-specifications of the model that could be done to improve it further, the model was accepted.

Structural Model

In this study, there are three structural equation models; one for testing how the structure of the Dairy Development Forum influenced information sharing between dairy value chain actors within the Tanzania dairy industry; second one to test the second hypothesis whether Information sharing within and outside of the Dairy Development Forum positively contributed to the nurturing of regional innovation platforms; and thirdly to examine the third hypotheses how the structure of the Dairy Development Forum contributed to the nurturing of regional innovation platforms. The structural model tested causal relationships between Structure, Conduct, and Performance variables. Variables for conduct and performance were the factor constructs derived after undertaking Exploratory Factor Analysis (EFA).

4.3.1 Test of hypothesis 1: Structure – Information Sharing

Goodness of fit indices and parameter estimates were examined to evaluate the hypothesized structural model. The path analysis on the structural model is illustrated based on standard coefficients in Figure 7.

Table 17: Structure – Information Sharing goodness of fit indices

Computation of degrees of freedom (Default model)	
Number of distinct sample moments:	54
Number of distinct parameters to be estimated:	51
Degrees of freedom (54 - 36):	3

	Absolute fit measures			Parsimony measures		Incremental measures	
Index	χ^2	χ^2/df	**RMSEA**	**PNFI**	**PCFI**	**NFI**	**CFI**
Recommended	χ^2, df, p>0.05	1.0< χ^2/df<3.0	<0.05 good, <0.08 acceptable	>0.90	>0.90	>0.90	>0.90
Obtained	χ^2= .804 df = 3 p = .849	.268	.000	.083	.083	.992	1.000

χ^2= Chi square; df = Degrees of freedom, χ^2/df = Normed Chi Square, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimonious Normed Fit Index, PCFI = Parsimonious Comparative Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index

The goodness of fit indices in Table 18 indicate that the hypothesized structural model for structure – conduct provided an acceptable fit to the data. Overall, four of the seven fit indices evaluated for this study indicated good fit for the model. The chi-square was not significant (χ^2= .804; df = 3; p = .849), indicating good model fit, which was collaborated by RMSEA = 0.000 (<0.05 good) as well as the Incremental measures NFI = .992 (>0.90), and CFI = 1.000 (>0.90). Only parsimonious fit indices were below the recommended cut-offs. Consistently with the guidelines of Jöreskog *et al.,* (2001), modification index for variance and regression parameters were examined and suggested no changes in model specification.

The next step was therefore to review the coefficient parameter estimates that are equally crucial in hypothesis testing in a structural model. The standardized coefficients for the Structure – Conduct path analysis are in Figure 9;

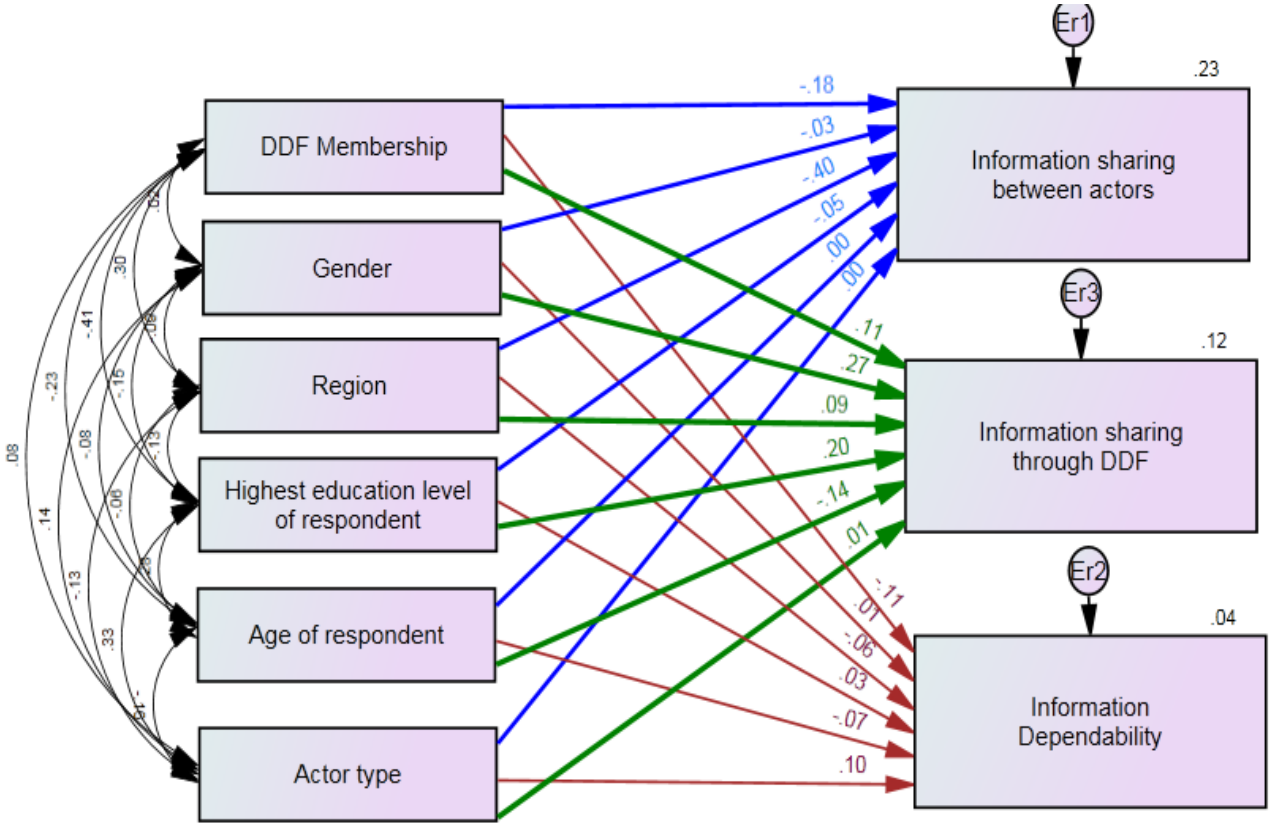

Figure 12: Structure – Information Sharing Structural Model

In this step, the proposed hypothesis was evaluated by using the significant level of the estimated structural path. Six variables representing the DDF structure identified three conduct factors. A covariance matrix was used to test the model. According to Hair *et al*., (2006), parameter coefficients are significant at 0.05 level if their t-values (critical ratios) are higher than 1.96 for their regression weight (estimate). For the structural model, t-values were obtained after the regression weight estimates were divided by the standard error (SE) estimates. The structure – conduct structural model in Figure 7 had eighteen causal paths that were examined alongside the corresponding t-values (critical ratios – CR). SPSS AMOS 22 displays both standardized and unstandardized regression coefficients. The unstandardized coefficients indicate the corresponding change between the dependent or mediating variable for every unit change in the predicting variable. Table 18 displays the standardized and unstandardized estimates, standard errors, and critical ratios;

Table 18: Estimates of regression weights for Structure – Information Sharing

				Unstndzd	Stndzd	S.E.	C.R.	P
DDF Membership	--->	Information Between Actors	Sharing	-.279	-.178	.181	-1.542	.123
Actor type	--->	Information Between Actors	Sharing	-.001	-.004	.028	-.033	.973
Age	--->	Information Dependability		-.004	-.065	.007	-.553	.580
Actor type	--->	Information Dependability		.024	.099	.031	.783	.434
Actor type	--->	Information Through DDF	Sharing	.002	.008	.030	.065	.949
Education level	--->	Information Dependability		.022	.033	.092	.238	.812
Region	--->	Information Dependability		-.018	-.059	.034	-.510	.610
Gender	--->	Information Dependability		-.016	-.009	.203	.081	.935
DDF Membership	--->	Information Dependability		-.165	-.105	.202	-.817	.414
Gender	--->	Information Between Actors	Sharing	.054	.030	.182	-.294	.769
Region	--->	Information Between Actors	Sharing	-.121	-.404	.031	-3.901	.000***
Education level	--->	Information Between Actors	Sharing	-.030	-.045	.082	-.363	.717
Age	--->	Information Between Actors	Sharing	.000	.000	.007	.000	1.000
DDF Membership	--->	Information Through DDF	Sharing	.176	.112	.193	.909	.364
Gender	--->	Information Through DDF	Sharing	-.493	-.274	.194	2.538	.011*
Region	--->	Information Through DDF	Sharing	.027	.091	.033	.820	.412
Education level	--->	Information Through DDF	Sharing	.132	.200	.088	1.508	.132
Age	--->	Information Through DDF	Sharing	-.009	-.141	.007	-1.255	.210

Estimated regression coefficients: **Unstndzd** = Unstandardized, **Stndzd** = Standardized
SE = Standard error of estimated unstandardized coefficient;
C.R = critical ratio
P = Probability of a t value equal to or greater than actual t value in a two-tailed test for significance of coefficient under the null hypothesis that the true value is zero.

Significance at 1 ***, 5 ** and 10 *

Of the eighteen causal paths that were tested in the model, only two (Region---> Information Sharing between Actors, and Gender ---> Information Sharing through DDF) were significant.

Gender results (β= -0.274, ρ<0.05) indicated that men were worse off by a -0.274 score in promoting information sharing through DDF compared to women. This interpretation considers the dummy coding of gender variable with 1 for male and 0 for female. This is despite women accounting for only 25.3 of the interviewed respondents. However, as highlighted by a key informant during the study, DDF was very much sensitive to gender balancing, even though most actors in dairy value chain were predominantly men. Indeed, the low representation of women is not unique to DDF following a finding by Lema and Nederlof, (2013) whose study found that women are frequently under-represented in innovation platform processes, despite being primary producers and processors of agricultural products.

Women being better in information sharing than men might be attributable to the observation that they were also better organized in producer groups. In some regions like Kilimanjaro, there were a number of dairy cooperative societies that were exclusively owned and managed by women including Nronga women Dairy cooperative and Kalali women Dairy cooperative societies. These cooperatives integrated several components of the dairy value chain including input supplying, dairy production, processing, and marketing. Such cooperative societies and other women dairy groups would send representatives to dairy development meetings such as DDF, and the representatives would then report back to their members on the dairy lessons they derived from those meetings. Consequently, women from such dairy platforms, cooperatives and dairy groups were more efficient in sharing the information and knowledge they gained from the Dairy Development Forum to their members absent from the DDF meetings. This corroborates findings by Mariami *et al.*, (2015) whose study on innovation platforms in Ghana indicated that women were better in market negotiations because they had more social connections to get necessary market information.

The results on contribution of region to information sharing between actors (β= -.404, ρ<0.05) indicates a highly significant negative effect. While a key objective of the DDF was to act as a non-formal consultative forum in which dairy industry stakeholders could come together for knowledge and information sharing, the results suggests that this objective is yet to be met since regional barriers are still limiting information sharing between regions despite periodical conventions of the actors through DDF. However, a limitation already outlined

earlier in the study is that DDF was still in its formative stages during this study, having conducted only two forum meetings when this research on it started. Whereas information sharing between actors might be good within regions, information sharing between actors across different regions is still low. Indeed, during a focus group discussion in Morogoro, a participant lamented "information sharing is only effective when dairy value chain actors are congregated in a meeting. Beyond meetings, there is low access to requisite information sharing technologies like computers and mobile phones."

Information sharing within an actor category was good compared to information sharing between actors. For example, processors had Tanzania Milk Producers Association (TAMPA) that was active in aggregating information relevant to processors and distributing it through emails, mobile phones and meetings, thus enhancing information sharing within the dairy processing actors. Similarly, producers also had dairy cooperatives in some regions and major input suppliers often shared information between themselves as informed by a key informant. However, avenues for information sharing across dairy actors were limited to agricultural shows such as *Saba Saba, Nane Nane, Maziwa* Week and the regional dairy platforms in Morogoro and Tanga as well as DDF.

Borowski, (2010) on a study on multi-stakeholder platforms discusses that information flow is only efficient through formalized communication because stakeholders also perceived the platforms as a threat to their own interests. Information sharing between actors was therefore limited since each actor hoarded useful information to gain a competitive advantage over other competing actors. However, these perceived benefits of hoarding information are discounted by findings of Houston, *et.al* (2010) whose study reported that increased information sharing between competing banks often resulted in increased profits, lower risks and higher economic growth.

4.3.2 Test of hypothesis 2: Information Sharing – Nurturing Smaller Innovation Platforms

While testing for the second hypotheses**;** Information sharing within and outside of the Tanzania Dairy development forum positively contributes to the nurturing of regional innovation platforms; SPSS Amos notes that the model is recursive, indicating that causation for all variables is directed in one direction, and error terms are uncorrelated.

The table 19 summarizes the estimates of goodness-of-fit as measured by various indices:

Table 19: Goodness-of-Fit for Conduct - Performance

Computation of degrees of freedom (Default model)							
			Number of distinct sample moments:				27
			Number of distinct parameters to be estimated:				24
			Degrees of freedom (27 - 24):				3
	Absolute fit measures			**Parsimony measures**		**Incremental measures**	
Index	χ^2	χ^2**/df**	**RMSEA**	**PNFI**	**PCFI**	**NFI**	**CFI**
Recommended	χ^2, df, p>0.05	1.0< χ^2/df<3.0	<0.05 good, <0.08 acceptable	>0.90	>0.90	>0.90	>0.90
Obtained	χ^2= 0.052. df = 6 p = 0.999	0.05	0 .00	0 .39	0 .40	0 .984	1.00

χ^2= Chi square; df = Degrees of freedom, χ^2/df = Normed Chi Square, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimonious Normed Fit Index, PCFI = Parsimonious Comparative Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index

The model fits the data reasonably well as indicated by the selected overall goodness-of-fit statistics χ^2= 0.052, p = .999 (p>0.05), RMSEA = .000 (<.06), NFI = .984 (>.95), CFI = 1.000 (>0.90). Barrett, (2007) posits that chi-square indices should be insignificant at 0.05 threshold for a good model fit. Since the probability value of the chi-square (0.999) is higher than the 0.05 level used by convention, the null hypothesis accepted because the model fits the data. According to Kaplan, (2000), Root Mean Square Error (RMSEA) should be interpreted as: ≤0.05 = close fit, 0.05 – 0.08 = fair fit, 0.08 – 0.10 = mediocre fit, and > 0.10= poor fit. For NFI, values close to one indicate a very good fit (Bentler & Bonett, 1980). Consequently, from the results in Table 20 above, the model exhibited an overall good fit to the data. If goodness of fit is adequate, the model argues for the plausibility of postulated relations among variables; if it is inadequate, the tenability of such relations is rejected (Byrne, 1994).

Noting that the model fits the data well and is theoretically consistent as hypothesized, the parameter estimates and individual tests of significance for each parameter are then evaluated. Figure 13 illustrates the path analysis diagram for the conduct- performance structural model.

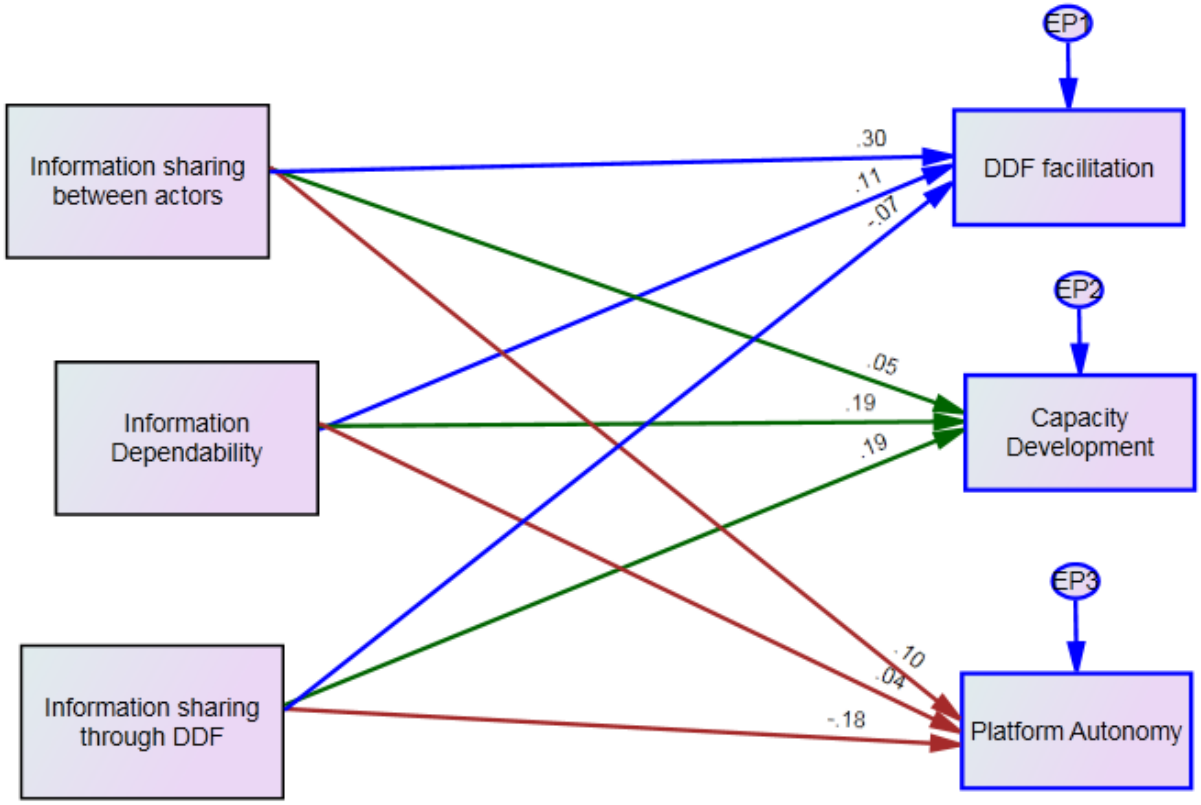

Figure 13: Information Sharing – Nurturing Smaller Innovation Platforms Structural Model

Table 20 summarizes the standardized and unstandardized parameter estimates generated through the path analysis;

Table 20: Estimates of regression weights for Information Sharing – Nurturing Smaller Innovation Platforms

				Unstndzd	**Stndzd**	S.E.	C.R.	P
Information Dependability		--->	DDF facilitation	.123	.111	.116	1.062	.288
Information Dependability		--->	Capacity Development	.212	.191	.118	1.793	.073
Information Between Actors	Sharing	--->	Capacity Development	.051	.046	.118	.434	.664
Information Through DDF	Sharing	--->	Capacity Development	.207	.186	.118	1.750	.080
Information Dependability		--->	Platform Autonomy	.040	.036	.120	.337	.736
Information Between Actors	Sharing	--->	Platform Autonomy	.117	.105	.120	.972	.331
Information Through DDF	Sharing	--->	Platform Autonomy	-.202	-.181	.120	-1.681	.093
Information Through DDF	Sharing	--->	DDF facilitation	-.083	-.074	.116	-.712	.477
Information Between Actors	Sharing	--->	DDF facilitation	.329	.296	.116	2.832**	.005

Estimated regression coefficients: **Unstndzd** = Unstandardized, **Stndzd** = Standardized

SE = Standard error of estimated unstandardized coefficient;

C.R = critical ratio

P = Probability of a t value equal to or greater than actual t value in a two-tailed test for significance of coefficient under the null hypothesis that the true value is zero.

The symbol ** are significant at the 0.01 alpha level that corresponds to 1.65

Path analysis was used to test for links between the conduct and performance latent variables as identified through factor analysis. The path analysis involved a simultaneous estimation of structural and measurement models and was performed using SPSS AMOS 22. The proposed model tested the causative relationships among six latent variables, three for

conduct within DDF, and the other three for performance of DDF. Using standardized path coefficients, the contribution of various conduct factors on performance factors is established.

Of the nine paths analysed, only one was significant at 95 confidence interval while three others are significant at 95 confidence interval. The contribution of information sharing between actors with other platform partners to DDF facilitation for regional innovation platforms was positive (Beta-value = 0.296, Sig. = 0.5). Dependability of information shared between value chain partners to capacity development of regional innovation platforms and working groups is positive (β = 0.191, Sig. = 7.3); and information sharing through DDF linkages to capacity development of regional innovation platforms and working groups is significant (β=0.186, Sig. = 8.0).

The DDF facilitation construct as generated from the factor analysis in Table 14 included the advocacy of concerns from regional platforms through DDF; providing a platform for regional dairy innovation platforms to learn from each other, guidance of regional innovation platforms to be dynamic in their focus issues; and enabling the regional innovation platforms to expand their knowledge of dairy innovations. The significance of contribution by information sharing between actors to DDF facilitation is expected, and a good indicator that despite the short time that DDF has been in existence, DDF has overcome the potential conflicts often faced during the initial stages of establishing an innovation platform (Thiele *et al.*, 2011). Indeed, Swaans *et al.,* (2014) notes that to address the varied interests of value chain actors, identification of win-win situations alongside high-quality facilitation are necessary. Their study further highlights the vital role played by facilitation during the initial stage when linkages between value chain actors are often weak.

Results above suggest the existence of some significant relationships among various conduct – performance constructs. The model fitted the data reasonably well and consequently validates hypothesis two that information sharing within and outside of the DDF positively contributes to the nurturing of regional innovation platforms.

4.3.3 Test of hypothesis 3: Structure – Nurturing Smaller Innovation Platforms

The third hypothesis; The structure of the Tanzania Dairy development forum positively contributes to the nurturing of regional innovation platforms; was also tested by performing a path analysis with SPSS AMOS 22. The output panel indicates that the model is recursive, meaning that there are no feedback loops and that the model is identified. The model fit results are presented in Table 21, and the path analysis diagram generated during the analysis

is illustrated in Figure 9. The model fit results in indicate an acceptable fit to the data as indicated by incremental indices and absolute fit measures in Table 21.

Table 21: Structure - Nurturing Smaller Innovation Platforms goodness of fit indices

Computation of degrees of freedom (Default model)							
			Number of distinct sample moments:				54
			Number of distinct parameters to be estimated:				51
			Degrees of freedom (54 - 51):				3
	Absolute fit measures			**Parsimony measures**		**Incremental measures**	
Index	χ^2	χ^2/df	**RMSEA**	**PNFI**	**PCFI**	**NFI**	**CFI**
Recommended	χ^2, df, p>0.05	1.0< χ^2/df<3.0	<0.05 good, <0.08 acceptable	>0.90	>0.90	>0.90	>0.90
Obtained	χ^2= 2.124 df = 3 p = .547	.708	.000	.083	.083	.98	1.000

χ^2= Chi square; df = Degrees of freedom, χ^2/df = Normed Chi Square, RMSEA = Root Mean Square Error of Approximation, PNFI = Parsimonious Normed Fit Index, PCFI = Parsimonious Comparative Fit Index, NFI = Normed Fit Index, CFI = Comparative Fit Index

The main task of SEM is "to determine the goodness of fit between the hypothesized model and the sample data" (Byrne, 1994). A good fit suggests that the hypothesized relations among constructs are plausible; a bad fit suggests the rejection of the theorized relations among constructs in the model. Hypothesis 3 postulated that the structure of the Tanzania Dairy development forum positively contributes to the nurturing of regional innovation platforms.

The model indicates an acceptable fit as indicated by the selected overall goodness-of-fit statistics χ^2= 2.124, p = .547 (p>0.05), RMSEA = .000 (<.05), NFI = .980 (>.95), CFI = 1.000 (>0.90). Since the probability value of the chi-square (0.547) is higher than the 0.05 level used by convention Barrett, (2007), the null hypothesis is accepted with reference to model fit to the data. However, even though the results suggest the plausibility of postulated relations

among structure-performance variables, it is notable that the normed chi-square alongside the parsimony measures indicate a poor fit, perhaps due to the young nature of the DDF as dicuseed by Dror et al. (2015).

The next step was to review path coefficients as generated from the path analysis. Results are summarized in Figure 14 and Table 22 indicates estimates for all path coefficients, standard errors, and critical ratios.

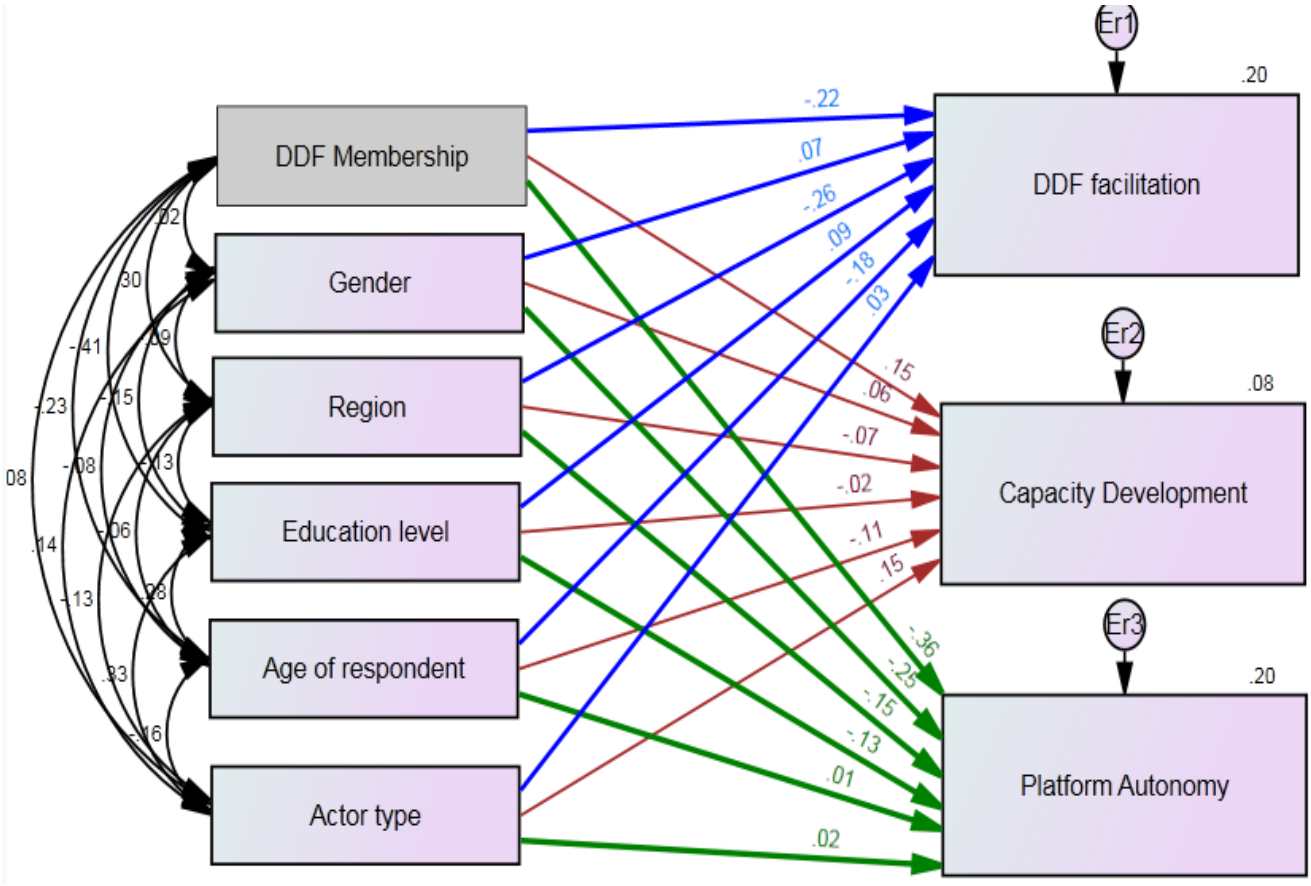

Figure 14: Structure – Nurturing Smaller Innovation Platforms Structural Model

Table 22: Estimates of regression weights for Structure – Nurturing Smaller Innovation Platforms

			Unstdzd	Stdzd	S.E.	C.R.	P
DDF Membership	--->	Capacity Development	-.258	-.148	.219	-1.174	.240
Gender	--->	Capacity Development	-.111	-.055	.221	-.503	.615
Region	--->	Capacity Development	-.023	-.068	.037	-.602	.547
Education level	--->	Capacity Development	-.015	-.021	.099	-.155	.877
Age	--->	Capacity Development	-.008	-.109	.008	-.951	.342
Actor type	--->	Capacity Development	.040	.147	.034	1.188	.235
DDF Membership	--->	Platform Autonomy	.623	.357	.204	3.048	.002
Gender	--->	Platform Autonomy	.510	.255	.205	2.484	.013
Region	--->	Platform Autonomy	-.048	-.146	.035	-1.391	.164
Education level	--->	Platform Autonomy	-.095	-.129	.093	-1.022	.307
Age	--->	Platform Autonomy	.001	.008	.007	.079	.937
Actor type	--->	Platform Autonomy	.005	.020	.031	.173	.863
DDF Membership	--->	DDF facilitation	.383	.220	.205	1.867	.062
Gender	--->	DDF facilitation	-.138	-.069	.206	-.669	.504
Region	--->	DDF facilitation	-.087	-.263	.035	-2.492	.013
Education level	--->	DDF facilitation	.070	.095	.093	.749	.454
Age	--->	DDF facilitation	-.013	-.185	.008	-1.715	.086
Actor type	--->	DDF facilitation	.008	.148	.031	.252	.801

The standardized parameter estimates for the Structure – Performance component revealed three out of eighteen statistically significant coefficients, indicating that three of the eighteen presumed direct effects on endogenous variables were statistically significant at 95 confidence interval.

DDF membership was found to influence platform autonomy (β= 0.623, Sig. = 2) indicating that DDF members were contributing more to platform autonomy by a score of 0.623 than the DDF non-members. The platform autonomy factor derived from factor analysis grouped together DDF working groups, and regional innovation platforms.

The platform autonomy performance construct was also influenced by gender (β= 0.510, Sig. = 1.3) indicating that men were contributing more to the autonomy of regional platforms and working groups within DDF by 0.510 score than women.

The region was found to be influencing DDF facilitation negatively ((β= -0.087, Sig. = 1.3) indicating that the distribution of the DDF members across the regions was not harnessing the DDF efforts to facilitate regional platforms and working groups. During a focus group discussion in Dar es Salaam with key stakeholders, it was highlighted that DDF facilitation to regional platforms was still in its infancy stages and DDF was working to link its working groups with the regional innovation platforms. The DDF working groups were composed of members from different regions and were assigned an issue to deliberate upon and report findings to the DDF. However, the effectiveness of these working groups was negatively impacted by the regional barriers like long distances and ineffective communication thus curtailing their ability to deliver on assigned mandates.

At the time of the study, MilkIT, a dairy project in India and Tanzania was more involved in facilitating village level platforms as well as Morogoro regional platform. Some development partners involved in DDF like ILRI and CIAT were however deeply involved in the MilkIT project and it was therefore likely that DDF efforts had some spill-over effects in the MilkIT facilitative efforts through these development partners. Indeed, it was established through discussions with key stakeholders that the MilkIT project had hired consultants to facilitate the setting up of regional and district dairy platforms as well as impart facilitation skills to platform organizers.

The regional focus groups held indicated that funding was a critical factor in determining the success or failure of the regional dairy innovation platforms. The Tanga Platform, arguably the most successful regional innovation platform in Tanzania was working with several development partners, some of whom were part of the DDF as also ascertained by (Cadilhon *et al.,* 2016). The partners would meet administrative costs of the platform and sometimes offer meals to members attending platform meetings. This was also similar in Morogoro where MilkIT was facilitating the setting up of the Morogoro regional dairy platform. In other regions like Iringa and Mbeya, attempts to set up regional dairy innovation platforms were often curtailed by lack of funding partners. The quagmire was that whenever members were requested to subscribe to the platform with a fee to finance the administrative costs of the platforms, they would always disintegrate.

CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The primary purpose of this study was to contribute to the understanding of how innovation platforms impact information sharing and nurturing of smaller innovation platforms. The study also contributed to the testing and refining of a conceptual framework developed by Cadilhon, (2013). The conceptual framework first breaks down the complex interrelationships in innovation platforms into meaningful categories through the Structure, Conduct, and Performance (SCP) paradigm and hypothesizes that the overall performance of an industry is influenced by the conduct of the stakeholders within the innovation platforms, which in turn is determined by the structure of the innovation platforms. The application of the SCP paradigm in this study does not apply in the context of neoclassical economics. Rather, only the rationality of perceived influences between structure, conduct, and performance constructs is assumed and applied in evaluating the impact of innovation platforms. The Dairy Development Forum is a national dairy innovation platform bringing together dairy industry stakeholders across Tanzania. Having been initiated in 2013, the DDF had successfully held three meetings by the time of data collection for this study and was posited to be influencing change in the Tanzanian dairy sector. In this study, DDF was studied by segmenting it in three constructs namely; DDF structures, conduct of its participants, and associated performance through nurturing regional innovation platforms. This study also provides maiden benchmarking results for the Dairy Development Forum to be used to evaluate future

For Structure – Information Sharing, findings of the research have shown that region and gender have a significant negative (β= -.404, ρ<0.05) impact on information sharing between dairy value chain actors. Region as a structure variable was found to negatively influence information sharing. This is despite efforts by the DDF secretariat to have representation from all regions during the forums. gender, also a structure variable has been shown to influence information sharing through DDF.

For information sharing – nurturing smaller innovation platforms, an adequate model fit was ascertained with information sharing between actors being significant in influencing the performance of the DDF through positive (Beta-value = 0.296, Sig. = 0.5) enhancement of DDF facilitation efforts in nurturing smaller innovation platforms.

With regard to Structure – nurturing smaller innovation platforms, an acceptable model fit was established. DDF membership and Gender structure variables were found to influence

the platform autonomy performance construct. Participation in DDF forums was found to positively influence (β= 0.623, Sig. = 2) platform autonomy indicating that DDF members were contributing more to platform autonomy by a score of 0.623 than the DDF non-members. On gender, men were also better at ensuring autonomy of smaller innovation platforms when being nurtured by DDF.

5.2 Recommendations

1. Strengthen collaboration with organized dairy cooperatives and dairy initiatives. Considering the challenges that are inherent in the initiation of innovation platforms, it is recommended that DDF works with organized groups and dairy projects. There are several dairy cooperatives scattered across different regions in Tanzania that have been able to organize themselves without external donor assistance.
2. Disseminate information virtually. The dissemination of information shared during DDF meetings through virtual and social networks would enhance information sharing to a larger number of actors in the Tanzania dairy value chain. Considering that attendance to DDF meetings averaged at about 60 participants per forum meeting, and the expanse of dairy value chain actors in Tanzania, the high-quality information shared and knowledge generate during DDF meetings would reach a wider audience. Indeed, this study has found that regional barriers were negatively influencing information sharing between value chain actors. Consequently, holding virtual meetings, or enabling interested dairy value chain actors to follow the proceedings of the DDF meeting off-site would increase participation and add more variety to shared views.
3. Under the structure elements, revise platform membership variable to platform participation or attendance. Considering that the attendance of DDF meetings, and in other innovation platforms is rotational dependent on interest to the topic under discussion, and that innovation platforms are have open membership, it is impossible to have designated members to an innovation platform. Consequently, the application of the monitoring and evaluation conceptual framework should be implemented with the acknowledgement that membership to innovation platform is very dynamic and greatly modelled by the mutating focuses of platforms.

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QID:_____

APPENDICES

APPENDIX 1: INDIVIDUAL QUESTIONNAIRE

Questionnaire for IP members

Objective of survey

I am a student research fellow working here with the International Livestock Research Institute (ILRI). We are doing a study to aimed at refining and testing a conceptual framework for monitoring and evaluating the impact of innovation platform. The study focuses on understanding how information sharing within Tanzania dairy development forum is influencing market access, and nurturing of regional innovation platforms. Your participation in answering questions related to your activities and your relationship with the dairy development forum is very much appreciated.

Informed consent

Your responses will be ***COMPLETELY CONFIDENTIAL*** *and the information you will give me will not be associated to your name in any of our work or in our further interviews with other stakeholders associated with the Tanzania Dairy Development Forum. Your responses will be added to those of 120 other respondents and analyzed together. If you have any questions or comments about this survey, you may contact Deogratius Mlay (Dairy Technical Services_ Department Manager Tanzania Dairy Board) email: deomlay@gmail.com / Kennedy Kago_Email: K.Kago@cgiar.org*

If you indicate your voluntary consent by participating in this interview, may we begin?

Identifying Information

General	Date (dd/mm/yy)			
	Starting Time			
	Respondent's name			
	Respondent's Cell phone number			
Stakeholder / Organization	Name of Stakeholder / Organization			
	Contact (Address)			
	Phone			
	E-Mail			
	Region		Reg	
	District		DIST	
	Division		DIV	
	Ward		LOC	
	Area / Village		VIL	

QID:_____

SECTION 1: DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENT

A: Respondent								
1. Gender	1= Male	2=Female						
2. Age								
3. Highest Education	1= Primary School	2= High School	3= Certificate	4= University	5= Post Graduate	6= PhD	7= Other	
4. Number of years working here								
5. Department								
6. Position								

B: Community/ IP-, DDF Membership						
1. DDF MEMBER	1= Yes	2= No	3= Not any more			
1a. **MEMBERS:** Attendance in DDF meetings	0= n/ a	1= Neve r	2= Not so frequently	3= Often	4= Every	
1b. **MEMBERS:** Numbers of employees/ members involved in DDF						
2. Are you a member of any other community or group regarding your activity?	1= Yes	2= No	**(If yes,)** Which one(s)			
2a. **MEMBERS OF OTHER GROUPS:** Attendance in meetings	0= n/ a	1= Neve r	2= Not so frequently	3= Often	4= Every	
3. Have you ever left an IP?	1= Yes	2= No				
3a. **LEAVERS:** Reason for Non-participating/ leaving the IP:						

QID:_____

SECTION 2a: Indicators of "Conduct"

	n/a, 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree,	
1. Information	1. We usually share information about our activities with other stakeholders.	
	2. The information we get from the other platform/ organization -partners is useful.	
	3. The information we get from the other platform partners/ organization is reliable.	
2. Communica	4. We attend periodic meetings of stakeholders to discuss common problems about our activities.	
	5. We use contacts with other platform/ organization actors to get information relevant to our activities.	
	6. We are satisfied with the communication frequency we have with other platform / organization members.	
3. Trust	7. We can express our views freely in exchanges with our platform/ organization partners.	
	8. Our trust on products/Services provided by platform / organization partners has increased in the past 2 years	
	9. We have greater trust in our partners if they are also part of a group (cultural, social, religious) we are part of.	

C: Organization							
1. Founding Date							
2. Type of activity	1= Input supplier	2= Producer	3= Trader	4= Processor	5= Consumer	6= NGO	8= Funding agency
	7= Research institute/ University		9= Government	10= Itinerant Retailer	11= Supermarket (Big scale)	12= Small Scale retailers (Kiosk, shops)	
	13= Financial organization			14= Service Provider		15= Other	

3. Form of Organization	1= Government	2= NGO	3= Private	4= Public	5= Association	6= Organization		
	7= Society/ Cooperative		8= other					
4. Source of funding	1= Operation generated cash	2= NGO funded		3= Government funded	4= Membership fees	5= Other		
5. Numbers of employees/ members		Number of men		Number of women				

4. Coordination	10. We exchange information with our platform/ organization partners about our on-going activities.	
	11. Our platform/ organization partners exchange information about their on-going activities with us.	
	12. We plan our activities according to the activities of our platform/ organization partners.	
5. Joint Planning	13. We plan our activities together with our platform/ organization partners	
	14. Our viewpoints are taken into account by our Platform / organization partners when they plan their activities.	
	15. Joint planning of activities with our platform/ organization partners has improved in the past 2 years.	

D: Information								
1. What is the main channel of	1= Telephone	2= Mobil phone	3= Computer	4= Radio	5= TV	6= newspaper	7= magazines	

communication you usually use in your activities?	8= Direct contact	9= Meetings	10= Extension agents	11= Other organizations	12= IP members	13= Other		
2. Where do you get information relevant to your activities?	1= Telephone	2= Mobil phone	3= Computer	4= Radio	5= TV	6= newspaper	7= magazines	
	8= Direct contact	9= Meetings	10= Extension agents	11= Other organizations	12= IP members	13= Other		
3. Have you ever shared information about your activities with other value chain partners?	1= Yes	2= No	If Yes How often per year					

QID:_____

SECTION 3: Focus-Indicators of "Conduct": Information Sharing

1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree	
1. We are satisfied with the quality of information we get from value chain	
2. The information we get from value chain partners is reliable	
3. We use the information shared with us in our activities	
4. We get too much information from DDF	
5. Information on the market is easily accessible to value chain actors	
6. We get enough information from DDF	
7. The DDF facilitates flow of dairy industry information to regional innovation	
8. DDF facilitates information sharing on establishment and management of	

a. Areas for which information provision is inadequate (identify information gaps)

_____

_____

_____

_____

_____

_____

____

QID:_____

Section 4: Indicators of "Performance"

	n/a, 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree,	
1. Advocacy	1. Representatives of the DDF facilitate innovation at the national level.	
	2. Platform members communicate their achievement in other organized groups.	
	3. The DDF lobbies for policy changes on national level.	
2. Capacity building	4. In the past 2 years, we have changed things (e.g. Practices, techniques) in our production, production process, or management.	
	5. In the past 2 years, we have gained knowledge and skills applicable in our activities from stakeholders **outside DDF.**	
	6. In the past 2 years, we have gained knowledge and skills applicable in my activities from DDF stakeholders.	
3. Value Chain Development	7. In the past 2 years, we have improved our product.	
	8. In the past 2 years, there has been an improvement in the Interaction between policies, Government, and other stakeholders.	
	9. In the past 2 years, we have had a better access to the market.	
4. Nurturing regional platforms	10. The DDF has created regional platforms	
	11. The DDF actively supports the work of other innovation platforms at provincial/ regional level.	
	12. The DDF encourages us to form working groups within the platform to discuss specific problems.	

13. Have you received any training on your activities?	1= Yes	0= No	If yes how many in the last year?		
13a. **IF YES:** On what:					

SECTION 5a: Focus Indicators for Performance "Market access"

1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree, N/A	
1. Market access to inputs has improved in the past two years	
2. Our access to output markets has improved in the past two years	
3. We can now better negotiate market prices than two years ago	
4. Our marketing skills have improved in the two years	
5. Our access to market information has improved in the past two years	
6. Our income from dairy activities has improved in the past two years	
7. We have created new products and services to respond to new market demands in the past two years	
8. We have faced constraints in accessing markets in the past two years	
9. Within the past two years, we have adhered to national or international quality or safety standards schemes	
10. Our geographical location has an impact on our access to markets	

a. Do you think improvements in market access are attributable to information sharing in the IP / DDF/? Yes_____ No_____

QID:_____

SECTION 5b: Focus Indicators for Performance "Nurturing regional IPs"

1= strongly disagree, 2= disagree, 3= undecided, 4= agree, 5= strongly agree, N/A	
1. The DDF actively facilitates the establishment of regional innovation platforms	
2. The DDF is involved in capacity development of members involved in managing regional innovation platforms	
3. The DDF is involved in capacity development of members involved in managing working groups and taskforces	
4. The DDF engages experienced advisors and consultants to guide regional innovation platforms in their development	
5. DDF assists to advocate concerns of regional innovation platforms at the national level	
6. DDF encourages regional platforms to change their focus of discussion from time to time	
7. DDF provides a platform for regional innovation platforms to learn from other successful examples of working IPs	
8. DDF enables regional innovation platforms to expand their knowledge of dairy innovations.	
9. DDF guides working groups and task forces on solving funding challenges	
10. DDF guides regional innovation platforms on solving funding challenges	
11. The DDF remains neutral in its interactions with the activities of regional IPs to ensure they achieve their goals democratically	
12. The DDF remains neutral in its interactions with the activities of working groups and taskforces to ensure they achieve their goals democratically	

SECTION 6: Closing part
For Commercial firms and associative businesses:

1. What is your yearly Gross Sales Value? _____
2. Do you want to continue associating with DDF?_____

i. If yes, Why:

_____
_____
_____

ii. If No, Why

_____
_____
_____

3. Do you know value chain participants, which have a similar structure as you have, and do NOT participate in the **DDF**?

Name	**Information**

4. Would you like to give us any comment regarding the Questionnaire?

_____
_____
_____

Interview was conducted in

1. Language of the questionnaire _____	2. Local language _____

Ending Time:_____

Focus Group Discussion Number: _____

APPENDIX II: FOCUS GROUP CHECKLIST

Focus Group Checklist

Name of Group:

……

Region / District:

……

Venue:

……

Total attendees: …….. No. of males: …….. No. of females: ……..

Date of interview: ……..

Start time: ……

Guidelines

- Get together: Have some refreshments before starting
- Welcoming: One of the Participants open with a word of prayer or a cultural ceremony of the community, if relevant and appropriate.
- Permission: Request for consent to use cameras or tape recorders (if any).
- Introduction:
    - Facilitator
    - Participants (indicating which group / value chain process they represent)
    - Organizations involved (ILRI) / Tanzania Dairy Board
    - Tanzania Dairy Development Forum/ NLA,
- Setting the scene:
    - Objectives of the focus group discussion,
    - Highlight the important role of the participants in freely discussing the issues to be raised
    - Orientate the participants on the planned process of the focus group discussion.
    - Set the ground rules together with the participants (assigning time for each speaker and focusing on the main/relevant issues for the study)

Focus Group Discussion Number: _____

General section

Members: What motivates you to participate in IPs/DDF?

1. Apart from the IP / DDF, are you also part of other associations / groups?
   Yes ☐ Number_____
   No ☐ Number_____

Tanzania Dairy Development Forum

2. What does DDF mean to you?

3. More generally, please discuss the positive and negative lessons that you have learned from your involvement with innovation platforms / DDF.

Positive	**Negative**
1.	
2.	
3.	
4.	
5.	

4. How do different actors and committees carry out different roles?
   a. Interaction between different actors
   b. To what extent have the roles been clearly defined?
5. Do DDF members also communicate and share the same information with non-members?

6. Did you see any improvement in your field of activity?
   a. What kind of improvement?
   b. How do you explain this improvement?
   c. Is this improvement attributable to DDF operations?
7. If you could change three things in your business activity related to the IPs and DDF, what would this be?

Focus Group Discussion Number: _____

Special questions for Tanzania Dairy Development Forum

Information sharing

1. What does information sharing mean to you?
2. How is information shared amongst value chain partners?
3. What kind of information do you mostly seek for?
   What sources do you use to access this information?
4. Do you offer information from your activities to other value chain partners?
5. What are the barriers to information sharing within the IPs and DDF?
6. What needs to be done to ensure effective and efficient information sharing?
7. How does the level of information sharing influence the performance of the IP/ DDF?

Nurturing smaller platforms

1. What do you understand by nurturing of smaller innovation platforms
2. Do you receive any consultancy services in establishing innovation platforms at lower levels (district / Village)?
3. What form of assistance is offered to smaller innovation platforms to nurture them/ DDF guides smaller innovation platforms?
4. How do smaller innovation platforms facilitate (fund) their activities?
   a. Has DDF provided guidance on how to source funding for IP activities?

Thank you very much for your time!

End time……..

Interviewer's observations

……

……

……

……..

Focus Group Discussion Number: _____

List of Participants

	Name	Organization/ Company /... representing	Role in value chain (Input supplier, Producers, processors, development partners, policy makers, traders etc)	Contact (phone)	DDF Member (Yes / No)	Requires transport refund (Yes/No)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

QID_____

APPENDIX III: KEY INFORMANT INTERVIEW

Key Informant interview

Objective of survey

I am a student research fellow working here with the International Livestock Research Institute (ILRI). We are doing a study to aimed at refining and testing a conceptual framework for monitoring and evaluating the impact of innovation platform. The study focuses on understanding how information sharing within Tanzania dairy development forum is influencing market access, and nurturing of smaller innovation platforms. Your participation in answering questions related to your activities and your relationship with the dairy development forum is very much appreciated.

Informed consent

*Your responses will be **COMPLETELY CONFIDENTIAL** and the information you will give me will not be associated to your name in any of our work or in our further interviews with other stakeholders associated with the Tanzania Dairy Development Forum. Your responses will be added to those of 120 other respondents and analyzed together. If you have any questions or comments about this survey, you may contact Deogratius Mlay (Dairy Technical Services_ Department Manager Tanzania Dairy Board) email:……../ Kennedy Kago _Email: K.Kago@cgiar.org*

If you indicate your voluntary consent by participating in this interview, may we begin?

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General	Date (dd/mm/yy)			
	Starting Time			
	Respondent's name			
	Respondent's Cell phone number			
Stakeholder / Organization	Name of Stakeholder / Organization			
	Contact (Address)			
	Phone			
	E-Mail			
	Region		CONT	
	District		DIST	
	Division		DIV	
	Ward		LOC	
	Village		VIL	

QID_____

SECTION 1: DEMOGRAPHIC CHARACTERISTICS OF THE RESPONDENT

<table>
<tr><th colspan="11">A: Respondent</th></tr>
<tr><td>1. Gender</td><td colspan="2">1= Male</td><td colspan="2">2=Female</td><td colspan="6"></td></tr>
<tr><td>2. Age</td><td colspan="10"></td></tr>
<tr><td>3. Highest Education</td><td colspan="2">1= Primary School</td><td colspan="2">2= High School</td><td colspan="2">3= Certificate</td><td colspan="2">4= University</td><td colspan="2">5= Post Graduate</td><td>6= PhD</td><td>7= Other</td></tr>
<tr><td rowspan="3">4. Type of activity</td><td colspan="2">1= Input supplier</td><td>2= Producer</td><td colspan="2">3= Trader</td><td colspan="2">4= Processor</td><td colspan="2">5= Consumer</td><td colspan="2">6= NGO</td><td>8= Funding agency</td></tr>
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<tr><td colspan="3">13= Financial organization</td><td colspan="3">14= Service Provider</td><td colspan="2">15= Other</td><td colspan="3"></td></tr>
<tr><td>5. Department</td><td colspan="10"></td></tr>
<tr><td>6. Position</td><td colspan="10"></td></tr>
<tr><td colspan="3">7. Number of years worked here</td><td colspan="7"></td></tr>
</table>

B: Community/ IP-, DDF Membership						
1. DDF MEMBER	1= Yes	2= No	3= Not any more			
1a. **MEMBERS:** Attendance in DDF meetings	n/ a	1= Never	2= Not so frequently	3= Often	4= Every	
1b. **MEMBERS:** Numbers of employees/ members involved in DDF						
2. Is your organization a member of any other community or group regarding your business activity?	1= Yes	2= No	**(If yes,)** Which one(s)			
2a. **MEMBERS OF OTHER GROUPS:** Attendance in meetings	0= n/ a	1= Never	2= Not so frequently	3= Often	4= Every	

QID_____

(Only for platform members) **Internal structure of the innovation platform**

1. What is your special role within the DDF? _____

1. Chairperson/secretary	2. Just member	3. Facilitator/organizer
4. Support organization	Other:	

2. What are the criteria for joining the DDF? _____

1. Wealth	2. Gender	3. Interest	4. Type of activity
5. Ethnicity	6. Age	7. Other ……	

3. What are the current numbers of members of the DDF?_____
   a. Does this differ from the numbers at the establishments of the IPs? Yes _____No_____
   b. If yes, why does this difference occur? ……
      ……
   c. How many of these members are women? ……
      ……
4. How do members usually interact to take decisions within DDF?

……

……

……

……

……

5. Has the DDF set up smaller committees within the platform to tackle more specific problems?

If yes, how do these committees work?

……

……

……

6. What are the current sources of funding of the DDF?_____

1= Tax on sales of members	2= Operation-generated cash	3= NGO	3= Government	4= Membership fees	5= Other:

7. Does the DDF have a secretariat to help organize the platform's activities? Yes ____ No____
8. If no, why not?

……

…….....

a. If yes, how many staff compose the secretariat?

_____

i. Whom do they report to?

……

……

ii. How are they paid?

……

……

iii. How do they decide on their work plan?

……

……

9. How many regular meetings does the platform undertake per year?

……

10. Does the DDF have any written by-laws to regulate the way the platform operates, the roles and obligations of its members? Yes _____No_____

a. If yes, please elaborate on the main elements of these by-laws.

……

……

……

……

……

(For all respondents)

External environment of the (1) dairy sector in Tanzania

11. What are the laws and regulations that already exist to frame the development of the dairy sector in Tanzania?

.....

.....

.....

.....

.....

12. Are there any laws or regulations that frame the existence and functioning of the DDF?

    Yes _____ No _____

    a. If yes, which ones and what are their main points?

.....

.....

.....

.....

13. Are there any particular cultural norms for interactions between stakeholders in the society in this country that affect how people will behave when doing business in DDF?

.....

.....

.....

Linkages between structure – conduct – performance

14. What does an "innovation platform" mean to you?

.....

.....

.....

Do you think IPs are helpful to the industry sector you are part of?

Yes……. No……

a. If so, in what ways?

.....

.....

15. What motivates you to participate in IPs/DDF?

.....

.....

16. What are the factors that sustain or curtail participation of dairy/agribusiness actors in DDF?

_____

_____

_____

_____

17. If you could change three things in how IPs/DDF operate, what would they be? And why?

.....

.....

.....

QID_____

Focus questions for DDF

18. Does the organizational structure of the DDF influence information sharing within the DDF?

Yes ☐ No ☐ Don't know ☐

If **Yes**, How?

_____

_____

_____

_____

19. Does the organizational structure of the DDF influence the way the DDF helps develop market access for its members?

Yes ☐ No ☐ Don't know ☐

If **Yes,** how?

_____

_____

_____

_____

20. Does the level of information sharing within DDF influence the way the DDF helps develop market access for its members?

Yes ☐ No ☐ Don't know ☐

If **Yes,** how?

_____

_____

_____

_____

21. Does the organizational structure of the DDF influence the way the DDF helps nurture smaller platforms for dairy development in Tanzania?

Yes ☐ No ☐ Don't know ☐

If **Yes,** how?

_____

_____

_____

_____

_____

22. Does the level of information sharing within DDF influence the way the DDF helps nurture smaller platforms for dairy development in Tanzania?

Yes ☐ No ☐ Don't know ☐

If **Yes,** how?

_____

_____

_____

_____

23. Are individuals allowed to join the DDF or is membership only for associations, companies, and government institutions?

Yes ☐ No ☐ Don't know ☐

a. Please explain reason for this choice of membership

_____

_____

_____

_____

Do you have any comments or question about the questionnaire we used or about the interview?

_____

_____

_____

_____

_____

Ending time: _____

Thank you very much for your time.

ACKNOWLEDGEMENT OF FUNDING

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