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CONCEPTUAL MODEL OF INFORMATION LOGISTICS IN VALUE CHAIN ANALYSIS OF FOOD PROCESSING SMES IN TANZANIA

D. MACHUVE[1,*], E. MJEMA[2], L. TROJER[3], I. ZLOTNIKOVA[4]

[1]School of Computational and Communications Science and Engineering, Nelson Mandela African Institution of Science and Technology, Tanzania

[2]College of Business Education, Dar es Salaam, Tanzania

[3]Blekinge Institute of Technology, Sweden

[4]College of ICT, Botswana International University of Science and Technology, Botswana

Abstract. Inefficient information flows are a global problem but are particularly acute in less-developed countries like Tanzania. The purpose of this study was to identify the information requirements for information logistics in the food processing value chain for SMEs in Tanzania. Information logistics in this work referred to an intervention to improve information flow on the value chain of small and medium-sized enterprises (SMEs). This study proposes a conceptual model of information logistics on value chain of food processing SMEs in Tanzania. One of the conceptual model relationships for information flow and value chain activities of SMEs determined using multiple regression analysis was tested with empirical data. The findings indicated a positive significant effect of SMEs value chain activities on information flow.

The conceptual model serve as a basis for developing an information logistics system to assist SMEs, in developing countries like Tanzania, make informed ICT investment decisions in improving their performance.

Keywords: Information logistics; Value chain; SMEs; Food processing; Conceptual Model.

2010 AMS Subject Classification: 93A30.

1. Introduction

Information and Communication Technology (ICT) provides competitive advantage through changing the way companies operate; affecting the entire process by which companies create

*Corresponding author

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their products [1]. The “value chain” concept highlights the role of ICT in competition. The value chain for food processing SMEs (Small and Medium Enterprises) in Tanzania is challenged by limited information flow and lack of trust among actors [2]. A cross-section survey of Tanzanian SMEs engaged in agro-processing sector, indicate that most SMEs are reluctant to employ ICT to link them with other actors on the value chain [3]. These challenges hinder the ability for SMEs to compete in the global market[4].

The Tanzania Vision 2025 envisages for a nation with competitive economy capable of producing sustainable economic growth and shared benefits [5]. The SMEs sector in line with the national vision that envisages for a nation with a competitive economy capable of producing sustainable and competitiveness of the sector is vital to the country’s economy, contributing about one-third of the national Gross Domestic Product (GDP) [6], [7]. The sector employs approximately 20% of the Tanzania workforce [7].The SME Development Policy [7] statements for business development services support the strategies that address limited access to information and adoption of technology for the development of SMEs. The strategies focus on raising the productivity and competitiveness of the sector. SMEs perform an important role in development through utilizing local resources in producing goods and services that are widely affordable. It has been established that in Tanzania, the food processing SMEs are potential for developing agrarian economies through adding value to many agri-value-chains [8]. The food processing activities in addition, reduce post-harvest losses (extend shelf-life of products), provide by-products (animal feeds) and provide employment to the community. There is however, limited research related to value chain analysis of food processing SMEs in developing countries including Tanzania [4].

Information logistics is a section of information management that deals with the flow of information within an organizational unit or between any numbers of organizations that in turn form a value creating network. The goal of information logistics is to deliver the right information product, consisting of the right information element, in the right format, at the right place, at the right time for the right people and all this customer driven demand [9]. ICT is used to realize information logistics complemented with technologies on domains of information, library, information systems, search engines and communication [10]. Information logistics in this work is viewed as an intervention to address information flow in food processing SMEs. The conceptual model is a tool that interprets theory in researcher’s own perspective on the problem and provides direction to the study. There are three aims of a conceptual model. Firstly, to describe existing practice; secondly to prescribe future practice; and thirdly to define key terms and fundamental issues [11].

The main objective of this study was to identify the information requirements for information logistics in the food processing value chain for SMEs in Tanzania. We developed a conceptual model to achieve the objective. The conceptual model provided an understanding of the information requirements for information logistics involved on the value chain of food processing SMEs. We analyzed the information requirements obtained in terms of information elements and information products. The key research questions on the study were: (1) What are the required information inputs to arrive at the expected output of 'Improved SMEs performance'? (2) What is the relationship between the input and the output? (3) What are other factors that affect the input and the relationships?

The subsequent sections provide theoretical background on conceptual framework, information logistics and value chain analysis; methodology; analysis of the concept used for the study with summary on the implication of the concepts for information logistics framework for SMEs in Tanzania.

2. Theoretical background and review of literature

2.1 Theoretical Framework and Conceptual Framework

The theoretical framework is the theory on which the study is based. The conceptual framework is the operationalization of the theory. A conceptual model includes concepts created, represented and illustrated, and logical constructs formulated, supported and countered [12]. It is perceived as information architecture for communication among stakeholders (such as policy makers, SMEs owners, researchers). The conceptual model represents researcher's objectives, comprehension and theoretical foundations and guides data collection, analysis and interpretation [13]. This in turn makes the research process explicit, records its dynamics and documents the process by which theory is induced from field data. The key concepts of research, constructs or variables and presumed relationship between them are investigated and analyzed using the conceptual model. The process of explicitly expressing the theoretical foundations, enabled by the conceptual model assists the researcher to consider their implications throughout the research [13]. The American National Standards Institute (ANSI) defined the three-schema architecture for database management systems and one of them is a conceptual schema [14]. It is defined as a logical neutral view of information, unbiased toward any single application of data and independent of how the data is physically stored or accessed.

Conceptual models have significantly influenced documenting software systems development and are broadly applied as mechanism for describing the business processes and corporate structures in an organization [15]. Conceptual models can be represented in computer readable form using programs like ARIS Toolset, Rational Rose or Cubetto Toolset. Research on conceptual model comparison proposes a semi-automatic model that involves humans to account for real world semantics [15]. It has been established that in organizations, one of the major challenges is to identify and deliver relevant information to solve certain problems [16]. Conceptual modeling is the intervention and appropriate tool to overcome communication problems between experts, users and IT personnel. It aims to support the communication between developers and users (experts and non-experts) and helps analysts to understand a domain by using a formal approach to articulate user requirements from a business perspective [16]. There are several requirements in Ribbert et al., (2004) that conceptual modeling approach must fulfill in order to enable communicating experts' problems solutions to users. One requirement includes; "Conceptual modeling language must be formal enough to avoid misinterpretations when targeted users apply conceptual models created with this technique".

Conceptual modeling finds application on fields of research in social sciences and applied sciences. It is used on knowledge discovery databases (KDD) in data mining to develop the conceptual three phase iterative model of KDD[17]. The conceptual model on KDD is divided into three layers namely philosophy layer, technique layer and application layer. This conceptual model provides accurate, reliable and efficient means to assist a user make many decisions towards discovering useful information from large sets of database. On information systems development, conceptual modeling is useful in facilitating early detection and correction of system development errors [18].The first phase of information systems (IS) development known as the requirements analysis phase often involves use of conceptual models. Conceptual models mediate between users' requirements and systems design. The conceptual models on IS development serve four purposes according to Wand & Weber, (2002): 1) supporting communication between developers and users, 2) helping analysts understand a domain, 3) providing input for the design process, and 4) documenting the original requirements for future reference. The framework for research on conceptual modeling according to[18] comprises four elements: 1) A *conceptual-modeling grammar*: provides a set of constructs and rules indicating how to model real-world situations. The rules in the grammar specify the relationship on the constructs. 2) A conceptual-modeling method: provides procedures on how to map observations of a domain into a model of the domain. 3) A *conceptual-modeling script*: is the product of the conceptual-modeling process. Each script is a statement in the language generated by the grammar e.g. the entity-relationship grammar are entity-relationship diagrams (ERDs). 4) The *context*: the setting in which conceptual modeling occurs and scripts are used. The contextual factors can be individual difference factors, task factors and social agenda factors. An approach presented in Gemino & Wand, (2005) studies issues related to complexity and clarity in conceptual modeling by combining theoretical considerations and experiments. It was observed that evaluation of conceptual modeling methods can be based on ontological analysis combined with cognitive theory to provide both predictions on possible differences and ways to test them. The other finding was the importance of measuring domain understanding obtained with a modeling method rather than just comprehension of the models operated with it.

2.2 Information Logistics and Value Chain

Information logistics is also referred to as demand-driven approach to information supply. It provides users with streamlined information and knowledge to better support them in the process of decision making and problem solving [20]. Information logistics hence addresses information overflow related problems by reducing the amount of information users have to process by only providing needed information at any given time [21]. The theoretical basis for inferring information demand in this work used the Multi-Grounded Theory (MGT) developed by Goldkuhl and Cronholm in 2003. MGT is an adaptation of Grounded Theory which provides an effective approach to inductive generation of new knowledge and theories on basis of previous knowledge of the investigated subject [21]. The case study for information demand for the work in [21]was small-scale businesses in Sweden. Swedish SMEs are important to the country's economy; they cover 95% of all Swedish enterprises which is equivalent to 30% of the Swedish work force. The availability of tools for analyzing and improving information flow within SMEs is challenging in terms of resources (technology, finances and human resources) compared to larger enterprises. SMEs have limited awareness of the value of information in terms of identifying information needs and fulfillment of such needs. SMEs are equally challenged on strategic use of ICT-systems, considering them only when they have a direct implication for cost-reduction (perceived benefits) compared to larger enterprises. Other factors that determine the investment on ICT-systems for SMEs are organizational readiness and external pressures. Business intelligence tools, workflow management systems, document and content management systems are ICT-systems for supporting work and knowledge management but their use is limited in SMEs. The empirical findings from 27 Swedish SMEs indicate that information demand is a central concept for improving information flow and management within organizations using technical solutions like information logistics or organizational approaches.

Information logistics research on value chain analysis is limited, featuring primarily on supply chains [22]–[25]. A value chain for SMEs refers to a model that describes the discrete value-adding activities that can contribute to the SMEs competitive advantage [26]. Activities on the value chain of SMEs represent the collaborative effort among primary producers, processors, distributors and retailers that create consumer value for a particular market segment. According to the concept of competitive advantage the differentiation in value chain activities among competitors is a key source of competitive advantage [26]. SMEs adopting the value chain approach have the advantage to improve their product quality, increase efficiency and develop differentiated products that in turn make SMEs more competitive and sustainable. Value chains focus on comprehending consumers' preferences and adding value where necessary and profitable.

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Every value chain activity has both a physical and an information processing component [1]. The physical component covers all the physical tasks required to perform the activity. The information processing component includes the steps required to capture, manipulate and transmit the data necessary to perform the activity [1]. Figure 1 below indicates how ICT transformed the value chain.

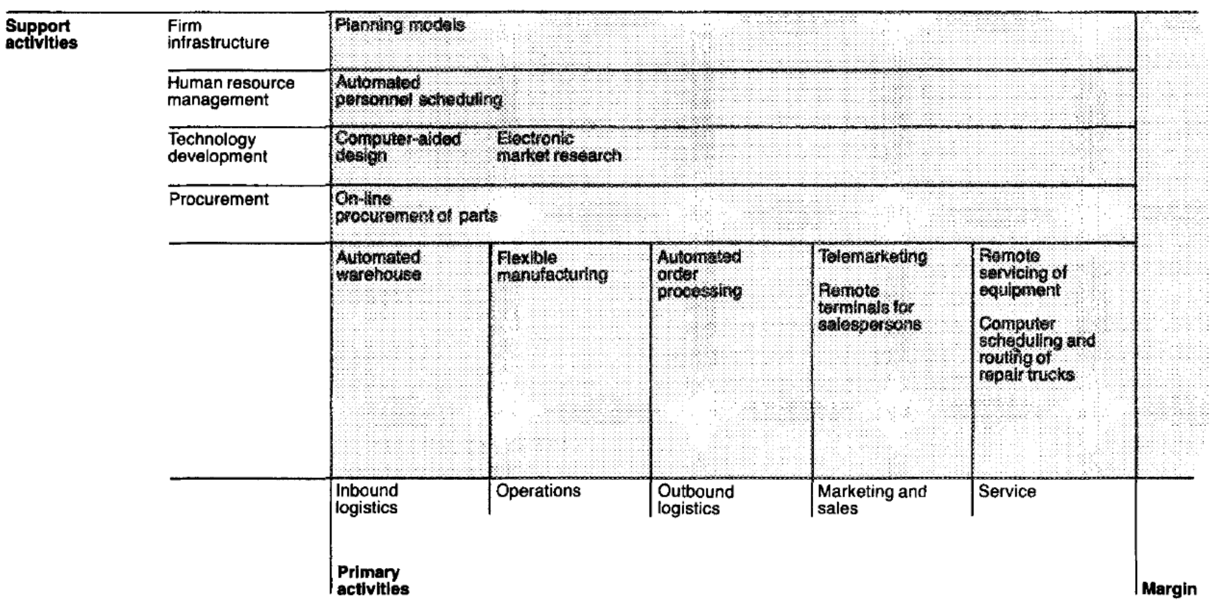

Figure 1: ICT transforms the value chain [1]

Figure 2 depicts a food processing value chain with various linked actors, which entails handling of raw materials, processing (production), packaging, and logistics activities through to the delivery of the final product. Each activity along the value chain uses and creates information. The basic characteristic of a value chain is that there is value addition at each step along the chain. There has to be feedback information from the market or retailers to the processors and to the producers in order to enable the process of value addition on the chain.

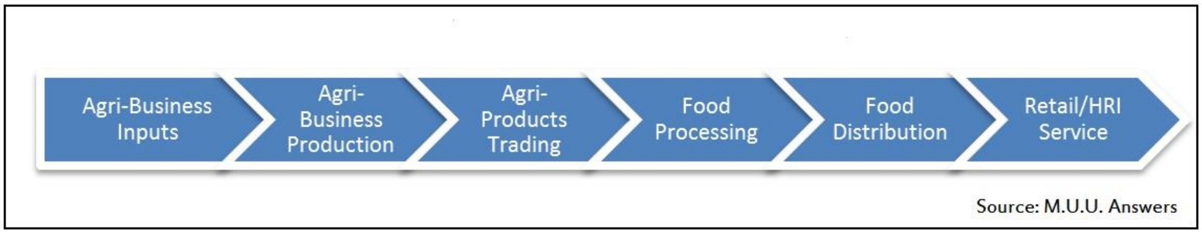

Figure 2: Generic food processing “primary activities” value chain [2]

In the Tanzanian context, small enterprises are categorized into micro, small and medium enterprises. Micro enterprises are those engaging up to four employees and have capital investment amounting up to Tanzanian Shillings (TZS) 5 million (equivalent to US$ 3,071). The majority of micro enterprises fall under the informal sector. Small enterprises are mostly formal undertakings engaging between five and forty nine employees and have capital investment from TZS 5 to200 million (US$ 3,071 to US$ 122,850). Medium enterprises employ between 50 and 99 people, have capital investment from TZS 200to 800 million (US$ 122,850 to US$ 491,400) and are mostly formal undertakings [7]. There were 614 registered food processing SMEs in Tanzania as per the Tanzania Food and Drug Administration (TFDA) 2006 baseline survey [2]. The SMEs are unevenly structured with only 26% of the SMEs operating at large and medium scale level and the remaining 74% at micro and small level. The food processing industry is one of the largest in the SMEs sector. The industry is currently subject to increased pressure from globalization with increased competition in the domestic market. There are ongoing efforts to develop SMEs’ food processing value chains in developing countries, inclusive Tanzania. Among these initiatives includes the Rural Micro, Small and Medium Enterprises (RMSME) programme and the Small and Medium Enterprise Competitiveness Facility (SCF). RMSME developed by the Tanzanian Ministry of Industry & Trade has the objective to improve the efficiency of specific value chains to deliver sustainable margins to producers and hence increase their incomes and reduce poverty [28]. SCF of Tanzania is a matching grants opportunity for food processing and food marketing SMEs to develop and increase their trade and exports [29]. SCF engages Business Development Service (BDS) providers to deliver training and technical assistance to food processing SMEs.

3. Methodology

The approach used to develop the conceptual model included literature review, key informant interview and analytical method. To establish the conceptual relationship between the information logistics and value chain in food processing industries, we used in-depth literature review and key informant interview. The reviews of literature included academic journals, books and case studies aimed to collect, organize and synthesize existing knowledge relating to information logistics and value chain analysis. The surveyed papers spanned various disciplines including management, management science, operations management, supply chain management, value chain and management information systems. The articles were selected through links to databases and resources such as Emerald, Google Scholar, IEEE, Science Direct, Springer and Athens on REPOA Library. The search involved keywords that included information logistics, value chain, value chain analysis, SMEs, food processing SMEs, information flow. The literature review considered papers published in English in areas of information logistics and value chain analysis. The selected references were then analyzed for the trend of information logistics and its closely-related aspects of information flow and information demand. The review of value chain analysis considered analyses of value chains of food processing SMEs in developing countries and information flow framework on the value chains.

We used the reviewed literature to develop the criteria for determining the information requirements for information logistics system on the food processing value chain for SMEs. The information requirements are the objects on the conceptual model. We considered the main value chain activities to obtain the constructs (variables) for each activity on food processing. The value chain activities we determined were the physical tasks of food processing, namely Operations, Maintenance, Inventory Control and Packaging. The conceptual model components are divided into three main categories: input, process and output. The input is the food processing activities and our desired output is improved SMEs performance. Since the process/intervention between the input and output is the information logistics system; we converted the physical tasks into information processing tasks. We expressed the food processing physical tasks constructs (variables) on the input in terms of information elements and information products. The information elements and corresponding information products for the physical tasks are indicated on Figure 3 below.

We then analyzed the relationships of the different constructs with the aid of Ishikawa (Fishbone) diagram indicated on Figure 4 below. The Ishikawa (Fishbone) diagram is an analysis tool that provides a systematic way of examining the effects and causes that contribute to those effects [30]. It is a method used to determine the global risk of an event with multiple relevant causes.

We used the Fishbone diagram to analyze the relationship of the information constructs of food processing that influence SMEs performance. We determined the combined influence of the constructs on SMEs performance. We then obtained a conceptual model with the variables and their relationships on SMEs performance established in a structured approach.

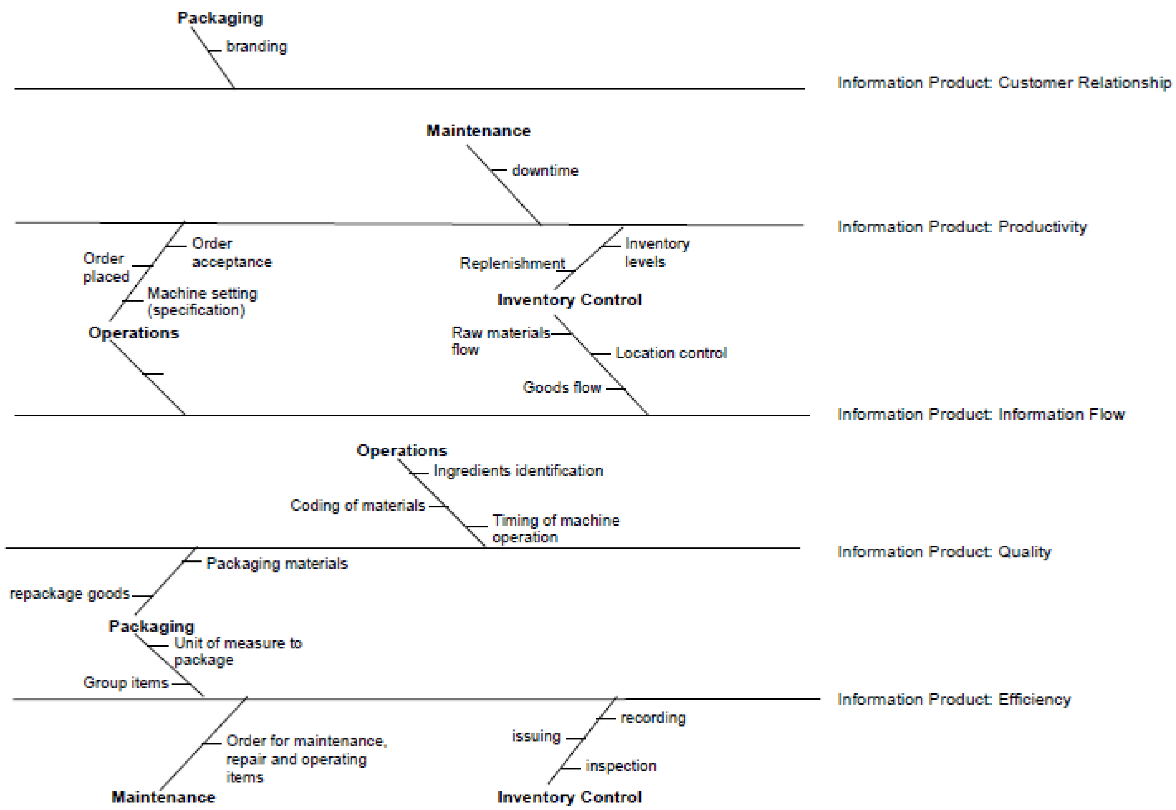

Figure 3: Information elements and Information producst of the conceptual model

3.1 Analysis of the Concept

The internal activities of food processing value chain namely operations, maintenance, packaging and inventory control influence SMEs performance. In terms of information logistics, there is information products associated with these activities. Information element is the information component located on the value chain. The combination of information elements leads to an information product [31].

Referring to the Ishikawa (Fishbone) diagram in Figure 4 above, the information products associated with the food processing activity and affect SMEs performance are Productivity, Quality, Efficiency, Information flow and Customer relationship. Each information product has corresponding information elements. The information elements are independent variables and information products are the dependent variables. Multiple regression analysis is considered suitable for this study since we have one dependent variable that is presumed to be a function of two or more independent variables. This analysis makes it possible to determine the prediction about the dependent variable based on its covariance with all the required independent variables [32], [33].

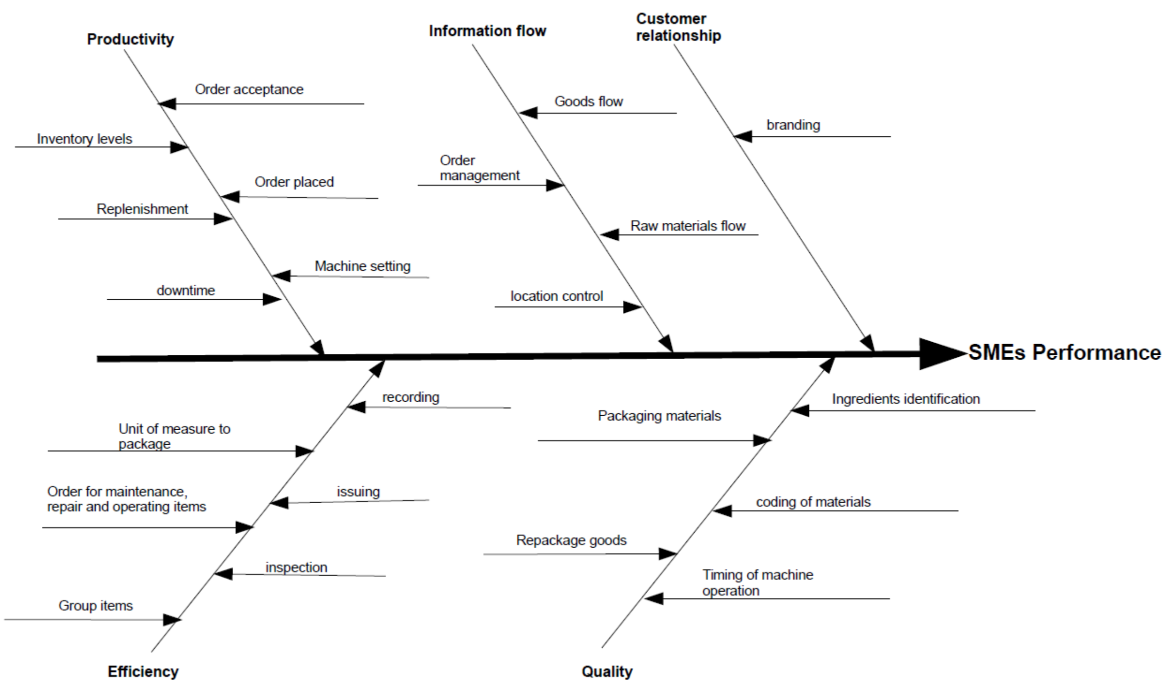

Figure 4: Ishikawa Diagram for Determining SMEs Performance

We used multiple regression model to determine the relationship of the information products and information elements involved on the food processing activities.

Considering the "*Productivity*" information product, the relationship to its corresponding information elements is expressed as follows:

Productivity $\mathbf{P_i}$

$$= \beta_1 + \beta_2 Oa_i + \beta_3 Op_i + \beta_4 Ms_i + \beta_5 Dw_i + \beta_6 Rl_i + \beta_7 Iv_i + u_i \qquad \ldots \ldots 1.1$$

Where

β_1 = intercept term

$\beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

Oa, Op, Ms, Dw, Rl, Iv = regressors for order acceptance, order placed, machine setting, downtime, replenishment and inventory levels, respectively

Considering the "*Information flow*" information product, the relationship to its corresponding information elements is expressed as follows:

Information flow $\boldsymbol{F_i} = \beta_1 + \beta_2 Gd_i + \beta_3 Rm_i + \beta_4 Om_i + \beta_5 Lc_i + u_i$ … ….2.1

Where

β_1 = intercept term

$\beta_2, \beta_3, \beta_4, \beta_5$ = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

Gd, Rm, Om, Lc = regressors for goods flow, raw materials flow, order management, location control respectively

Considering the "*Customer relationship*" information product, the relationship to its corresponding information element is expressed as follows:

Customer relationship $\boldsymbol{CR_i} = \beta_1 + \beta_2 Br_i + u_i$ … … .3.1

Where

β_1 = intercept term

β_2 = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

Br = regressor for branding

Considering the "*Efficiency*" information product, the relationship to its corresponding information elements is expressed as follows:

$$\textbf{Efficiency} \quad E_i = \beta_1 + \beta_2 Rc_i + \beta_3 Is_i + \beta_4 G_i + \beta_5 Ip_i + \beta_6 Omro_i + \beta_7 Un_i + u_i \quad \ldots\ldots 4.1$$

Where

β_1 = intercept term

β_2 = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

$Rc, Is, G, Ip, Omro, Un$ = regressors for recording, issuing, goods flow, inspection, order for maintenance, repair and operating items and unit of measure to package respectively

Considering the "*Quality*" information product, the relationship to its corresponding information elements is expressed as follows:

$$\textbf{Quality} \quad Q_i = \beta_1 + \beta_2 Pm_i + \beta_3 In_i + \beta_4 Cm_i + \beta_5 Tm_i + \beta_6 Rp_i + u_i \quad \ldots\ldots 5.1$$

Where

β_1 = intercept term

$\beta_2,\ \beta_3,\ \beta_4,\ \beta_5,\ \beta_6$ = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

Pm, In, Cm, Tm, Rp = regressors for packaging materials, ingredients identification, coding of materials, timing of machine operation and repackage goods respectively

Therefore, the effect of the information products on food processing activity is expressed as:

Food processing $\boldsymbol{FP_i} = \beta_1 + \beta_2 P_i + \beta_3 F_i + \beta_4 CR_i + \beta_5 E_i + \beta_6 Q_i + u_i$ … ….6.1

Where

β_1 = intercept term

β_2, β_3, β_4, β_5, β_6 = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

P, F, CR, E, Q = regressors for productivity, information flow, customer relationship, efficiency and quality respectively

The effect of food processing on SMEs performance is a linear regression model expressed as:

SMEs performance $\boldsymbol{Pe_i} = \beta_1 + \beta_2 FP_i + u_i$ … … .7.1

Where

β_1 = intercept term

β_2 = Partial regression coefficient

i = *i*th observation

u = stochastic disturbance

FP = regressors for food processing

The conceptual model, product of the study thus obtained from the constructs is indicated on Figure 5 below. The inputs to food processing and output on SMEs performance improvement are expressed in terms of physical components.

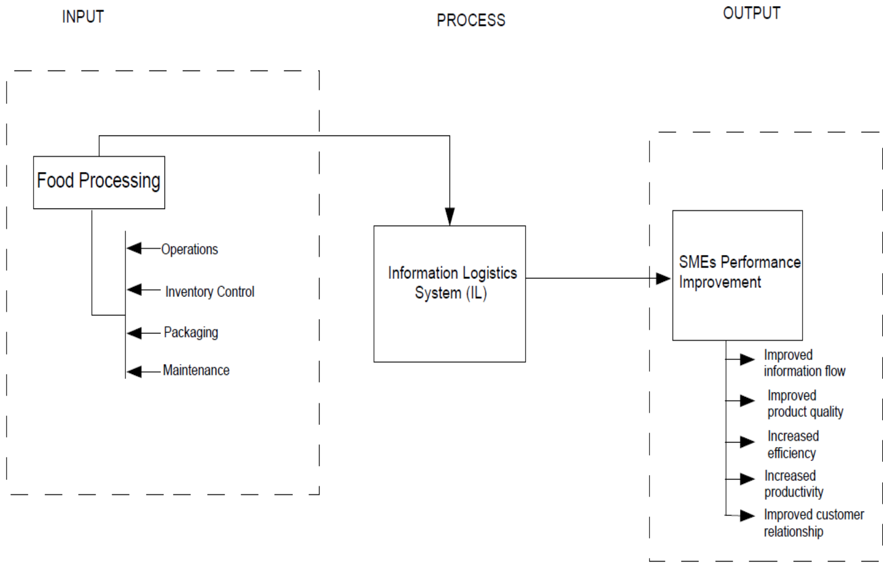

Figure 5: Conceptual Model for Information Logistics in Value Chain Analysis of Food Processing SMEs

4. Analysis of Information Flow

4.1 Data Collection

In this study, two value chain activities; inventory and order management, were used to determine the relationship of the information logistics concept of information flow and value chain activities of SMEs using the relationship on equation 2.1 of the conceptual model. The research question was "To what extent does SMEs' inventory and order management predict the cost of business communication (accessibility)?"

The population unit consisted of food processing SMEs in the micro and small enterprise categories. The SMEs were selected randomly from various regions in Tanzania. The most popular products for SMEs in these categories were considered including soya drink, nutritious flour, peanut butter and honey. The sample size for multiple linear regression was estimated at the minimum of five cases per predictor [34]. The sample involved fifty two (52) SME owners where thirty nine (39) responded positively. Tables 1a and 1b provide sample characteristics.

Table 1a: Sample distribution by SME category

SME Category	Frequency	Percentage (%)
Micro	30	76.9
Small	9	23.1
Total	**39**	**100**

Table 1b: Sample distribution by region and product type

Region	Product Type (Frequency)			
	Soya Drink	Honey	Peanut Butter	Nutritious Flour
Arusha	5	7	6	10
Dar es Salaam	0	5	0	1
Dodoma	1	2	0	1
Kilimanjaro	3	5	2	5
Manyara	2	3	0	3
Tabora	1	2	2	2
Tanga	0	1	0	0
Total	**12**	**25**	**10**	**22**

The study used primary sources of data. Data was collected using questionnaires and guided interviews. Data collected was mainly of a quantitative nature. Qualitative data comprised of descriptive statistics of the SMEs.

The conceptual model identified the information requirements for information flow, indicated in Equation 2.1 above. Information flow which is the dependent variable corresponds to the indicator of accessibility adopted from (Badenhorst-Weiss, et al., 2013). Accessibility was determined by the cost of accessing information for SMEs. The independent variables, inventory management and order management were determined by the amount of raw materials purchased per month and number of orders placed by customers respectively. The information flow model in equation 2.1 is translated to equation 8.1 below representing accessibility $\boldsymbol{Ac}$:

Accessibility $$Ac_i = \beta_0 + \beta_1 Inv_i + \beta_2 Om_i \qquad \ldots\ldots Eqn\ 8.1$$

Where

$\beta_0, \beta_1, \beta_2 =$ partial regression coefficients,

$i =$ *i*th observation,

$Om =$ average number of orders placed by customers for products per month,

$Inv =$ average amount of raw materials purchased per month,

$Ac =$ cost of business communication (accessibility).

The computer software of STATA SE9 was used for regression analysis. Specifically, multiple regression analysis was carried out to find how inventory management and order management can be used to predict the cost of business communication (accessibility) for SMEs in a given time period.

4.2 Results of Regression Analysis

The results of regression analysis (presented in Table 2) indicate that the variation in the independent variables can account variation of the dependent variable (accessibility) by 78.69 percent, calculated from the coefficient of determination 0.6192. The findings show that the independent variables are good predictors of determining the SMEs cost of business communication (accessibility).

Table 2: Model Summary(Source: Field Data, 2014)

Source	**SS**	**df**	**MS**	
				Number of obs = 14
Model	1327.84805	2	663.924026	F(2, 11) = 8.94 Prob> F = 0.0049
Residual	816.486221	11	74.2260201	R-squared = 0.6192
Total	2144.33427	13	164.94879	Prob> F = 0.0049 Adj R-squared = 0.5500 Root MSE = 8.6155

infocost	**Coef**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.Interval]**	
rawmaterial	0.0480843	0.0169125	2.84	0.016	0.0108601	0.0853086
orders	-0.0555587	0.0608274	-0.91	0.381	-0.1894389	0.0783215
_cons	18.35992	2.763073	6.64	0.000	12.27844	24.4414

Furthermore, in the output of Table 2; $Prob > F$ is significant at 5% level of significance because the probability value of F-test is 0.0049 which is less than 5% (0.05). The p-value for raw materials (inventory management) is significant at 5% level of significance since $P > |t| = 0.016$ which is less than 5% (0.05). However, the p-value for orders is not significant at 5% level of significance,$P > |t| = 0.381$.

On substituting the coefficients indicated in Table 2 to equation 8.1, the model below represent accessibility:

Accessibility $\boldsymbol{Ac} = 18.35992 + 0.0480843Inv - 0.0555587Om$

Where

Om = average number of orders placed by customers for products per month,

Inv = average amount of raw materials purchased per month,

Ac = cost of business communications (accessibility).

5. Discussion of the Concept

The established relationship of information elements and information products of the value chain activities determines their individual effect on SMEs performance. This develops an understanding on the relationship between food processing value chain activities and SMEs performance under the influence of information logistics system. The combined influence of the constructs on SMEs performance is determined in a structured approach using Fishbone diagram. The proposed conceptual model encompasses the information requirements for information logistics in food processing value chain for SMEs that affect SMEs performance. This model extends current thinking on value chain analysis to not only consider physical components but also information processing components. Thus, the information requirements are considered crucial on the value chain analysis for food processing SMEs.

All the variables (constructs) on the conceptual model interact with each other. This has led to establishing equations describing the relationship i.e. multiple regression equations and the analysis concerning the interaction will be multiple correlations. In view of the interaction of the variables (constructs) on the conceptual model and the established relationships, the influence on SMEs performance using food processing and information logistics can be determined.

The concepts of information flow and information demand are information logistics aspects on value chain analysis for food processing SMEs. This establishes an understanding of the relationship between value chain analysis and key aspects of information logistics (information demand and information flow). It is evident that these information logistics concepts are important to consider for any corresponding intervention on the value chain.

6. Summary and Outlook

By introducing the conceptual model we visualized the information requirements for information logistics on food processing SMEs. We identified the corresponding constructs (variables) and their relationship something initially described as objective on determining information requirements for information logistics in the food processing value chain for SMEs. We analyzed using multiple regression the relationship among variables in terms of information elements and information products which are key aspects of information logistics. We also explained why conceptual modeling is the suitable tool for representing our objectives on the research process, analysis and interpretation. On the other hand we examined the key aspects of information logistics and value chain where we observed that information demand and information flow establish their relationship. We provided an overview of the SMES in the food processing sector for Tanzania.

The study also presented empirical evidence of the analysis of the established relationship among constructs (variables) on food processing value chain and their effect on SMEs performance for information flow. The findings from the analysis indicated that the value chain activities have a positive significant effect on SMEs information flow. The value chain activity of inventory management had more influence on the cost of business communication indicated by information flow indicator of accessibility. On the other hand, order management had least influence on information flow.

The study established an understanding of information logistics concepts in relation to value chain analysis for SMEs. Future work will be on the design and development of information logistics system for food processing value chain for improved SMEs performance in Tanzania.

Conflict of Interests

The authors declare that there is no conflict of interests.

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