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"Marketing Response To Impact Of Climate Change On Agro Food Supply Chains In A Ghanaian Context"

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Abstract:
The case study adopted the value chain strategy in analyzing the value chain activities of the Food Research Institute in Ghana, a major player in the agro-food supply chain. The study concluded that managers of food processing firms needed to acquire new marketing skills and techniques that enhanced quick response to environmental concerns, in order to ensure sustainability of their businesses. The proposed skills, among others, included knowledge in the use of planning models, which enhanced effective planning and handling of large variety of decisions, and being abreast with models that would ensure efficiency in the primary and secondary activities in the agro food supply chain. High numeracy skills were also required to enhance marketers' ability to analyze available data quickly for timely flow of vital information along the supply chain for decision making. Multi-discipline astuteness, that is, marketing managers' ability to be well knowledgeable in other fields of endeavour would enable managers appreciate different projects along the supply chain, and engender effective collaboration and cooperation among chain members. Judgment competency is an important skill in an entrepreneurial decision-making process, and the quality of good judgment is firmly embedded in a combination of other feeder competencies.

Key words: *value chain strategy; supply chains; agro food; climate change; marketing response*

1.Introduction

Climate change (CC) is considered a phenomenon that is associated with variations in the statistical distribution of weather patterns over a long period ranging from decades to millions of years. Governments globally have shown so much concern with the establishment of various international, regional and local bodies with the sole aim of addressing various challenges that are viewed to be associated with climate change (UNCTAD, 2012). It was observed that the impact from CC would be geographically specific, based on local climate and the natural resource base of the ecological zones, and the linkage other activities that sustained livelihoods. A meeting of the International Panel on Climate Change (IPCC) observed complex negative impact on small holders, subsistence farmers and fisher folks due to complex tendencies (IPCC, 2007). For example in Ghana, the projection was that temperature would continue to rise in all agro-ecological zones, while average annual rainfall would be expected to decrease by year 2020, 2050 and 2080 in all the agro-ecological zones (Agyemang-Bonsu, 2007). A vulnerability assessment, based on a 40-year observed data, also attested to the apparent effect that CC would have on the Ghanaian economy (Agyemang-Bonsu, 2007). In the face of these challenges, it is expected that the primary upstream activities of the agro food supply chain will be negatively affected, and subsequently on the value derived by customers since water availability and optimal temperatures are pre-requisite for sustainable food production.

It is noteworthy that customers' expectations of value is increasing in terms of timely delivery to the market, need for innovative and customized products (Livesey, 2006). This situation makes the determination of value rather subjective, and a challenge to players in the supply chain. Condra (1985) interpreted value as a fair return in goods, services or money for things exchanged that were worth, in comparison with similar products from competitors. Further, Treacy and Wiersema (1996) considered value as resulting from the fulfillment of customers' expectations through which the organization achieved the economic benefit. Given the subsistent and small-scale nature of the agro food industry, it is likely to face the greatest impact, according to Justian (2013). Corporate bodies, as well as government agencies in the United States of America are addressing the impact of CC by giving attention to policies and strategies that enhanced disaster risk management (Reynolds et al., 2013). These strategies range from incremental steps that increased the preparedness of existing systems, such as improving emergency response plans, to the transformation of infrastructure to adapt to climate extremes. A recent report by a committee on CC revealed that the United Kingdom (UK) was a major importer of goods that produced carbon dioxide in other countries, giving much room for concerns over issues about fair trade products (The Marketer, 2013:33). A report by the Environmental Protection Agency (EPA) indicated that issues about CC needed serious attention in order for

developing countries to meet their development goals (EPA, 2009). Also, there is the need for firms to implement continuously incremental innovation in order to sustain their competitive advantage (Tidd et al, 2001; Humphrey et al, 2005). This study supports calls for continuous improvement in marketing activities rather than other administrative duties, in shaping the firm's competitiveness (Zain and Kassim, 2012). To this end, an analysis of the value chain of the CSIR-Food Research Institute would provide valuable information for decision making, and pathways for efficient management of agro-food supply chains in the face of the challenges arising from climate change.

2.Literature Review

2.1Overview Of The Agro Food Industry In Ghana

The agricultural sector, includes crops, livestock, fisheries, and forestry; and accounted for about 26% % of Ghana's real Gross Domestic Product in 2011, and employed in excess of 60 % of the country's working population (WFP, 2012). In 2009, according to the Institute for Statistical, Social and Economic Research (ISSER), an amount of US$ 150.86 million, representing 37.7% of Ghana's foreign exchange earnings was generated from agriculture (ISSER, 2010). This makes agriculture the most dominant sector of the economy of Ghana. Food crop and animal production in Ghana are mainly subsistence in nature, with only about 15% as large scale commercial enterprises (WFP, 2012). The agro food industry comprises mainly raw food producers or farmers (both crops and animals), small scale agro food processors, middle agents, food distributors or retailers, such as, grocery shops, supermarkets, etc. Other agro-based institutions provide extension services and material inputs for the main players in the industry. For example, the agricultural institutes of the Council for Scientific and Industrial Research Institute (CSIR) provide inputs and services such as improved seeds and seedlings, post harvest and processing techniques, for farmers and agro processors.

2.2.Characteristics Of Agro Food Supply Chains

The agro food supply chain, just as any other supply chain, is a network of organizations working together in different processes and activities in order to bring produce and services to the market, with the purpose of satisfying customer demand (Christopher, 2005). An agro food supply chain is characterized by limited shelf life, demand and price variability, which makes the underlying supply chain more complex and difficult to manage than other supply chains (Ahumada and Villalobos, 2009). An agro food system comprises organizations that are responsible for the production and distribution of food crops or animal-based products to the final consumer, that is, from 'farm to fork' (Ahumada and Villalobos, 2009). In general, two main chains could be distinguished. First, agro food chains for fresh agricultural products: such as fresh vegetable and fruit. In general, these chains may comprise growers, middle agents, importers and exporters, retailers and Specialty shops and their input and service suppliers. Basically, all of these stages leave the intrinsic characteristics of the produce untouched. The main processes are the handling, conditioned storing, packing, transportation and especially trading of these goods. Second, agro food chains for processed food produce: such as portioned meats, snacks and juices. In these chains, agricultural produce is used as raw materials for producing consumer products with higher added value. In most cases, conservation and conditioning processes extend the shelf-life of the products (FAO, 2005).

2.3.Influence Of Climate Change On Supply Chain Management

Supply chain management (SCM) is the management of a network of interconnected businesses involved in the ultimate provision of product and service packages required by end customers (Harland, 1996). A customer-focused definition was given by Hines (2004) that required a total systems view of the linkages in the chain that worked together efficiently to create customer satisfaction at the point of delivery to the consumer. Traditionally, supply chains (SC) were designed with more focus on movement of materials rather than information flow (Ramanathan, 2014). Due to increasing competition in businesses, many supply chains have departed from the traditional way of doing things, depending on the current situation at hand (Ramanathan, 2014). The direct impact of CC on SCM in the agro food industry could be traced upstream, at the production level where the primary activities take place, with rippling effects on other activities such as processing, storage and distribution. Though CC is a global challenge, developing countries are considered the most vulnerable due to their location in mostly lower and warmer latitudes. The area most severely affected by declining food production was Sub-Saharan Africa, where countries such as Sudan and Senegal faced potential food decline by more than 50% (Cline, 2007). In Ghana, it was estimated that there would be decrease in rainfall on average by 2.8%, 10.9% and 18.6% by 2020, 2050 and 2080 respectively in all the agro-ecological zones, leading to about 60% reductions in available water in all basins by 2020 (Agyemang-Bonsu, 2007).

From the statistics provided on Ghana's vulnerability, primary activities such as supply of raw materials and production was likely to be affected, with rippling effects on other activities in the supply chain of the agro food industry. The implications for SCM in the agro food industry were; low farm income for entrepreneurs who were key stakeholders in SCM, leading to cash flow challenges (Kurukulasuriya et al., 2006). Cost of transporting farm produce from the farms to the market centres would also be high, due to the high cost of energy; resulting from the projected 60% reduction in available water for hydropower generation by 2020. Cost of raw materials for processors would also increase leading to price hikes in the industry, with demand and supply imbalances arising from low production in quantity and quality (Ahumada and Villalobos, 2009). This situation would result in distortions in demand and the speed of response to customer orders. According to information provided by the United Nations Conference on Trade and Development (UNCTAD), SCM in the agro food industry of developing countries was expected to focus largely on; improving

domestic food supply; targeting the domestic market; cost efficiency to ensure price competitiveness with imported commodities due to food shortage (UNCTAD, 2008). Also, as competition in markets and demand for traditional food produce increased, agro food industries in developing countries were likely to experience some technological changes. The impact of CC has brought in its wake a new paradigm of activities in SCM dubbed 'Carbon-abatement activities'. Thus, companies worked hard to reduce carbon emission in production and transportation by engaging in carbon reduction activities (Brickman and Ungerman, 2008). Firms are now determining the "greenness" their supply chains by calculating the amount of greenhouse gas emission associated with the production and transportation of goods (Simflex, 2010).

2.4.The Value Chain Concept

Porter (1985) defined value as the amount buyers were willing to pay for what a firm provided. The "value chain framework" regarded as a combination of generic value added activities operating within a firm, which worked together to provide value to customers. Porter (1985) linked up the value chains between firms to form what he called a 'value system' as depicted in Figure 1 below.

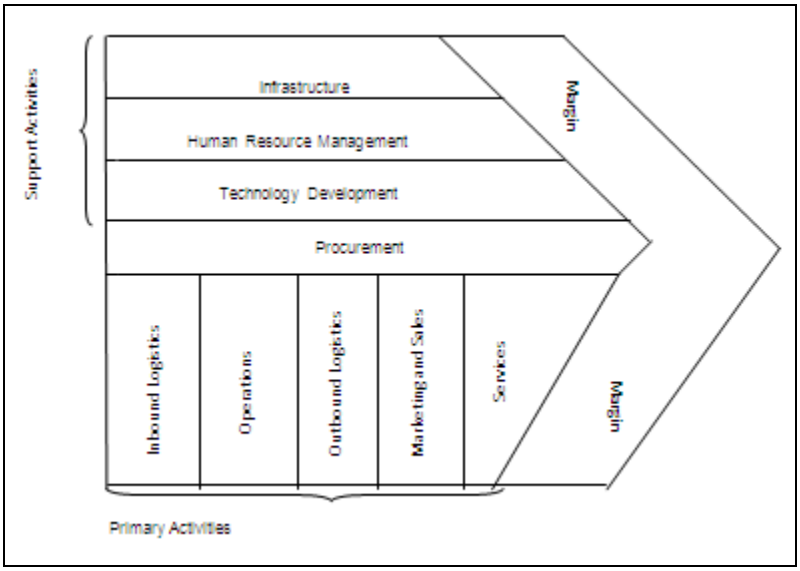

Figure 1: The Value Chain Framework (Porter, 1985)

The primary value chain activities are inbound logistics, operations, out-bound logistics, marketing and sales, and service. The primary activities are supported by the infrastructure of the firm, human resource management, technology development, and procurement. The functions of each link in the chain involve sourcing inputs, making/producing, and then delivering/selling product to the next link in the chain (Macfadyen et al., 2012).

2.5.The Value Chain Strategy

Broadly, marketing strategy is considered as a systematic effort at creating value for a firm's client and other stakeholders in tandem with the firm's desired strategic and operational objectives (Tikkanen et al., 2007). Despite the associated challenges, it is a sound reasoning that performance is enhanced when a business produces and implements a creative and effective strategy (Slater et al, 2010). The marketing strategy of a firm accounts for tasks that must be taken systematically within and among complex and integrated networks. These complex processes required effective coordination, adaptations and collection of customer and market intelligence within the relevant business networks (Tikkanen et al., 2007). There is debate in the literature as to whether the value chain concept is an analytical tool or a strategic tool. Whereas Sturgeon (2001) considered value chain as a tool for analyzing a business system, Walters and Lancaster (2000) argued that the concept was a tool for analysis as well as a means of facilitation. The definition offered by Walters and Lancaster (2000), based on preceding definitions, considered value chain as a business system, which created end user satisfaction and realized the objectives of other member stakeholders. This study regarded value chain strategy as a marketing strategy that focused on driving down operational costs and maximizing efficiencies, engendering collaboration and cooperation with supply chain partners. Studies in the field of value chain management identified the importance of having a clearly defined value chain strategy that was deployable and could be monitored on a regular basis (Al-Mudimigh et al., 2004). The strategy should also deliver the wishes and levels of ambitions of any organization. Al-Mudimigh et al., (2004) identified four benefits accruing from adopting the value chain strategy. First, there was an opportunity to develop a value proposition. Firms were able to identify their core competencies and positioned themselves in the market place, according to their strength and weaknesses. Second, focus on customers was created, coupled with continuous uninterrupted relationships and the flow of information in both ways and enabling the company to move speedily, be flexible and agile. Third, was the development of a partnership, highlighting how value chain strategy enabled the firm to network with suppliers and other stakeholders. Finally, a firm could drive down cost by optimizing activities and establishing the interdependency between value processes. Nonetheless, Harnan (2000) argued that there were some major challenges

that many organizations faced in their bid to put together a clearly defined value chain strategy. Donelan and Kaplan (1998) identified two dimensions of challenges with value chain analysis. The first challenge was that accounting systems were not designed to assign costs to value-added activities. Nonetheless, when activity-based costing was implemented that problem could be managed. Second, it could be difficult to find an accurate return on sales and return on asset data to determine the value chain. That notwithstanding, rough estimates could be used to give some insight into the value chain. Despite the challenges, Donelan and Kaplan (1998) argued that it could be an effective strategic management tool in times of fierce competition when firms are expected to manage their activities and costs in order to survive. Al-Mudimigh et al., (2004) also offered some guidelines for achieving excellence and sustainable performance standards, using value chain principles. These involve putting in place a valuable creation mission and vision based on extensive knowledge of the customer; engaging high leveraging capabilities of the organization which deliver their value propositions.

3.Methodology

3.1.Data Collection And Analysis

The study applied the three principles of data collection in case study research, namely, the use of multiple source of evidence, creation of case study database, and maintaining a chain of evidence (Yin, 1984). The source of secondary data was largely published documents, such as, strategic plan, strategic marketing plan, archival records (organizational structure, annual reports, etc.), and direct observation. The value chain analysis involved a three-step process: first, identifying the activities undertaken to deliver the product or service; second, for each activity, the study considered what would be done to add the greatest value for customers; and third, evaluated whether it was worth making changes.

3.1.Context Of The Study

The Food Research Institute (FRI) is a public sector research institute established in 1969 by the National Liberation Council Decree (NLCD) 329, as one of the 13 institutes of the Council for Scientific and Industrial Research (CSIR). CSIR-FRI's vision is: to be recognized nationally and internationally as a Science and Technology (S&T) institution that is playing a key role in the transformation of the food processing industry. The mission is "to provide scientific and technological support to the growth of the food and agricultural sectors of the national economy in line with corporate priorities and national objectives" (CSIR, 2008). Part of its mandate is to generate funds internally to supplement government budgetary support. The Institute's core competence and commercialization activities include; pilot studies & transfer of processing technologies; technical and analytical services; food biotechnology; food evaluation and product development; training and community outreach; food safety and quality assurance.

4.Results Of Valuec Chain Analysis And Discussion

The study utilizes the value chain analysis framework categorized in terms of the primary and supporting activities. The primary activities were inbound logistics, operations, out-bound logistics, marketing and sales, and services, while the supporting activities were: Infrastructure, Human Resource Management, Technology development, and Procurement. Value chain activities are not isolated from each other; rather, one value chain activity often affects the cost or performance of the other. A value chain analysis of the institute is based on the current situation and synthesis of the findings in the context of the theoretical framework.

4.1.Primary Value Chain Activities

4.1.1.Inbound Logistics

Inbound logistics entail the receiving and warehousing of raw materials, and their distribution to manufactures, as desired. At CSIR-FRI, food items meant for processing were bought directly from farmers and sometimes from the open market, and chemicals purchased directly from suppliers. Inconsistent supply patterns resulted from increment weather conditions such as unreliable rainfall pattern and prolonged dry seasons. This situation might be expected given the predictions of weather inconsistencies about the effects of CC on agro-ecological zone (Agyemang-Bonsu, 2007). Therefore the effects of CC are mainly at the upstream activity level of the institute's value chain, leading to inconsistencies in supply of raw material, coupled with price fluctuations. Prices of chemicals also increased as suppliers of chemicals for laboratory analysis adjusted prices with changes in the exchange rate of the US dollar to the Ghanaian currency. The institute may consider re-capitalizing the commercial activities and increase storage facilities in order to take advantage of the peak season, and mitigate the inconsistencies in supply and price fluctuations.

4.1.2.Outbound Logistics

Outbound logistics are the warehousing and distribution of finished goods. When there is adequate raw material for processing, it automatically affected the finished products in terms of quantity. At the institute, the processed food produce was transported to sales outlets, such as the institute's shops and designated supermarkets with the institute's vehicle and sometimes through private vehicles. The institute did not have a transport vehicle solely devoted to the purpose of product / service delivery; leading to instances of delay and shortage of stock delivery, creating disquiet for customers. The nature of logistics required that managers expanded their skills and took advantage of new technologies and ideas in order to handle both internal and external responsibilities of the logistics function

(Sutton, 1993). This would enable logistics managers to respond quickly to uncertainties in the distribution and all aspects of the material flow.

4.1.3.Operations

Operations deal with the processing of transforming raw foods into finished product and service. Raw food material is transported from the farms or market sources for production of the processing units of the institute. The institute's processing equipment has been in use for many years, and are rather inefficient due to obsolesce, and was one of the reasons for the high operating cost incurred by the institute. Laboratory analyses of food samples were done in the institute's accredited laboratories, and the protocols and procedures were religiously followed in tandem with the regulations under the accreditation. As such, the results were internationally accepted and food processors and exporters were excited about their products being accepted in developed markets, such as the European Union and United States of America. A regular market analysis would enable the institute to develop a customer-driven operations strategy for timeless understanding of customer wants and to provide better service than competitors (Krajewski and Ritzman, 2005).

4.1.4.Marketing And Sales

Marketing and sales involved identification of customer needs and the generation of sales. The institute segments and targets the middle to upper class in society who could afford processed food items. Demand for such processed food was not as high as raw foods, because consumers usually preferred the traditional way of cooking. Analytical services were offered to food exporting industries and local producers, and consultancy services were provided to government agencies and international organizations. Pricing of laboratory services was done with the involvement of key stakeholders including regulators, while that of training service, consultancy services was done exclusively by the institute with cost-plus approach. Physical goods were sold in shops at the institutes' office premises and in supermarkets; while consultancy, training, etc., were done mostly through personal contacts. The institute did not have a budget line for media advertisement due to the high cost involved, and relied largely on direct marketing using pamphlets and flyers, reducing customer reach and accessibility. Though the personnel were informed about the activities of CSIR-FRI, they lacked the requisite technical expertise for explaining some technical details of products to customers, requiring the use of a multi-disciplinary marketing teams. Though multi-disciplinary teams could create the ambiguity of dual responsibility due to different reporting lines within their department, they helped to generate solutions to problems, and suggestions for process improvement (CIM, 2010).

4.1.5.Services

Services are the support offered to customers after the products and services are sold to them. The Commercial division of the CSIR-FRI had an after-sale follow up service for entrepreneurs who received training on food processing techniques, mushroom production, etc. This was to ensure that the right techniques and procedures were applied rigorously, and for entrepreneur to benefit fully from the skills training. Customer care was also executed through personal visits and a centralized call centre. Though these 'after-sale' services had enabled the institute to keep in touch with its clients and gain their loyalty, the call centre activities were not properly integrated into the strategic plan of the institute, partly due to inadequate funds needed to ensure their sustainability. According to Bradley et al. (2010), interactions between customers and service providers were routine and were sometime characterized by conflicts and intense emotion. However, these differences could be managed when the providers managed their emotions and ensured good relationship with their clients. In terms of market orientation and value delivery, consumers had the most obvious and direct impact upon planning, since in order to succeed the Institute needed to understand, in some detail, their expectations and likely pattern of behaviour.

4.2.Supporting Activities

4.2.1.Procurement

Procurement involved purchasing inputs, such as materials, supplies, and equipment. Materials procured included chemical, food items, and materials for fabrication. These were coordinated by the procurement unit which was under the supervision of the Head of Finance Division. Consultancy services were usually handled by the Institute's Director and the research scientists involved. Bureaucratic procurement procedures usually caused the delay in release of funds which obviously caused delays in the supply of the requisite inputs. Sound and objective procurement may be implemented by framing the desired procurement outcomes in clear and objective manner that kept to timelines, and did not favour particular suppliers, and avoided weak procurement disciplines (EU, 2013).

4.2.2.Technology Development

Technology development support is to enhance value-creating activities. The institute's R&D has focused on improving on processing equipment and post-harvest technologies for small-scale entrepreneurs, etc. Though the institute had made significant inroads in this respect, there were key enabling technologies in the food industry that needed consideration (Navarro, 2013). For example, refrigeration has become an essential part of the food chain, and is used in all stages of the chain; from food processing, to distribution, retail and final consumption in the home. Currently, the food industry employs both chilling and freezing processes

where the food is cooled from ambient to temperatures above 00C in the former, and between -18oC and -350 C in the latter to slow the physical, microbiological and chemical activities that cause deterioration in food (Navarro, 2013).

4.2.3.Human Resource Management

Human Resource Management (HRM) involves employee recruitment, hiring, and training. There are three categories of staff in the CSIR-FRI, namely, senior members, senior and junior staff. The senior members are made up of mainly the research scientists and other professionals, while the senior are technicians and other administrative supporting staff. The junior staff from the unskilled labour. The expertise of the core research grade workers spanned different disciplines in the natural and social sciences, engineering, and applied sciences, with research-oriented qualifications. Non-core research workers included human resource personnel, accountants and limited numbers with expertise in marketing, human resource and accounting. The institute could enhance the firm performance by creating an understanding among personnel at the functional departments on the concept of strategic grouping (Gannon et al., 2012). Embracing this concept will help the institute re-focus on the firm and industry level and create a competitive advantage.

4.2.4.Institute's Infrastructure

The infrastructure of a firm includes an organizational structure, control systems, and firm's culture, among others. The CSIR-FRI operated a bureaucratic organizational structure which was characterized by high routines, and operating tasks achieved through specialization, formalized rules and regulations. Authority was centralized with narrow span of control, and decision making followed the chain of command. As chief executive officer, the Director is responsible for strategic decisions in the institute with assistance from functional heads. Information flows from the Director through the Heads of Division to members of a department. This process slackened access to vital information, and prevented customer-facing employees, such as sales persons and researchers scientists in consultancy services, from attending to the concerns of clients expeditiously. Though, the institute had a well developed website (viz, www.csir.org.gh/fri.html), it was not interactive, as it did not provide opportunities for real time response to customer concerns and requests. The use of information technology (IT) is a key to surviving and succeeding in a highly competitive environment (Croteau and Raymond, 2004). Hence, the efficient use of IT could improve the marketing team's efficiency as members could share cross-functional information quickly and improve on the team synergy. Also, excelling in the use of IT could be beneficial for monitoring customers' perceived value and cost effectiveness (Jackson and Humble, 1994). The institute's Management Information System was not as vibrant as expected, in terms of regular update with market information. The lack of regular and timely information on marketing and environmental trends affected the institute's response mechanism. Information is generally believed to be vital in creating responsiveness in the firms by anticipating and attending quickly to environmental and customer concerns, and maintain long-term relationships (Daugherty et al., 1995).

5.Conclusion And Managerial Implications

CSIR-FRI's vision statement lacked focus as it did not state the precise role it intended to play in the food industry, while the mission statement provided scant sign post on the institute's disposition towards the main stakeholders in the food industry. The marketing strategy did not segment the markets effectively as it was largely focused on the medium to upper social class leaving out large prospective clientele at the lower social strata. The marketing and sales activities require clear objectives and a focus aligned with the organization's mission and goals. When a company decides on its mission, it is essentially answering two questions; what is the company's core business / areas of activity. Who should this be? (CIM, 2010). Business-to-business firms often excluded customers further along in the downstream supply chain from their marketing plans (Kleinaltenkamp et al., 2012). Since in a business-to-customer context, demand is always derived from buying decisions made further down the supply chain, firms in the industry need to give attention to customers in the marketing plans. Management of food processing firms may consider new marketing skills and new techniques that enhanced quick response to environmental concerns, while meeting customer demands. The skills might include; knowledge in the use of planning models, which was needed for effective planning and handling of large variety of decisions, such as crop scheduling, resource assignment, selection of production methods, and investment decisions. Marketers must be abreast with models that will ensure efficiency in the primary and secondary activities in the agro food supply chain (Allen and Schuster, 2004). This would enable them to make cogent suggestions to supply chain players. High numeracy skills are also required to enhance marketers' ability to analyze available data quickly for timely flow of vital information along the supply chain for decision making, and not to depend on statisticians (Briscoe et al., 2001). Multi-discipline astuteness, that is, marketing managers' ability to be well knowledgeable in other fields of endeavour would enable managers appreciate different projects along the supply chain, and engender effective collaboration and cooperation among chain members (Walker et al., 1998). Judgment competency is an important skill in an entrepreneurial decision-making process, and the quality of good judgment is firmly embedded in a combination of other feeder competencies. These feeder competencies include knowing when to get help, seek out more knowledgeable people, and find resources to gain more insight and tools to help one deal with the obstacles (Brownlie and Saren, 1997; Boterf, 2009).

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