

ACTION RESEARCH DRIVEN KNOWLEDGE MANAGEMENT IN LOGISTICS TRANSFORMATION

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Introduction

Logistics is defined by the Council of Logistics Management, cited in Vogt et al. (2002, p. 6), as “the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point-of-origin to point-of-consumption for the purpose of conforming to customer requirement.” This research involves in particular the supply-side logistics to create winning product value to satisfy customer needs through transforming the farm-to-table operations using knowledge-based information and action-research’s co-participative knowledge management strategies. Knowledge-centered organizational learning is necessary, according to Kay (1993), to build core competence that could lead to competitive advantage. A core competence becomes competitive advantage when it is successfully applied in a particular market or markets (Evans et al., 2003). Such a co-participative knowledge management reinforces heavily on valuing the “implicit to explicit” and “explicit to implicit” parts of the knowledge management, as these two processes are generally harder for the competitors to imitate (McEvily and Chakravarthy, 2002). The strengthening of this capability would allow the organizational core competency to not easily be imitated by the competitors, which is further supported by not being transparent to outsiders and not easily transferable even by the resignation of key senior managers.

In other words, logistics in terms of production planning to raw material and work-in-progress logistical movement is a key driving force for successfully implementing the designed business model. This continuous learning enabled knowledge-driven process would also secure durability for competitive advantage. This research discovers that when logistical decision is learning-cum-research enabled and knowledge-driven, the functionality of logistics can help to transform the entire operations of the business and thus to meet desirable operations’ key performance indicators in the dimensions of quality, speed, dependability, flexibility and cost (cf. Slack et al., 2010). In note passing, business model can be known simply as a description of how a firm does business which, according to Tan and Sangchan (2014), is an integrative strategic management framework that incorporates the concept of blue ocean strategy (Kim and Mauborgne, 2005), externally oriented industry-attractiveness driven strategy (Porter, 1979) and internally oriented resource-capability driven strategy (Prahalad and Hamel, 1990).

To test how knowledge management serves as a fundamental enabler for inbound and production logistics transformation, both action research cycle and business model cycle will be employed. Knowledge management will be a critical bridge between these two cycles. While the former cycle is driving knowledge creation, the latter cycle is about knowledge utilization. The strikingly explicit benefits of this action research oriented problems solving and change management are multi-faceted. This implies that an intense focus of the problematic issue, driven by the set teams and the team-based active participation and result orientation, can help to pull along other relevant issues to be tackled in parallel. Factors of barriers and supporting mechanisms relating to the use of knowledge creation, knowledge management and knowledge utilization will also be discussed. Most importantly the outcome of knowledge management-enabled logistics transformation in a seafood production facility will be discussed and although it is a single case, but by its rich nature and in-depth action-driven involvement, this research certainly has provided the utility aspect of research quality generally demanded by an applied research.

The research paper is organized in five sections. While the abstract outlines the overall research process and provides a concise summary of the research expectation and outcomes, this introductory section justifies the research background that puts the topic of interest into perspective. In the literature review section a framework will be proposed by intercepting the three disciplines of knowledge, namely action learning and action research, knowledge management and business model, and in addition, research objectives will be raised. Following the literature review is a section focusing on outlining research design which aims to reflect the problematic context and the nature of the firm and its industry, and to identify the procedural structure to address the research objectives, which is followed by discussion and conclusion.

Literature Review

It is worth noted that this literature review is a final iteration along the action research process which signifies that literature structure is shaped by the research process in the context of action research. This also implies the effective working of the cyclical process of the research that involves theory formulation, action taking, data collection and insightful reflection. By activating a higher-level, goal-based double-loop learning approach of the action research, according to Field and Ford (1995), the basis for sustainable competitive advantage can be secured. Within this context, knowledge – a necessary outcome of the learning process – is a factor of production not subjective to depreciation and diminishing returns and thus is a non-consumable resource. As such, knowledge is an appreciating capital asset which emanates wisdom for change and creative innovation, and thus helps to emancipate from outmoded ideologies.

When an organization possesses a capability to apply knowledge and to put knowledge in action, wisdom is claimed to have developed (Bart, 2001). In addition, an organization does not become wise unless individual's wisdom is articulated and transferred to others (Bierly III et al. 2000), and thus to activate an effective knowledge creation process the use of set team is recommended (Taylor, 1994). In addition, a need for knowledge absorption, digestion and applications is recommended (McGill and Beaty, 2002) which suggests the use of action research approach that is conducted through an intense and prolonged contact with a problematic issue of significant importance to the organization. Based on an input-process-output approach in a typical operations management (Slack et al. 2010), knowledge management undertakes knowledge creation as its inputs and knowledge utilization as its output. Knowledge creation can best be activated by an action learning and action research cyclical process (Tan, 2014), while knowledge utilization is best implemented using concept of business model (Tan and Sangchan, 2014). The configuration of their linkages is shown in Figure 1.

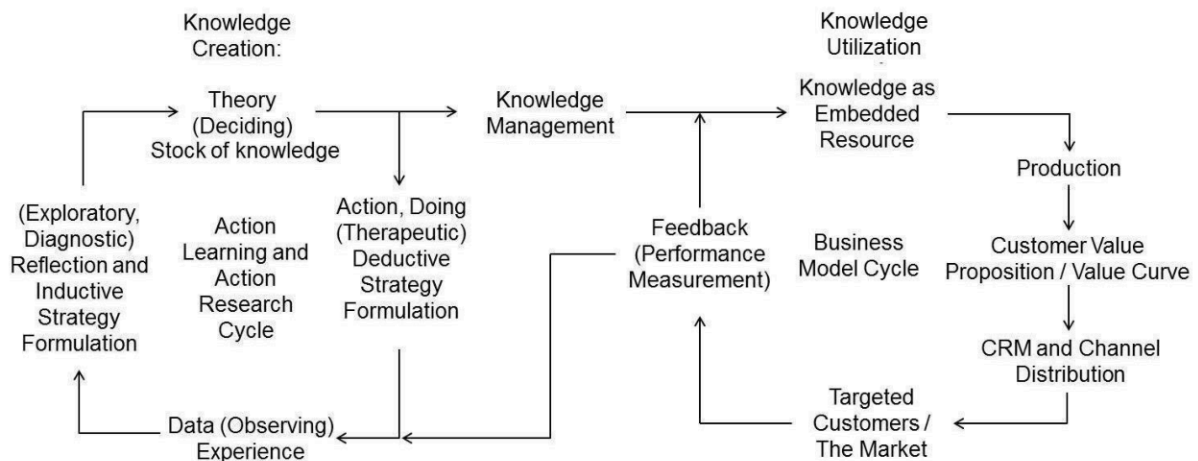


Figure 1: Knowledge Creation, Knowledge Management and Knowledge Utility enabled by Action Learning and Action Research Cycle, and Business Model Cycle (Source: Developed for this research)

The usefulness of using action research framework to drive knowledge creation process is shown in a research conclusion by Gregory (1994), in which action research is employed as the knowledge supporting infrastructure from which individual and collective learning are promoted and where rigorous knowledge can be brought about.

However, knowledge-induced success in an organization depends very much on corporate vision and strategic intents (Hamel and Prahalad, 1989) and corporate strategies and tactics (Mintzberg, 1987), and this is captured by the horizontal aspect of the action-research cycle as shown in Figure 2. Specifically, action research cycle can be interpreted as the superimposition of the horizontal action-reflection activities of action learning (McGill and Beaty, 2002) and the data-theory cycle of induction and deduction in a typical scientific research process (Tan, 2014), which also resembles the experiential learning model of Kolb (1984).

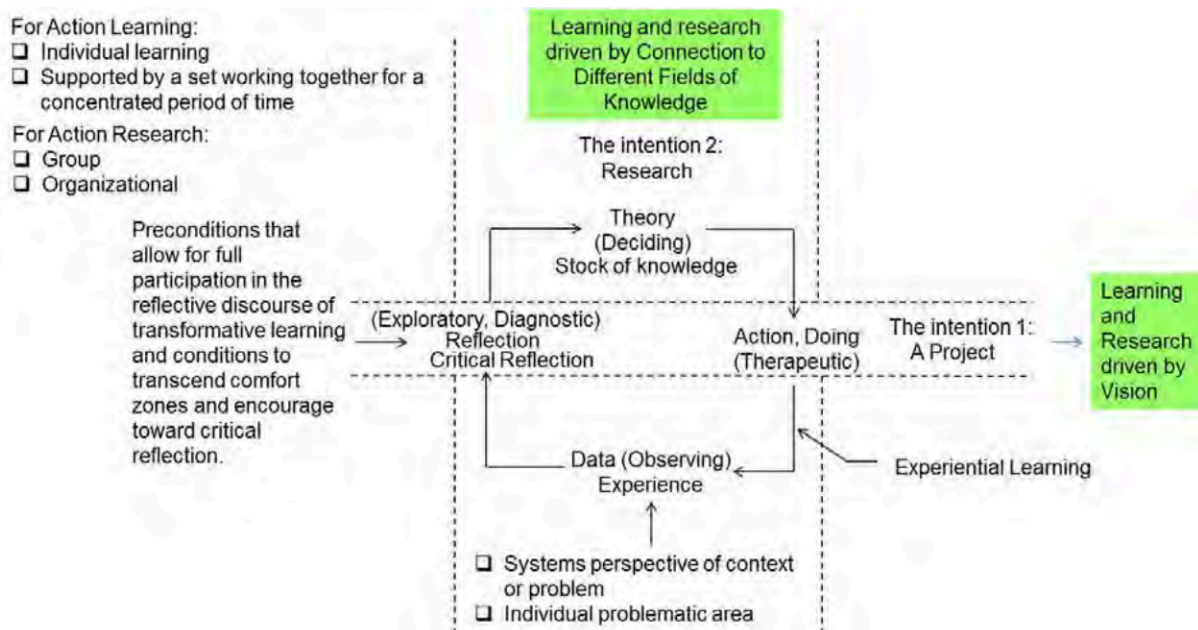


Figure 2: An Action Research Framework

The knowledge creation outcome which is enacted by using a generic action research framework as shown in Figure 2 is then becoming the input to the knowledge management process which typically involves the acquisition, organization and distribution of knowledge (Probs et al., 2002).

Based on the nature of action-oriented research and learning approach to the study of the research phenomenon, the following two objectives are raised:

- What can the set team and the organization critically learn from the proposed action learning-enabled action research methodology and the knowledge management and business model framework? To promote a systematic guideline for action research, the set team members are required to critically reflect upon and examine the enabling and restraining forces at work along the steps of the action research process. In other words, seeing things beyond the normative pattern of knowledge is necessary as it implies gaining the skills of inductive research and deductive research. In addition, the set team members are also required to arrive at a final state of utility or objective of the action research i.e. productivity improvement and successful frozen food package development that gained the continuity of sales growth.
- What is the overall crucial pattern of experience being captured from this action research that embraces the key success factors and the final business model enabled by logistical transformation in the organization? This question is addressed as a summary to the overall research findings in the conclusion section.

Research Design

The company's revenue was in the neighborhood of a higher end of Y,000 Million Baht after a systematic business model-wide transformation. The industry involved value-adding the raw seafood materials to a variety of ready-to-eat high-end retail food products. Diversity of, for instance, seafood raw materials in cultivated farms provided the strongest strain or stress for the entire organization's operations which complicated the works of the informational aspect of the logistics, namely master production scheduling and material requirement planning. These strains prevented the growth of the organization and the problems were further complicated by the misaligned departmental goals in particular those of the purchasing, production, marketing and sales and the inventory management. These issues were spiraled out of controls i.e. by reducing productivity, employee morale, reducing meat yield and thus wasting earnable margins, lowering seafood quality caused by the weakening of seafood color pigments and the inconsistency of quality in multi-faceted dimensions i.e. seafood texture. The implementation of Balanced Scorecard systems and the ERP systems still wasn't able to allow the organization to step outside this conundrum. It was only when the organization engaged systematically in an action research effort, of approximately 2 years of duration, that the light from outside the tunnel was seen and growing brighter. This research paper presented only the overall findings by synthesizing all the themes discovered and implemented and, only the logistics-driven

issues were emphasized whereas many other emerging research phenomena were not included in the discussion. What follows are the findings and discussions as per the stages of the proposed theoretical framework as shown in Figures 1 and 2.

Findings and Discussion

Having analyzed the structure of the industrial forces in working the organization realized the general weaknesses in both the supply and the demand side. While the former identified a loss-loss for the raw material (i.e. shrimps) supplier and the buyer organization caused by the normal auction practices that no one is in control of the sizes of the raw materials, the latter sees the customers not being able to easily customize their retail food products with high yield, innovativeness and robust traceable quality. The organization thus aimed to capitalize on this weakness by systematically re-examining the industrial norms of practices and suggested alternative platforms of business model. In doing so these weaknesses were transformed into growth drivers for the organization in the industry – that is, the organization was capable to co-streamline the business model with the active participation of both the suppliers and key customers.

To ensure effective presentation the findings and discussions will be organized in three stages namely knowledge creation stage, knowledge management stage and knowledge application stage. These three stages also represent the sequential events of logistics transformation activities and thus, the validation of them provides a useful theoretical model for possible analytical generalization and future research that could exploit questionnaire-based surveys. The process itself also served the emancipatory purpose in enlightening the participants and the organization with many subtle details and useful operations behaviors that were hidden under the surface of the originally proposed framework. This clearly demonstrates the usefulness of action research.

The following summarizes the research findings in an attempt to answer the two objectives raised earlier. Practically speaking, the proposed frameworks as shown in Figure 1 and Figure 2 are, to the organization, like strategy to realize the goals, and answering the two research questions are like studying and proposing the tactics to implement the strategy.

Critical reflection and findings

- For the action research stage, the set team discovered three enabling or restraining factors, namely reflection, leadership and team synergy. Note that forces of enabling or restraining nature were two sides of the same phenomenon.
- Reflection – The organization realized that active reflection allowed the team members and the employees of the organization to stretch their cognition and understanding, and this was made possible by promoting a questioning attitude, by challenging the employees to study the results critically and to rationalize the reasons for their work practices, and by setting an effective working and monitoring platform to help develop reflective insight and competency (i.e. by developing a work form that organized around the concept and dimensions of six-sigma DMAIC together with SPC graphical support). Consequently reflection shifted the organization from a reactive mode that awaited customer complaint or reports of audits to proactive continuous improvement attitude. In addition, reflection was effectively accomplished by the support of carefully reviewing the existent literature in many cycles within the two-year period, and it was discovered that literature review provided the set team the ability to parsimoniously organize the emerging knowledge so that the resultant knowledge can be widely applied throughout the organization and spread its wing of impacts far and in depth.
- Leadership and team synergy – It was discovered that as action research involved active experimentation and implementation of the proposed ideas that impacted on the entire business value chain or the business model, it was important the leader possessed the decision-making authority. In addition, leader must be able to foster an atmosphere and to develop a platform for effective communication, dialogue, ideas generation, brainstorming and committed actions among different members of the action research team. As the team involved the suppliers, the customers and the team members, the leader's role had to show role model that won the supports of all the stakeholders, which was made possible by the leader being capable to integrate wide ranges of ideas and turned them into implementable work practices in auditable quality management systems i.e. ISO 9001, ISO 22000, HACCP, GMP, BRC, and FMS. In short, the leader must be able to set the context for everyone to actively participate and engage in the common research theme. Also, leader without the supporting team was seemed to be less effective and thus team synergy was considered similarly important. Throughout the success and failure experience of the research, it

was found that team diversity of different role competencies was necessary in order to produce useful creative suggestions and to secure commitment for implementation of ideas and strategies. In addition the teams had gained significantly from the platform of immediate feedback i.e. by developing a DMAIC oriented work forms and KPIs (Key Performance Indicators) assessments, as checkpoints which provided the thrust and motivational energy to verify and validate their works and to move forward with full swing.

- For the knowledge management stage, the team members discovered work forms designed using the concept of DMAIC were useful which also provided immediate feedback for responses and traceability that ultimately linked to the ERP databases. When DMAIC-oriented work instructions and work forms were re-engineered operations wide, it provided useful knowledge sharing and communication media. In addition, ERP reports-generation must be trained to the supervisory and managerial levels including how to use them to help extract useful strategic information. In addition, DMAIC culture ensured active engagement of the employees in continuous improvement to continually update know-how, know-what, know-who and know-why.
- For the success of the entire business model implementation, it was discovered that organizational culture was very effective means as it fostered shared understanding and values, and also promoted active willingness and commitment. In addition the success of business model implementation was pivotal at common shared theme – i.e. to produce efficiently tastier, fresher and innovative seafood products adaptably and flexibly to cope with the diversified thirsts of the consumers and the retail customers.

Utility findings

- A crucial utility of the action research was concluded – Positive results of action of the co-created ideas produced excitement, further promoting motivation and developing commitment which moved the team's efforts forward, and also positive results gained the trust of the entire organization and the support of the CEO which helped to propel the project to impact on the entire business model.
- Knowledge management allowed data and information to be quickly re-organized to produce knowledge useful for a wide range of contexts i.e. meat yield maximization, color pigments optimization, activity-based costing, identification of potential bacteria threats points and thus suggesting equipment and infrastructure cleaning work practices, responsive audit assessment and customer complaint handling, speedy food recall process, budgeting, and new product development and market penetration.

The utility of the logistics-enabled business model transformation is captured in the business model as follows:

- Contract farming relationship was created to support the growth strategy of the business and was subjected to continuous improvement and learning, and quality improvement in both farms and hatchery management was collaborated and audited by a diversified teams including the retail customer groups, which included the dimensions of traceability, structures and equipment, feed and water, animal health, procedure and systems and environment.
- ORACLE based master production and material requirement planning was developed, which was supported by the daily seafood raw material's price intelligence analysis and the forecast of raw material size maturity in order to satisfy order needs and anticipated partnership programs.
- Inbound logistics transformation (reflected by the indicators like speed of delivery, and quality of the delivery in terms of raw material temperature and texture) to ensure high-yield of seafood raw materials and excellent translucent color and good texture capable to use for high-margin ready-to-eat food products.
- Implementing the use of DMAIC (Define-Measure-Analyze-Improve-Control) oriented work instructions and work forms in the ISO 9001 QMS (Quality Management System) and FMS (Food Management System) in every facet of the factory operations, in logistical issues, production and quality controls, auditing, infrastructural provision maintenance (i.e. air, water, steam heat, freezers), R&D, NPD (New Product Development), inventory controls, purchasing, engineering maintenance, waste treatment and pest controls, and facility cleaning.
- A robust food traceability system was installed within the ISO 9001 and ISO 22000 food quality management system, supported by the real-time databases in order to secure confidence and brand trust of the customers for quick rapid recall capability, quality related troubleshooting, food quality improvement such as yield analysis for profitability and the nature of historical problems, and even production costing.
- Streamlined and redesigned production flow and its logistical and labor supports.

- Use of KIPs (Key Inspection Points) which was a concept borrowed from KPIs (Key Performance Indicators) for food production and logistics equipment cleaning work practices.
- Logistical competencies from the farm to table were driven by a simple theoretical concept, which was only obvious when the organization used action research that also relied on the literature review, namely the “Food Safety Objective (FSO)” which was governed by a simple equation: $H_0 - \sum R + \sum I \leq FSO$, where H_0 is the initial level of hazard, $\sum R$ is the cumulative (total) decrease in level of hazard, $\sum I$ is the cumulative (total) increase in level of hazard (due to recontamination and/or growth), and \leq is preferably less than, but at maximum equal to.
- The action research teams also exploited a “simple numerical analysis” to estimate the right temperature and time duration for safe cooking of seafood products within the initial given context of the logistical data which can also be applied to food shelf-life analysis and meat yield optimization. In this, the team used the theory of numerical integration and the theory of lethal rate to optimize seafood meat cooking yield for better profit margin, seafood product color and texture.
- For shipment to customers, order lists were picked from the ERP systems robustly and products quickly be moved to the vehicle which was pre-cooled to 10° Celsius or lower and appropriate data-logging was installed to ensure full traceability.
- Visitor logistics were also streamlined and carefully checked to prevent cross-contamination, i.e. visitors and contractors consuming nuts prior to entry into production sites were alerted and subjected to hand-washing procedures and also inner cloth not contaminated by nuts in any circumstances.
- Waste water management and logistics were also monitored to correlate with the production sites. For instance, the 5-day BOD which measured the amount of oxygen consumed by biochemical oxidation of waste contaminants in a 5-day period also reflected the production sites work practices and the attitude.
- The logistical issues of steams and water systems into the production sites were also carefully studied to prevent possible bacteria infiltration and cross-contamination. For instance, water supply taps were all knee-operated with simple four-bar-linkages to prevent unnecessary cross contamination between the hands and the water taps.
- The entire quality assurance system was based on this robust knowledge management / traceability systems, and its efficiency depended upon the ability to track each individual product and distribution (logistics) unit, in a way which embedded continuous monitoring from primary production (harvesting, catch, and production) until final disposal to consumers.

In sum the action research essentially yielded the following business model as shown in Figure 3 in which MPS (Master Production Scheduling), MRP (Material Requirement Planning) and FSO (Food Safety Objectives) provided the enabling policy systems to meet the targets of the order-winning operations KPIs (Key Performance Indicators) which then drove the operations of the business model.

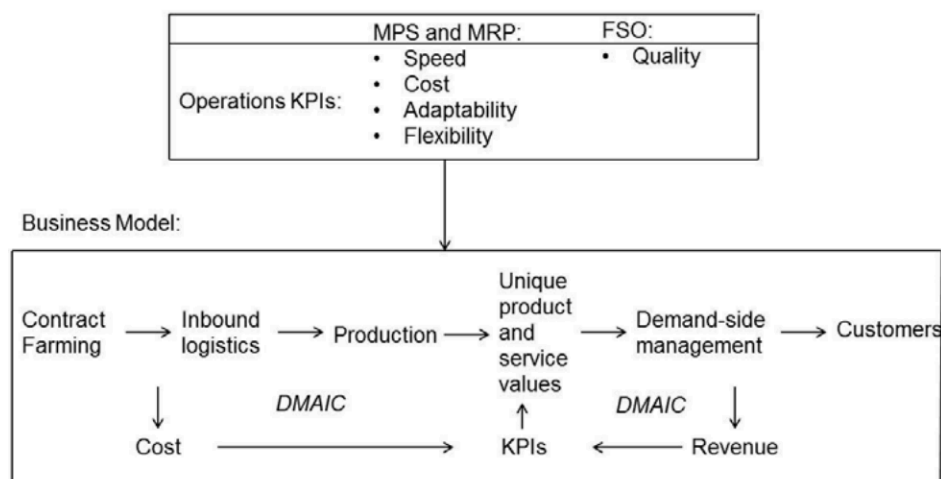


Figure 3: Transformed Business Model

Conclusions

This action research indicated clearly that while the originally proposed model could be perceived as “strategy”, the enabling and restraining forces being identified through critical reflection of the set team could be interpreted as the “tactics” to help realize the goals (the “utility”) of the action research. Thus, action research leads to the formation of rich knowledge that is captured in tactics, strategy and the cause-and-effect patterns of the utility of the research.

While the positivistic deductive research approach structuralizes the key patterns of variables, action research was shown to be able to help identify the subtle details situated below the surface. The usefulness of action research is clearly shown i.e. in enabling emancipatory learning and in providing a channel for new knowledge acquisition of the organization, and the platform of “action” in the research cycle allows the design-build-operate-transform of new concepts which systematically and holistically affect the entire business. In short, action research provides not only a platform to validate the conceptualized business strategy but also to arm the employees with proven tactics and work practices that lead to positive results and are thus considered as a useful reinforcing mechanism to increase the odds that the employees in the organization will behave according to the shared goals.

Overall, this research concluded that knowledge management in which food traceability system is based and in which core competencies are derived is extremely vital and its success is pivotal to the role of leadership, team synergy, organizational culture, the hardware and software and the alignments and reinforcing fitness of the business model activities. Traceability, to be successful, must capture both logistics traceability (i.e. points of origin, etc.) and qualitative traceability (i.e. information relating to the source of hazard and the cause that generated it, the conditions and methods of production and the quality of products and processes).

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