The process of organizational change in Food Waste Management in the Food and Beverage production industry in Thailand: Through the lens of loop learning

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The main field of study – Leadership and Organisation
Degree of Master of Arts (60 credits) with a Major in Leadership and Organisation
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Abstract

Thailand is called the kitchen of the world; the country produces food and beverage products and exports around the globe. According to previous studies, there is not enough data on food waste in Thailand and worldwide. This study aims to analyse the characteristic of the loop of learning in assisting the process of organizational change and explain how it can support sustainable change in Food Waste Management. Even though a loop of learning is used frequently to develop changes in organizations, the relationship between organisational learning methods and organisational change is still not yet identified.

The qualitative method, particularly a case study, was used to accomplish the aim. The case study focuses on how production companies develop their organisational change toward sustainable Food Waste Management in Thailand by aligning the management's thinking level with a loop of learning themes analysed by thematic analysis. The data collection method is a semi-structured interview with 12 managers of different food and beverage manufacturing companies. The results show that current actions are 1) following the existing regulation and finding solutions for challenges, 2) developing better methods and re-using waste, and 3) setting new strategies to achieve sustainable Food Waste Management. Thus, those actions have the quality of single, double and triple-loop learning.

Furthermore, the research findings indicate that changing norms with environmental concerns can influence other factors, such as laws and stakeholder expectations. The organizational change process must involve continually thinking in the loop of learning from an individual and organisational perspective. These authors conclude that the nature of loop learning is a process that individuals and organizations can use to identify and reclaim problems; this process assists organization to realise the need for changes and continue developing solutions for those matters. The outcomes of continuous thinking will present changes in action which reach organisational change.

Keywords: Organizational change, Organisational learning, Loop of Learning, Food and Beverage Industry, Food Waste Management
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Tiffany Berne & Sheyima Zeidan Zekaria
1. Introduction

1.1 Background

Thailand is one of the ASEAN, recognised as a manufacturing hub that produces nearly 5% of global manufacturing, especially food and beverage. (Anbumozhi & Kimura, 2018). Those products are consumed by Thai people and exported globally. Moreover, many international food and beverage enterprises have been manufactured in Thailand, such as Nestlé Group Thailand, which has 7 factory plants (Nestle Thailand, 2023), Thaibev (Chang Beer) has an international presence in over 90 countries which produces from 218 subsidiaries and associates (Thaibev, 2023a), and Charoen Pokphand Foods (CPF): one of the world's largest producers of pork and chicken meat and agricultural products with 370 plants and distribute their products to 21 countries (C.P. Group, 2023). Those enterprises are just examples of nearly 9,000 food and beverage processing manufacturers in Thailand (Thailand Board of Investment, 2016). Therefore, Thailand can be called ‘the kitchen of the world’ (Rodmanee & Huang, 2013).

The data about food waste on a global scale shows that a third of food products are lost or wasted, around 1.3 billion tonnes every year (Gustavsson et al., 2011). Moreover, Stenmarck et al. (2016) report that food waste generated in households and food service reached 57 million tonnes, which accounted for 65% of the total food chain in food loss and waste and much higher compared to other sectors, as shown in the detail of on-farm 11%, processing/manufacturing 19%, and retail and wholesale 5%. On the other hand, the growth of food manufacturing in Thailand is shown by accounting as the number 1 and 2 exporter of 5 food production lines (Thailand Board of Investment, 2016), as shown in Figure 1. Therefore, the data shows the increasing amount of food waste generation in Bangkok from 2,860 tonnes per day in 2003 to 5,669 tonnes per day (approximately 2.1 million tonnes per year) in 2018, which is high even compared to other developed cities (Liu et al., 2020). Dou and Toth (2021) mention that the U.S. food waste per year was 24.5 million tonnes for households, 22.7 million tonnes for consumer-facing businesses, 9.1 million tonnes on-farm and 0.9 million tonnes for processing/manufacturing. In comparison, the amount of food waste from one city in Thailand (Bangkok) is higher than in some sectors in big countries like the U.S.

Figure 1: The list of numbers and percentages of Thailand's food export
Source: (Thailand Board of Investment, 2016)
Therefore, the urgent need for effective food waste management is essential for Thailand. Especially the lack of empirical studies on food loss and food waste in Thailand mentioned by Ortiz-Gonzalo et al. (2021) that Thailand's food loss and food waste data have a ‘very low confidence level’ and even worldwide food loss and waste publications have only 20% of the research uses direct measurements. The rest is conducted from a few industries in a few countries. Thus, it clearly shows the need for academic knowledge in Food Waste Management from a local to global scale.

Regarding the low data on food waste in Thailand, especially from the industry section, the authors use the data from the private sector to give the initial idea of how much food waste in food & beverage factories needs to be managed each year. Thaibev had a total food loss and waste volume of 53,658.17 tonnes (Thaibev, 2020b). CPALL is a sub-business in CP Food; the total food waste in 2022 was 170,754 tonnes, 21,343 tonnes was the reduced amount of excess or leftover food, and 12,611 tonnes of repurposed food waste (CPALL, n.d.) However, how do they operate Food Waste Management? What are their logics in managing food waste? Do they want to do it right, or do they want to find a more effective way to manage their waste? It still needs to be answered.

Furthermore, the global concern in climate change, the rising awareness of sustainable development and the norm in expecting a higher level of Corporate Social Responsibility from businesses. These social pressures and changes affect the organization’s operations. As a result, many companies have adopted a more constructive stance regarding acknowledging the problem and their responsibility for addressing the climate change issue. This new approach is reflected in high-profile corporate initiatives in creating beyond-expecting projects such as ‘Beyond Petroleum’ from BP and ‘Ecoimagination’ from GE, which shows that businesses are taking climate change seriously (Jones & Levy, 2007).

What is about the food and beverage manufacturing companies? The food and beverage production industry has direct responsibility for Sustainability Development goal number 12: Ensure sustainable consumption and production patterns. UN (2023) states that unsustainable consumption and production patterns are the root of crises in climate change, biodiversity loss and pollution. Thus, target 12.1: The focus is to implement the 10-year framework of programmes on sustainable consumption and production in all countries by expecting the developed countries to take the lead and support developing countries.

Thailand is one of the developing countries that is facing challenges remaining on its SDG index report, with 5 major challenges, such as diversity lost in life below water and life on land (SDG 14 & 15), 10 significant challenges, such as sustainable consumption and production and climate action (SDG 12 & 13). Nevertheless, SDG 12 indicates its results to be on track or maintaining SDG achievement (SDG Index Thailand, 2023), as shown in Figure 2.
The improving indicator from goal 12 must involve improving practice from households and industries. However, this study will only focus on the industry level in the food and beverage production factories on the process of organisational change toward sustainable Food Waste Management in Thailand.

1.2 Research Problem

The low efficiency in the food and beverage industry in Thailand was also mentioned in the study of Rodmanee and Huang (2013) that the low-efficiency score of the whole manufacturing process resulted in the need for managers to consider productivity and profitability improvements simultaneously. Therefore, it impacted production achievement and profit generation in organisations. Furthermore, Thi et al. (2015) studied Food Waste Management in developing countries. They mention that Thailand had a total food waste of 9,312,788 tonnes per year, and the Thailand government encouraged people to separate food waste at sources in some cities by implementing 3R: reduce, reuse and recycle, which aims to increase organic waste utilization by 50% before 2026. Nevertheless, the food waste from industry has yet to be identified or has insight into academic study.

Furthermore, the releasing concept of Corporate Social Responsibility affects the companies voluntarily integrating social and environmental concerns into their business activities and stakeholders (European Commission, 2002). The food and beverage production industry is highly relevant to sustainable development because of its strong impact on the economy,
environment, and society. Therefore, food and beverage companies attempt to gain differentiation from their competitors by reporting voluntary activities to demonstrate CSR (Chaddad & Mondelli, 2013). Nevertheless, challenges to implementing this concept also arise (Boland et al., 2016). Thus, to realize the full potential in Food Waste Management, the company must deliberate effort to transform its waste-related values, norms, and procedures (Ladero et al., 2022).

The change in organizations related to food waste started to develop through the support of organisational learning: double-loop learning, which is shown in a study by Kolawole et al. (2021). They conclude that a loop-of-learning strategy can be helpful in the context of Food Waste Management since it challenges practices that lead to waste generation, thereby helping businesses achieve long-term waste reduction, which is relevant to Mbuyane (2020) who states that double-loop learning creates the ability to self-reflect and pinpoint growth opportunities that create a culture of transparency and frequent feedback among staff members in the organization.

In the present studies in the food and beverage production industry, the researchers state that productivity changes are related to competitive advantage (Kapelko et al., 2020) and the expectations from their food supply chain and customers (Chen et al., 2015). Furthermore, Wanto and Suryasaputra (2012) studied the effect of organizational learning on the company's competitive strategy in Indonesia's food and beverage industry. They conclude that organizational learning is an effective tool to receive positive changes in an organization's capability and competitive strategy.

Moreover, organizational learning has been integrated into Thailand's food and beverage industry. For example, the Minor Food Group in Thailand has a digital feedback system where customers can rate their experiences after the service. The company used this information to enhance its products and services (Banu et al., 2020). Therefore, its success in maintaining high customer satisfaction and gaining market share may come from a loop learning strategy.

From all the above, there is a process of learning and changes in the food and beverage organization in Thailand. However, the process of organizational change still needs more explanation in the relationship with organizational learning. Even though organizational change theory has been involved in academic research and industry practice in every transition. Nevertheless, the question of how to start the change and the transition processes, which align with the reproduction and the existing operations, structure, and organizations' assumption, need to be clarified (Seravalli & Witmer, 2021).

Thus, this study will support the need for more empirical studies in Food Waste Management in Thailand, especially from an industry perspective. On the other hand, the loop of learning has been recognised as a helpful tool in Food Waste Management in another region. In Thailand, the loop learning strategy was used in the organisational learning process in the food and beverage service sector to receive feedback and develop change within the organization. Nevertheless, The previous studies did not emphasise the organisational change toward sustainable Food Waste Management. Therefore, this study will fill the gap in how the
loop of learning assist the process of organisational change in the Food Waste Management area.

Moreover, the study focuses on the food and beverage production industry, which can support the food waste academic study by having direct measurements from a high-impact production samples group. Lastly, the synergy between organizational change and loop learning can help Thailand's food and beverage sector progress toward higher efficiency in SDG number 12. The United Nations mentions that unsustainable consumption and production are the roots of climate change and biodiversity loss, which are Thailand’s critical challenges in its sustainable development report. To gain more knowledge on how food and beverage manufacturers can develop changes toward sustainable Food Waste Management, the outcome can also support the other existing challenges, such as improving the current loss diversity underwater (SDG 14) and on land (SDG 15) in this country.

1.3 Research Aim

To analyse the characteristics of loop learning in assisting the organizational change process and explain how it can support sustainable change in Food Waste Management.

Therefore, to accomplish the aim, a set of research questions is developed to lead the further process of this study.

1.4 Research Questions

RQ1. What are the current perspectives and actions of the Food and Beverage production factories in Thailand?
RQ2. Why and how do Food and Beverage production factories develop organisational change toward sustainable Food Waste Management?
RQ3. How does the thinking process in Loop of Learning assist in the process of organizational change?
1.5 Thesis Structure

This research study focuses on the relationship between the loop of learning and organizational change in the context of sustainable food waste management.

- Chapter 1. The introduction covers the background and issue of food waste, highlighting its environmental impact. Research problems were identified, such as the lack of empirical studies & low efficiency in the food & beverage industry in Thailand. The research aims and research questions are presented in this Chapter.

- Chapter 2. The theoretical framework presents the Organizational Change Framework and Organizational Learning Framework. The Organizational Change Framework covers different perspectives on organizational change and the concept of planned organizational change. The Organizational Learning Framework presents the three levels of learning, namely, single-loop, double-loop, and triple-loop learning, and how they are applied in the context of organizational change. The section also explores how the loop of learning presents the organizational change process.

- Chapter 3. Methodology & methods: This chapter explores 6 main sections. Research design, Presentation of the object of the study, data collecting procedure, data analysis, reliability & validity, and lastly, ethical principles. The research designs regarding the research questions aim to analyse the relationship between organizational change and the loop of learning. The presentation of the object of the study covers the case study and the sample section. The data-collecting procedure follows semi-structured interviews.

- Chapter 4. Results and Analysis: The chapter presents all the findings and analyses to answer research questions. Start with presenting a perspective on current food waste management by coding and developing themes relevant to the characteristic of loop learning, explaining the organizational change from the context of sustainable Food Waste Management and finally, identifying the relationship between organisational learning and organizational change.

- Chapter 5. Discussion: a summary of key findings regarding each research question. Moreover, the authors discuss the results of this study compared to the theory.

- Chapter 6. Conclusion: The conclusion summary of the thesis follows by presenting theoretical and practical implications and giving suggestions for future study.
2. Theoretical Framework

This chapter illustrates the theoretical framework of this thesis, beginning with presenting the theory of organizational change and its importance for achieving change in organizations. Then, the theory of organizational learning explores single-loop, double-loop, and triple-loop, which links with the process of organizational change.

2.1 Organizational Change Framework

Scholars defined change management as ‘‘the process of continually renewing an organization’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers” (Brightman & Moran, 2001). According to Burnes (2004), change is an ever-present feature of organizational life, both at an operational and strategic level. Therefore, it is essential for any organization to have the ability to identify where it needs to be changed and how to manage a successful change; thus, organizational change cannot be separated from organizational strategy. Due to the importance of organizational change, management terms require higher managerial skills (Senior, 2002). In addition, Graetz (2000) suggests that a growing knowledge workforce and shifting social and demographic trends are tasks for management in organizational change leadership.

However, Change can range from minor or incremental to significant or transformational. Austin and Claassen (2008) state that sometimes an organization is in a state of equilibrium and is forced to deal with “revolutionary” such as in evidence-based practice. Therefore, organizational change can also be viewed in terms of its context, its content, and the change process (Armenakis & Bedeian, 1999).

Change context includes both external and internal factors, such as environmental forces and organizational characteristics, that can be considered when assessing for and planning a change process (Langley et al., 2013). External and internal contextual factors such as environmental changes, decreased funding, and expectations for greater accountability can lead to organizational change. Internal contextual factors such as management and program capacity can suggest the need for change and affect how an organization responds. Change content includes goals and targets for change, administrative changes, and program or technical service changes. The change process includes tactics and methods leaders use, such as total quality management and organization development. However, context will be influenced by the type of change implemented and through the process followed during organizational change efforts (Pettigrew, 1987).

Thus, organizational change in this study will use the definition from Seravalli and Witmer, (2021) that organisational change can be understood as a matter of attempting to transform practices, structures and assumptions. It is a process informed both by intentionality and contingency (Czarniawska & Joerges, 1996).
Lastly, organizations have several types based on types of change, including planned and unplanned change. Therefore, the study focuses on planned organizational types, which will be explored in the following section.

2.1.1 Planned Organizational Change

According to Bryson and Bromiley (1993), strategic decision-making is made to optimize operations; it is a critical factor for successfully operating projects, also referred to as planned change. Planned change can be viewed as a succession of steps from various perspectives. The research followed the explanation from Palmer et al. (2008): planned change is implementing the change process using change tactics and specific change technologies (methods) and assessing outcomes of the change process. Theories of planned change focus on how processes can be managed or controlled (Poole & Van De Ven, 2004). Therefore, this study focuses on the process of change toward sustainable Food Waste Management, which can be seen in the Planned Organisational Change theory. Raza (2008) mentions that increasing organization effectiveness through the planned change in the organization’s process is a part of organisational development; in other words, it is a planned system of change.

Thus, this approach assumes that the organization is in a stable equilibrium state and that the relationship between it and its environment is balanced. If the context changes, the organization must move from equilibrium state A to a new equilibrium state B, in which the organization will again be able to meet the requirements of its environment (Burnes, 2009). A change process typically starts with identifying a change need or opportunity and framing it as a goal. An assessment process may have begun before goal setting, but in any case, assessing the organization’s current state is a necessary step. This would be typically followed by strategy selection and decisions about tactics and methods. Finally, the process outcomes will be assessed concerning the original change goals. A non-linear aspect of this model can be seen in the notion that an executive should routinely assess the organization’s current state in both external and internal contexts. In addition, it looks for improvement opportunities (Poole & Van De Ven, 2004).

Furthermore, the assessment includes looking at current conditions regarding what needs to be addressed and what internal factors must be considered in developing a change goal and plan, as shown in Figure 3. Moreover, Lines (2005) states that individuals’ perceptions and responses to change are important indicators of either the success or failure of planned organizational change. Therefore, the process of organizational learning from the individual organization’s members is important to the change that occurs in its organization.

Even though planned change is a helpful tool in the organisational change process, there is not much academic research in this area, and no recent publication demonstrates the need for additional research.
2.2 Organizational Learning Framework

Crossan et al. (1999) explain the state of an organizational learning framework that it contains four related processes: intuiting, interpreting, integrating, and institutionalizing that occur over three levels: individual, group, and organization; intuiting and interpreting occur at the individual level, and interpreting and integrating at the group level. Moreover, integrating and institutionalizing are repeated by the workgroup, informally thinking about what actions should be replicated. Then, the workgroup may establish formal rules and procedures, and routines become embedded. Finally, the process of institutionalizing occurs. The process of institutionalizing is an organization-level phenomenon. It is socially constructed (Berger & Luckmann, 1966).

However, academics have approached and defined organisational learning theory in various ways. On the one hand, Fiol and Lyles (1985) defined organizational learning as a function of experience. In contrast, Castaneda and Rios (2007), on the other hand, explained it as the integration of knowledge acquisition and organizational change. Another description has been developed by Argyris and Schön (1996), who portray organizational learning as a tool to respond to changing conditions and new challenges. Organizational learning as a theory arose out of the need to better understand how organizations approach, acquire, store, and assess knowledge to succeed in an ever-changing environment.
“organizations are driven to incorporate the practices and procedures defined by prevailing rationalized concepts of organizational work and institutionalized in society” (Meyer & Rowan 1977, p. 340).

The theory provides processes to acquire and facilitate information for change. Corporations should create learning processes to identify and correct mistakes as well as improve performance based on previous experience. Furthermore, the important role of organizational learning capability has been documented previously in the development of mass customization practices (Kotha, 1996). This would further help organization achieve sustainable competitive advantage (Pine II et al., 1995).

The research and practice of organizational learning have identified distinct systemic levels of learning: single-loop, double-loop, and triple-loop learning (Argyris & Schöen, 1974; Flood & Romm, 1996; Snell & Chak, 1998). Single-loop learning refers to making simple adaptations and taking disciplinary actions, whereas double-loop learning involves reframing and learning to see things in new ways. Finally, triple-loop learning entails members developing new processes or methodologies for arriving at such re- framings (Georges & Witteloostuijn, 1999). Therefore, single-loop learning is widespread in most organizations, but double-loop is particularly, and triple-loop learning takes more stages to develop. This research will explore single-loop, double-loop, and triple-loop learning because the various types of production and sizes of businesses may affect the laws and regulations. Moreover, the different goals of each organization can drive the organization to different levels of learning.

2.2.1 Single-loop Learning

“Single-loop learning is instrumental learning that changes strategies of action or assumptions underlying strategies in ways that leave the values of a theory of action unchanged”


Organizational learning has different levels of learning, which differ in depth and focus and have been categorised by scholars with different terminology and by using different models. The most common way to define organizational learning is by using the concept of the loop model introduced by Argyris and Schöen (1978). The first level of the loop is single-loop learning which occurs when error detection- “permits the organization to carry on its present policies or to achieve its present objectives”. This kind of organizational learning manifests itself as a consolidation process. It is a change in the organization's knowledge and competency base without altering present policies, objectives, or mental maps (Snell & Chak, 1998).

In single-loop learning, people, organizations, or groups modify their actions according to the difference between expected and reached outcomes (Argyris & Schon 1978). In other words, it will consider how the situation could be fixed when something goes wrong or does not happen as planned. Single-loop learning can also be described as observing our present situation and facing problems, errors, inconsistencies, or impractical habits (Argyris & Schöhn,
1996). After that, behaviour and actions are adapted to mitigate and improve the situation, as shown in Figure 4.

2.2.2 Double-loop Learning

The second level of the loop is double-loop learning, which is achieved when an error is detected and corrected by modifying an organization's underlying norms, policies, and objectives (Argyris & Schöon, 1978). In other words, double-loop learning manifests as a transformation process involving changes in the organization's knowledge and competency base by collectively reframing problems and developing new policies, objectives, and mental maps (Snell & Chak, 1998). Furthermore, for developing double-loop learning, the organization’s key actors must create ongoing dialogues and a conversational process in which defensive reasoning and behaviour do not impede free and open inquiry (Argyris et al., 1985). Double-loop learning appears to facilitate the adaptive potential of an organization, but most organizations seem to have great difficulties learning in a double-loop manner (Argyris, 1996).

The application of single-loop and double-loop in the process of learning

Single-loop learning compares existing problems and organizational values and norms to develop an adequate solution, while double-loop learning’s correction requires adaptations of organizational values and norms. The double loop refers to two feedback loops that connect observed effects with strategies and values served by those strategies, as shown in Figure 4. In addition, potentially divergent organizational performance requirements could cause conflicts among individuals in the organization. According to Argyris and Schon (1996), if corporate managers are to engage in conflict, they must undertake a process of inquiry significantly different from the inquiry characteristic of single-loop learning. They must become aware of the conflict, set up a new division that has yielded unexpected outcomes, and identify an error. They must reflect upon the unexpected to the point where they become aware that they cannot deal with it adequately by doing better from the old way of thinking.

Moreover, Argyris and Schön (1974) explain that double-loop learning is needed for organizations to improve systems and modify policies. It allows the organization’s stakeholders to change policies and procedures. Therefore, single-loop learning answers the question, “Are we doing things right?” while double-loop learning answers the question, “Are we doing the right things?”, which affects the development of a new approach to work (Jaaron & Backhouse, 2017).
In addition, Argyris and Schon (1996) account for deliberate human behaviour in terms of theories of action. They explain that humans design actions to be effective and to achieve desired or intended consequences. However, real-life situations are complex, and the human mind has limited information-processing capacity. Therefore, humans use theories of action to decide what to do. Similarly to the process of organisational change in this study, in the situation of rising awareness in sustainability, laws and regulations (1), if an organization wants to achieve consequence in the outcome of sustainable Food Waste Management (2), do some changes(3). Hence, during the process of (1), (2), and (3). The managers need to integrate the level of thinking regarding their companies’ conditions and develop new solutions in their Food Waste Management, which aligns with this study's aim.

2.2.3 Triple Loop of Learning

The last level of this model is triple-loop learning. Triple-loop of learning can be defined as an umbrella of both loops as it is beyond and superior to single-loop learning and double-loop learning, as it requires a change in the underlying paradigms, principles, and purposes that govern the assumptions on which organizational values are based (Tosey et al. 2012). According to Flood & Room (1996), triple-loop increases the fullness and deepness of learning about the diversity of issues and dilemmas faced by linking all local learning units together in one learning infrastructure and then developing the competencies and skills to use this infrastructure) Triple loop learning manifests itself as “collective mindfulness”: members discover how they and their predecessors have facilitated or inhibited learning and produce new structures and strategies for learning (Georges & Witteloostuijn, 1999).

The connection between single-loop, double-loop and triple-loop learning can be seen in Figure 4: the process started from action and then framed to context. In this view of
organizational learning, members of an organization investigate if and how they and their predecessors had the opportunity and competencies needed to develop new processes to reframe the underlying systems, subsequently producing new strategies that facilitate or inhibit learning (Romme & Van Witteloostuijn, 1999). Moreover, triple-loop learning assists the organization in getting to know new ways of learning and new commitments. Problems and solutions are linked together even when separated widely by time and place by asking the question, ‘How do we decide what is right? (Tosey et al. 2012).

Moreover, Tosey and others also mention that it is important to consider that achieving a transformational change through triple-loop learning is a challenge and requires multiple resources due to the embedded complexities of the process. Thus, with triple-loop learning, learners should be able to understand how their previous actions created the conditions that led them to our current situation and problems. Organizations can benefit from triple-loop learning in many ways:
- The relationship between organizational structure and behaviour will change fundamentally because the organization learns how to learn.
- Organizations learn new ways to comprehend and change their purpose.
- Organizations get a better view of understanding how to respond to their environment.
- Get a more profound comprehension of why organizations choose to do what they do.

Nevertheless, Kwon and Nicolaides (2017) mentioned the lack of agreement on the common understanding of triple-loop learning. For instance, it has been said that triple-loop learning is a form of learning that goes beyond single- and double-loop learning. The learning process can potentially develop transition and changes; however, the definition of triple-loop learning in the framework still needs to be added.

![Figure 5: Paradigm shifts of diversity management.](image)

Note. (A) Single-loop learning, (B) double-loop learning, and (C) triple-loop learning
Source: (Kwon & Nicolaides, 2017, p. 90)

2.3 How can the loop of learning assist in the process of organizational change?

This study focuses on one specific industry: food and beverage production companies with complex operation lines and many employees. Thus, the organizational structure in this study's sample group is hierarchical, where decision-making power comes from top to bottom. Therefore, the research collects data from the management teams, who have the power to influence the changing process in the organizations toward their sustainable development.
Teng and Wu (2018) conclude in their study about sustainable development and competitive advantage from the group of managers who are in the production industry; the results show that the companies that have better environmental performance (evaluated by ISO 14001) have a higher value ratio between market value and replacement cost of a company (market-value/replacement costs). In other words, the companies that develop sustainable environmental management can gain more economic value compared to the competitors in the market.

Thus, with the relevant sample groups between this study and Teng and Wu’s study and the supporting theories from the previous studies, the author creates a framework, shown in Figure 6. The framework shows the relationship between the organisational change process and how the loop of learning can assist in the change process. For example, the competitive advantage of sustainable development is objective; therefore, it can come from both challenging situations and maintaining the competitive advantage. Furthermore, the hierarchical structure divides the organising process into various hierarchical levels, providing an advantage for knowledge sharing in information, ideas, and resources (Salancik, 1995; Kim, 2017). Therefore, the framework shows the process of organization learning as a flow of thinking processes that lead to future information/action between management teams and organization members regarding the input situations or challenges. When problems occur, the management teams need to evaluate the situation by thinking of solutions that can meet the need or beyond, which can be analysed by a loop of learning methods. Then, decisions are made and passed down to the organisation’s members for the organizational change process. However, the different objectives and resources can impact the level of organisational learning and definition regarding each organization.

“Organizational learning can be classified based on different criteria, such as intentionality (formal/informal learning), degree of determinism and emergence (analytic/experimental/structural/synthetic/interactive/institutional learning), consciousness level (conscious/unconscious learning), the origin of the experience (internal/external experience learning) or error level (learning by success/failure)” García-Morales, et al., (2008)

Therefore, this study classifies the organization learning from loop learning characteristics: the intentionality of handling the situations from managers’ thinking levels.

“Single-loop learning” in the framework indicates learning at the level of primary effectiveness and how to achieve existing goals and objectives and the changes; it can be seen by changing the routines or behaviour so the error does not occur again. However, the organization performance still follows the same organisational value and norms (Argyris and Schön, 1996; García-Morales, et al., 2008).

“Double-loop learning” in the framework indicates learning at the rules, insights and principles level, which leads to changing strategy, values, routines, rules, tools, goals and proposals. The thinking process goes beyond the accepted limits of the problem and repletes the question “why” to make the performances more cognitive and effective (Argyris, 1990; García-Morales, et al., 2008).
“Triple-loop learning” is the constant awareness changing with the continuous transformation process. Thus, this learning characteristic is continuity and sustainability (Kwon & Nicolaides, 2017).

After the management teams use the process of organisational learning to handle challenges in the various levels of thinking, they will generate new knowledge and applications for organization members, especially those related to changes and improvement (García-Morales, et al., 2008).
Lastly, learning in organization is analysed as the process of developing knowledge, abilities and attitudes together to achieve permanent changes (Senge et al., 1994; García-Morales, et al., 2008). In addition, when the team members continue implementing the new knowledge in action and assumption, it develops the essential tools for sustainable competitive advantage (Easterby-Smith, 1995; García-Morales, et al., 2008), which can be seen in the process of organisational change and maintain a competitive advantage in the framework. Therefore, the framework is a theoretical framework in this study. Moreover, it will be used in further analysis and explain the process of organisational change, which needs to identify how the change started, as mentioned in Chapter 1.2 of the research problem.

3. Methodology and Methods

3.1 Research design

Regarding the research’s questions and aim in analysing the characteristic of loop learning in assisting the organizational change process and explain how it can support sustainable change in Food Waste Management. The managers’ perspectives and the events of the organisation’s change process need to be collected and analysed to accomplish the aim. Therefore, the qualitative method is suitable for this study. Moreover, Knight and McCabe (1977) suggest that the case study has an advantage in combining several qualitative methods and avoiding reliance on a single approach. Furthermore, Bryman and Bell (2015) identify ‘case’ as:

“the study associated with a geographical location such as workplace or organization. What distinguishes a case study from other research designs is the focus on a bounded situation or system, an entity with a purpose functioning parts” p. 68.

Thus, a case study is suitable for this research regarding a research design. The ‘case’ is the boundary between the levels in the loop of learning and the organisational change process toward sustainable Food Waste in food and beverage manufacturing companies in Thailand. This study aims to find characteristics of the form of loop learning in organizational change process, which is aligned with a case study strategy as it can provide in-depth elucidation for the study (Bryman & Bell, 2015). Moreover, Regarding Yin (2003), this study uses a typical case type because it seeks to explore a case that exemplifies the situation or form of organization. According to Bryman and Bell (2015), suppose the researcher begins the investigation with a clear focus rather than a general notion of wanting to research a topic; in that case, the interview will be semi-structured. Therefore, from the ‘case’ explanation in the research design earlier, a semi-structured interview was a suitable method for data collection.

Thus, the researchers used an exploratory study by collecting data from a semi-structured interview to gain data on organisational experiences and change stories. Furthermore, a better understanding of what level of thinking the leaders/ managers use to lead their organisational change around Food Waste Management is on focus. The sample group was selected by non-probability sampling techniques to gain more access to the participants and coherence with the exploratory study design. Furthermore, the sample selection focused on a homogeneous group. They are managers in different food and beverage production companies with
decision-making power. Therefore, their ideas can influence the changes in the companies. Finally, concerning the ability to gain as much data as possible from participants, the open questions were used to probe and create themes relevant to the research questions. The step of data analysis explains in Chapter 3.4

3.2 Presentation of the Object of Study

This chapter explains in detail the ‘case’ in his study and the organisations’ size and structure of samples that support the data collection process and assist in accomplishing the research aim.

3.2.1 The Case Study Approach

Chapter 3.1 of Bryman and Bell defines ‘case’ as a study associated with a geographical location or a research design focusing on a bounded situation or system. Therefore, the specific location identified (Thailand), the bounded situation identified (relationship between organisational learning and the organisational change process) and this study focus on the system change identified. Therefore, we argue that the case study is the logic of this research. Moreover, accounting for the loop of learning as an organisational learning method used in this study made our case focused on the specific bound of the situation. Furthermore, the case studied the level of management team thinking about present or future situations, and the researchers analysed the level of thinking as initial ideas toward the change in action or strategies that finally lead to organisational change.

3.2.2 Sample selection: The organization size and structure

The samples in this study were 12 management positions/ owners from different food and beverage production companies in Thailand that distribute their products to local and international customers. The sample section used non-probability sampling from the academic-social network in Industrial Technology from Silpakorn University, Thailand. The study includes various sizes of organizations for the benefit of comparing management perspectives on Food Waste Management if size impacts the character of the loop of learning and change process. Therefore, this study collected the data from the group of samples who are in charge of the production lines, strategies planning, and problem sorting and have the power in decision-making, which can develop a change around Food Waste Management in the organizations.

3.3 Data Collecting Procedure

Regarding the research design, the research followed the sample size recommendation from Saunders et al. (2012), which recommends that semi-structured/in-depth interviews should have 5-25 participants. Therefore, this study set individual semistructured -interviews with 12 managers who work in food and beverage production companies. Regarding the samples located in Thailand, the interviews were arranged via Zoom meeting from 23-28 April 2023. The languages used were Thai and English, depending on the participant’s level of English,
for approximately 1 hour. Moreover, one of the researchers has Thai as a first language and is certified in ISO 14001:2015, Environmental management certificate training to align the level of industry-standard with the samples. The appointment time was scheduled in advance for the participants to prepare themselves in a quiet place and concentrate on the interview. In addition, the content of the interview was recorded; however, this matter was informed in advance, together with their acknowledgement in the consent forms.

3.3.1 Semi-structured Interview

To conduct the semi-structured interview, the researchers had a list of themes and possibly key questions relevant to the research questions that needed to be covered. However, the order of the questions depend on the conversation flow, and follow-up questions will be added regarding the previous answer from the participants (Saunders et al., 2012). In addition, the researchers used open questions to probe the concept from the interviewees' answers to receive rich data and gain more insight into the research topic.

The scope of each semi-structured interview was considered by the question ‘What do I need to know in order to answer each of the research questions I am interested in?’, which means the questions will cover the topic area but from the interviewees’ perspective (Bryman & Bell, 2015).

Thus, the questions were set to answer these themes:
1) How do organisations treat their waste?
2) The process of changes around Food Waste Management
3) How do the managers’ perspectives develop to change in action?

The list of themes questions and their relationship with the theories were separated into the concept below:
1) Introducing questions used to get to know the organization type, operation and participant’s role and the organisation’s goal in Food Waste Management.
2) Follow-up questions were used to continue the story from the participants’ previous answers.
3) Probing questions were asked with relevant questions with 3 set themes above; however, the questions were open-ended questions that can nudge the prospects toward revealing more information about their organizations.
4) Specifying questions integrated into the area that needed more information, but the participants did not mention it.
5) Direct questions used to confirm the previous answer from participants
6) Indirect questions were used to generate more stories and receive different perspectives relevant to organisational learning and organisational change in their organization.
<table>
<thead>
<tr>
<th>Participant number/ role</th>
<th>Interview Date</th>
<th>Language</th>
<th>Organization type/ size</th>
<th>Experience in organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1/ Company owner (P1)</td>
<td>23/04/2023</td>
<td>Thai</td>
<td>Ready food production / Small</td>
<td>10 years</td>
</tr>
<tr>
<td>Participant 2/ Production Manager (P2)</td>
<td>23/04/2023</td>
<td>Thai</td>
<td>Juice factory band and OEM /Big</td>
<td>15 years</td>
</tr>
<tr>
<td>Participant 3/ QA Manager (P3)</td>
<td>24/04/2023</td>
<td>Thai</td>
<td>Dairy products Position/ Big</td>
<td>14 years</td>
</tr>
<tr>
<td>Participant 4/ Quality Manager (P4)</td>
<td>24/04/2023</td>
<td>English</td>
<td>Sub-unit business in Sugar production factory / Medium</td>
<td>14 years</td>
</tr>
<tr>
<td>Participant 5/ QC Manager (P5)</td>
<td>25/04/2023</td>
<td>Thai</td>
<td>Supplement drink/ Big</td>
<td>10 years</td>
</tr>
<tr>
<td>Participant 6/ Assistant Factory Manager (P6)</td>
<td>25/04/2023</td>
<td>Thai</td>
<td>Sugar Factory /Big</td>
<td>10 years</td>
</tr>
<tr>
<td>Participant 7/ Assistant Factory Manager (P7)</td>
<td>25/04/2023</td>
<td>Thai</td>
<td>Coconut processing product/ Medium</td>
<td>19 years</td>
</tr>
<tr>
<td>Participant 8/ R&amp;D Manager (P8)</td>
<td>25/04/2023</td>
<td>Thai</td>
<td>Conden milk, OEM/ Big</td>
<td>8 months with this organization 17 years in F&amp;B factory</td>
</tr>
<tr>
<td>Participant 9/ Process Authority Manager (P9)</td>
<td>26/04/2023</td>
<td>Thai</td>
<td>Chili paste brand/ Big</td>
<td>20 years</td>
</tr>
</tbody>
</table>
3.4 Analysis method

Regarding the research design to accomplish the research aim, qualitative study is a suitable method for this study. This is because the qualitative data are rich and involve many stories of events, which depend on the ability of the researcher to explore and gain as much information as possible relevant to the topic. In qualitative research, all findings are driven by words, not numbers. However, words contain multiple and unclear meanings, so carefully exploring and clarifying is essential. Thus, this can indicate that the quality of qualitative research depends on the coherence between the data collection and data analysis to allow all findings to be explored and clarified (Saunders et al., 2012).

Thus, the study aims to investigate the organizational change process toward sustainable development in Food Waste Management through the loop of learning by managers’ thinking levels. First, the loop of learning theory themes will be used to evaluate the level of participants’ thinking to support their Food Waste Management process. The characteristics of single-loop, double-loop and triple-loop learning will be applied to the participants’ answers. Then, organizational change theory will be used to investigate the actions of changes and how the organization is willing to adapt itself to the new norms and support sustainable development goal targets in Thailand. Therefore, an inductive approach is used in the sense of exploratory purpose to make the analysing process more flexible and fully utilise the data findings to test the conceptual framework. Moreover, Saunders et al. (2012) point out that the researchers should analyse the data findings and develop a conceptual framework as a guideline for the following study steps.

After finishing the interview process, the data preparation step started with transcribing the interview audio into a written (word-processed) account by the Enveo program and translating it from Thai into English. Then, the researchers made a transcript summary for the data analysis. Niland et al. (2014) state that thematic analysis is suitable for a wide range of data types, especially with data from traditional face-to-face data such as interviews, which was used in the data collecting method in this study. Furthermore, the researchers can bring the theoretical concepts or theories that can provide a foundation for seeing data into meaningful code and finally reach to develop themes (Braun et al., 2015). Thus, the focus of this study is
identifying the characteristics in the loop of learning in assisting the process of organizational change; therefore, thematic analysis is suitable for this study as it is a method for identifying themes in qualitative data. Moreover, thematic analysis can support theoretical processes and procedures in the analysis (Terry et al., 2017). Guest et al. (2012) mention that thematic analysis has an experiential orientation approach, which focuses on what participants think, feel and do and is supported by the theoretical assumption that language reflects reality. Furthermore, thematic analysis can characterise the themes independently from any particular epistemological and ontological base, which gives thematic analysis flexibility and is distinct from other qualitative analyses (Clarke et al., 2015).

From all the above, thematic analysis suits the research’s objective and has high flexibility to analyse the data by focusing on the themes of characteristics from organizations’ events from the context of the managers’ level of thinking toward sustainable Food Waste Management and how those contexts are important for future action in organisational change. Nevertheless, there is criticism that thematic analysis is not really a particular or distinctive method but a process for identifying patterns (Terry et al., 2017). Therefore, the authors follow the process for a good thematic analysis shown in Figure 7 to analyse all findings to provide a reliable qualitative analysis in this study.

<table>
<thead>
<tr>
<th>Process</th>
<th>No.</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transcription</td>
<td>1</td>
<td>The data have been transcribed to an appropriate level of detail, and the transcripts have been checked against the tapes for ‘accuracy’</td>
</tr>
<tr>
<td>Coding</td>
<td>2</td>
<td>Each data item has been given equal attention in the coding process</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Themes have not been generated from a few vivid examples (an anecdotal approach), but instead the coding process has been thorough, inclusive and comprehensive</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>All relevant extracts for each theme have been collated</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Themes have been checked against each other and back to the original dataset</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Themes are internally coherent, consistent, and distinctive</td>
</tr>
<tr>
<td>Analysis</td>
<td>7</td>
<td>Data have been analysed – interpreted, made sense of – rather than just paraphrased or described</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>Analysis and data match each other – the extracts illustrate the analytic claims</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>Analysis tells a convincing and well-organised story about the data and topic</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>A good balance between analytic narrative and illustrative extracts is provided</td>
</tr>
<tr>
<td>Overall</td>
<td>11</td>
<td>Enough time has been allocated to complete all phases of the analysis adequately, without rushing a phase or giving it a once-over-lightly</td>
</tr>
<tr>
<td>Written report</td>
<td>12</td>
<td>The assumptions about, and specific approach to, thematic analysis are clearly explicated</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>There is a good fit between what you claim you do, and what you show you have done – i.e. described method and reported analysis are consistent</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>The language and concepts used in the report are consistent with the epistemological position of the analysis</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>The researcher is positioned as active in the research process; themes do not just ‘emerge’</td>
</tr>
</tbody>
</table>

Figure 7: 15 points checklist for a good Thematic Analysis
Source: (Braun & Clarke, 2006, p. 96)
3.5 Reliability and validity

The qualitative method with semi-structured interviews for data collecting suits this study best regarding the research questions and aim. However, there are often questions about the statistical generalisability of qualitative research based on the small number of samples. Saunders et al. (2012) argue that the quality of the qualitative study should not be interpreted the same way as the quantitative study. They suggest that the generalisability of each study will depend on the nature of the samples based on the research topic. Moreover, a well-designed research interview can gain good data quality, which will assist the research in reaching the standard. Therefore, this study follows Bryman and Bell (2015) in alternative terms and ways of assessing qualitative research in trustworthiness to ensure that all components are concerned with delivering a good qualitative study.

There are 4 criteria:
1) Credibility, which is parallel with internal validity: How believable are the findings? The samples in this study are owners and management teams who have worked in the organizations for more than 10 years in the majority. Therefore, the ideas and stories from them have high credibility.
2) Transferability, which is parallel with external validity: Do the findings apply to other contexts? This study emphasises organisational change toward sustainable Food Waste Management by using a loop of learning as a tool; therefore, the study is unique and has its own perspective, which may be different from the other studies.
3) Dependability, which is parallel with reliability: Are the findings likely to apply at other times? The study follows the organisational change process from the managers’ level of thinking in each situation concerning waste management; therefore, different times or events will not be relevant to the specific data findings.
4) Confirmability, which is parallel with objectivity: Has the investigator allowed their values to intrude to high degrees? The findings come from the managers’ perspective, supported by data or events that happened within their organizations; therefore, the researchers have not intruded on all data findings.

3.6 Ethical Principles

The researchers follow ethical principles from Diener and Grandall (1978) concern with 4 concepts:
1) Harm to participants; in this specific research which uses semi-structured interviews via Zoom, there will be no physical harm. Nevertheless, harm to career perspective or future employment can be accounted for in this matter. However, we do not ask for the participant’s names, names and specific locations of organizations. Therefore, it will be no harm to participants in this study.
2) Lack of informed consent; The interviewer will inform the participants about the research topic, process and the aim of the interview. Moreover, the participants’ privacies will be identified again.
3) Invasion of privacy is relevant to the lack of informed consent. However, participants will be informed that they are given the opportunity to refuse to answer some questions or withdraw.

4) Deception; the researchers clearly inform the participants that the data collecting process is for a master thesis study and will not be presented in other ways than what it is.

4. Results and Analysis

This chapter will analyse the empirical findings; first, identify the current Food Waste Management in Thailand to support the need for more empirical studies in this field. Second, to understand the organisational change process toward sustainable Food Waste Management and the reason behind it. Lastly, explain how the loop of learning thinking characteristic can assist in organizational change.

4.1 Organizational Learning Framework in Current Food Waste Management

This section is dedicated to the analysis of the current food waste management practices in Thailand. To facilitate a comprehensive examination, the researchers have classified the 12 participants into three groups based on their organizational level of loop learning. By organizing the participants in this manner, the research can effectively assess and compare organizations' food waste management strategies with the loop of learning theory and be able to answer RQ1. The researchers used the thematic analyses approach to analyse the participant’s statements and identify themes that align with single-loop, double-loop and triple-loop learning characteristics by following the steps in Figure 7, including transcription, coding, analysis, overall and written report.

From following Terry et al. (2017) suggestion on thematic analysis, from familiarisation to some form of theme development, then to coding. The purpose of coding is to find evidence for the themes. Themes are developed from coding and align with data and codes; They are the outcome of the analytic process. Generating codes is making casual observational notes and creating meaningful segments relevant to research questions. Moreover, codes vary in what they capture or highlight, from the semantic obvious meaning to more conceptual ideas. Lastly, Reviewing themes that go along with the dataset can confirm that they work well and can tell a distinctive and meaningful story that can answer the research questions. Therefore, for all the processes mentioned above, the authors analysed all findings using thematic analysis steps and contributed a report, shown in Table 2.
Table 2: The process of coding and themes analysis

<table>
<thead>
<tr>
<th>P</th>
<th>Verbatim/data</th>
<th>Codes</th>
<th>Theme 1 Doing things right</th>
<th>Theme 2 Doing the right things</th>
<th>Theme 3 we decide what is right</th>
</tr>
</thead>
</table>
| P(1) | “I have self interest in Food Waste Management, my company separates food waste and each type use different method for example we send good quality waste to farmers to feed animals, sell old oil to contract supplier and the rest will be pick up by municipality for the further process. I would say we are almost ‘zero waste’, most of the waste can be reused somehow, only the bone that need to be burn and it is municipality who take care of it’ However, I wish to have new technology for the seafood waste but I don’t have budget for it yet.” | - Doing routine in sustainable Food Waste Management.  
- want to do better  
- set future goal  
- Questioning present actions and think about the new solution for the future. | X                                                                         |                              | X                              |
| P(2) | ‘My factory received green factory award last 2 year, we are developing all the time to be less harmful to environment, for example we change from using coal to LPG in generate energy in our factory and we have our contract suppliers to pick up the fruit skin and take care of waste water treatment before release to natural which follow the standard requirement. We have to adapt ourself because of industry law and norm that changing, we are certified in very standard: ISO, GMP. Therefore, we have rule to follow and we are monitored by municipality and ISO audit. We work closely with local community because we want to make sure that they are happy and have no complain” | - Continually developing.  
- Doing routine in sustainable Food Waste Management.  
- Follow law and norm and reach expected certificate standard.  
- Thinking about future  
- Prevent problem with stakeholders. | X                                                                         | X                              |                                |
<table>
<thead>
<tr>
<th>P</th>
<th>Verbatim/data</th>
<th>Codes</th>
<th>Theme 1 Doing things right</th>
<th>Theme 2 Doing the right things</th>
<th>Theme 3 we decide what is right</th>
</tr>
</thead>
</table>
| P(3)| “Our organization use system to monitor our whole operation by follow the ISO standard. Our raw material is milk, we will use the leftover from one product line to be the new material in new product for example from milk to yogurt so we don’t have waste in milk, however, we have waste in packaging that we have contact suppliers to correct for recycle process. We are trying to be better than standard, it benefit in competitive advantage and create good relationship with stakeholder. The changes in our organization mostly come from operation teams with support from management” | - Follow laws and regulation  
- Monitoring action by followed the certificate standard  
- Continue to develop and want to do better in Food Waste Management  
- Open and listen to organization members in the change process. | X                                      |                               | X                              |
| P(4)| ‘Our chain company’s objective is zero waste, we are using circular economy in our operation. We don’t call it waste, we call by products, we use molasses to produce ethanol, it create value to us. We have our new mission in BCG Economy (Bio Circular Gain) which mean we want to use everything resources we use to benefit our economy. We have Environmental Social Governance. We will do much for in the future’” | - Clear mission statement  
- Setting a higher goals as the new target for the continuing process in developing better Food Waste Management  
- Holistic thinking | X                                      | X                              | X                              |
| P(5)| ‘We use chicken meat as our raw material; therefore after the production, we will have contacted suppliers collect all residue and product animal food. We have R&D team to check the quality of water in the waste treatment pond and reuse it in our factory. We create the green area around our factory, we educate our staffs to think about the world and update the new laws with the continue learning process. We think beyond and improve our production to produce less and less waste.” | - Food Waste Management routine identified  
- Doing right in the actions and double-check the result  
- Continue learning process and educate organization members  
- Thinking beyond laws requirement | X                                      |                               | X                              |
<table>
<thead>
<tr>
<th>P</th>
<th>Verbatim/data</th>
<th>Codes</th>
<th>Theme 1 Doing things right</th>
<th>Theme 2 Doing the right things</th>
<th>Theme 3 we decide what is right</th>
</tr>
</thead>
</table>
| P(6)| “Our company has sub-businesses supporting each other, we use the residue from sugar cane as the tinder to produce electric to use in our factory and sell to Thai government, we give the filter cake to famers to use as fertilizer. We have our Corporate Social Responsibility, we have more than 1,000 farmers who sending the sugar cane to us, that is why we need to sustaina our business, not only for us but for our stakeholders. We invest a lot of money in the new technology in the production to release less waste as possible. We think for future and we have future project to recycle our waste to paper” | - Circular economy waste management in action.  
- Holistic thinking for business and stakeholders  
- Future investment for better solution of Food Waste Management.  
- Thinking and evaluate the situation in advance  
- Set up future target | X | X | X |
| P(7)| “our waste is residue from coconut, we have contracted supplier to collect it and use in animal food. We are thinking about further all the time. Our strategy is we are preparing for change by put our operation many steps ahead, we educate in new social norm and why we have to change to our staffs. We even talk to our suppliers about adapt themselves to sustainability concept. We need to move to sustainability together with our supply chain. Only one sustainable organization doesn’t mean anything” | - Food Waste Management routine performing.  
- Holistic and preventative thinking.  
- Lead supply chain to reach sustainability  
- Continue thinking and developing | X | X | X |
| P(8)| “We re-process our bypoducts to be the new product, therefore, we don’t have much waste, only some fat in washing water. We treat it in the treatment pond before we release to the natural. However we follow ISO 14001, 45000. Our strategy is following our customers demand and requirement because our products sell in both local and international market. We have to do everything right.” | -The action align with laws and regulations  
- Follow certificate standard  
- Take action in what necessary for business | X | | |
<table>
<thead>
<tr>
<th>P</th>
<th>Verbatim/data</th>
<th>Codes</th>
<th>Theme 1 Doing things right</th>
<th>Theme 2 Doing the right things</th>
<th>Theme 3 we decide what is right</th>
</tr>
</thead>
</table>
| P(9) | “Our waste such as child stalks will return back to our supplier and the residue will be fertiliser. We mainly follow the laws and our solutions relate to the problems/challenges”                                                                                                                                     | - the actions follow the laws.  
- Thinking to sort current problem                                                                                                                                  | X                           |                               |                                |
| P(10) | “Our raw material is already byproduct from daily product from our supplier, therefore the waste is only come with washing water. We have water treatment pond to treat the quality of water. We have international customers so we have to develop our standard that align with their rules and regulations because if we follow international standard we can sell our product to wider customers’ location and now our customers is concern about sustainable production” | - doing right treatment applied.  
- Thinking from business perspective.                                                                                                                                  |                               | X                             |                                |
| P(11) | The raw material is molasses, therefore our waste is sediment after the fermentation. We operate it to be fertiliser and the water will go to treatment pond. Our strategies is planned 5-10 years ahead. We aim to use less energy, release less waste and use less water and we set our year target | - Actions follow laws.  
- Reach expectation.  
- Future plan set  
- Continue to develop for better outcome in Food Waste Management                                                                                                                                  | X                           | X                             |                                |
| P(12) | our raw material come from agriculture products; therefore the main waste is palm sugar shell. We send it to feed the cow in our local community and the water, we treat follow by regulations. I have to manage the waste right because our customers ask about it and if we do it right, we can sell our products to more places.’ | - Current action follow laws and regulations.  
- Do right treatment for food waste                                                                                                                                  |                               |                               | X                             |
4.1.1 The different themes in comparison to the characteristics of single-, double, and triple-loop learning

**Current Food Waste Management in Single-loop Learning from Industry Perspective**

According to the findings from the data gathered in this study, all participants in this study currently have shown the achievement of single-loop learning in their food waste management practices. Argyris and Schön (1996) define single-loop learning as the process of addressing problems or deviations from planned outcomes. It involves recognizing and addressing issues, errors, inconsistencies, or ineffective habits within the present situation. For example, in the participants' (2, 8, 9, 10, 12) statements, it becomes evident that the management teams responded to errors or took corrective actions in their current food waste management practices to answer the question, “Are we doing things right?”. Thus, organizational learning at this level manifests itself as a consolidation process. It is a change in the organization's knowledge and competency base without altering present policies, objectives, or mental maps (Snell & Chak, 1998).

Furthermore, the collective actions of the participants reflect a characteristic of single-loop learning by identifying specific areas for improvement and implementing corresponding changes. Therefore, this iterative process fosters continuous improvement within their Food Waste Management practices. In single-loop learning, people, organizations, or groups modify their actions according to the difference between expected and reached outcomes (Argyris & Schon 1978).

Therefore, they have achieved their objective of performing the right treatment for their waste and have solved the problems from certain situations by changing their routines, using new technology or changing the procedures. However, they still keep the same objective: doing every right regarding the regulation or laws.

**Current Food Waste Management in Double-loop Learning from Industry Perspective**

In the second theme of the analysis, 5 out of 12 participants/managers have shipped from single-loop to incorporating double-loop learning into their current waste management practices. Snell & Chak (1998) define double-loop learning as a transformation process involving changes in the organization's knowledge and competency base by collectively reframing problems and developing new policies, objectives, and mental maps due to the managers taking further reactions than they do in single-loop learning. Therefore, managers at this level are trying to answer the question, ‘Are we doing the right things?’

Regarding their statements, the participants (1, 2, 3, 5, 11) exemplified a mindset of continuous reflection and adaptation, demonstrating the characteristics of double-loop learning in their approach to waste management. Furthermore, they showcase a proactive attitude towards exploring new technologies, striving to exceed established standards, adopting comprehensive strategies, and setting long-term goals. Therefore, this level of loop learning enables organizations and their stakeholders to question and challenge underlying assumptions, leading to the development of innovative approaches to work (Jaaron &
Backhouse, 2017). By embracing double-loop learning, these participants are on the ongoing improvement and the ability to drive meaningful change within their organizations.

Thus, this reflects a characteristic of double-loop learning, where the participants go beyond simply addressing problems or deviations and instead focus on reevaluating and adjusting the underlying principles and strategies guiding their actions. It is relevant to Argyris and Schön (1974) explanation that for organizations to improve systems and modify policies, double-loop learning is needed. At this level of loop learning, the organizations address issues or deviations and reassess and adjust the fundamental principles and strategies that govern their decisions. By adopting this approach, the participants foster continuous improvement and revamp their Food Waste Management practices, resulting in higher levels of sustainability in their organizational practices.

**Current Food Waste Management in Triple-loop Learning Industry from Industry Perspective**

In the third theme of the analysis, 3 out of 5 participants/managers have transformed from double-loop to triple-loop learning. The managers at this level thought deeply about their current and future waste solutions and involved the question, ‘How do we decide what is right?’ (Tosey et al. 2012).

Furthermore, the statements provided by participants (4, 6, 7) highlight a relationship between triple-loop learning and planned organizational change in the context of their sustainability practices. These participants demonstrate a characteristic of triple-loop learning by continuously challenging existing assumptions and paradigms for better solutions regarding waste management. The ongoing thinking process represents the fullness and deepness of learning about the diversity of issues and dilemmas (Romme & Van Witteloostuijn, 1999). It can be seen in triple-loop learning in organizations. These participants question the traditional notion of waste and envision new possibilities for resource utilization. This process shifted their mindset to planned organizational change, such as stating future plans in the next 3-5 years. Therefore, the outcome of triple-loop learning was aligned with the planned organizational change mentioned in Chapter 2.1.1.

Furthermore, the managers at this level engaged in continuous learning and reflection, challenging existing practices and embracing new approaches to integrate sustainability into their waste management. This cautious thinking leads to changes in their operations, such as repurposing waste for energy production (P, 6) and contracting suppliers for waste utilization (P,7). With the assistance of triple-loop learning and planned organizational change, these participants foster a sustainable pattern and pave the way for long-term environmental and economic benefits. Moreover, comprehensive thinking about their stakeholders mentioned by (P6), he thought further that if his business does not sustain, it will impact contracted farmers and their quality of living. Likewise, (P7) he realized that his company couldn’t be sustained without his suppliers. Therefore, in this level of thinking, the concern and responsibility go beyond the organizational level.
The current food waste management methods in Thailand from the industry perspective.

1) Animal feeding, 2) Correcting by certified suppliers to be treated, 3) Use as new raw material to produce other products (reuse, circular economy), and 4) Fertilizer.

Summary

By using thematic analysis with the constructionist orientation, the researchers seek to apply the analyst’s interpretation as rooted in a theoretical framework (Lochmiller, 2021). Therefore, the different characteristics of loop learning are applied as patterns to develop 3 themes: 1) single-loop learning: when the organizations are performing the food waste treatments right, 2) double-loop learning: when the organizations use a higher level of thinking and want to perform the right food waste treatments, 3) triple-loop learning: when organizations perform beyond standard or norm to reach their own target/goal in what can be the right way to manage their waste and sustain their Food Waste Management. From the dataset received from 12 interviews, the authors could find the “evidence” for different themes and the distinction between each characteristic. Thus, coding and developing themes are apparent in this study. Therefore, the analysis process and results are relevant to Boyatzis (1998)’s statement on the data-driven (inductive) which can be called the “coding reliability” mode in thematic analysis. In addition, Terry et al. (2017) mention that this version of thematic analysis allows the researchers to test and report the codes, which is essential for the research’s quality.

4.2 Organizational Change from the Context of Sustainable Food Waste Management

4.2.1 The Factors Influencing Changes

Regarding the research question (RQ2), the researchers aim to clarify the reasons/ factors influencing the change in Thailand's food and beverage organizations. The participants mentioned that the government monitors food and beverage manufacturers. There are laws that they need to follow, which may be different regarding the specific type of production and size. However, every organization is controlled by the local municipality. Moreover, the higher awareness of environmental problems set the informal higher standard for food manufacturers to adapt themselves to the new coming stream (sustainability). Furthermore, the strength of the thematic analysis is suitable for qualitative research questions about experience, understanding, and the social process and the ability to identify patterns in data (Terry et al. (2017). It helps to clarify that external pressure and monitoring started adapting to the new characteristics of the organization’s image. Furthermore, it created the boundary that customers/suppliers want to do business with an equal standard company. In other words, it is safer for them to do business with factories with good waste management to reduce the risk of stakeholders’ dissatisfaction and production in the future. Therefore, the character of organizational change in the circumstances started with adaptation aligning to law and norms.
“We have to adapt ourselves because industry law and norms are changing; we are certified in ISO and GMP standards. Therefore, we have rules to follow, and the municipality and ISO audit monitor us.”

(P2, April 24 2023)

Moreover, in the specific country in data collection, the researchers found that national laws and regulations can be different and are also one of the external factors that impact the changes in organizations. For example, the case study is in Thailand; the participant mentioned the government law regarding environmental concerns for the industry section: EIA (Environmental Impact Assessment in Thailand), which requires more action and requirements.

“Yes, we are certified in ISO14001, but we also have to reach the EIA standard, which requires more specific tasks.”

(P6: April 25 2023)

In summary, all participants stated their reasons that influence the changes around Food Waste Management: industry law, changed norms, stakeholder's expectations, corporate image, competitive advantage and business expansion.

Braun and Clarke (2006) state that thematic analysis can also be a “constructionist method”, which examines the ways in which realities, events, meanings and experiences are the effects of a range of discourses operating within society. Therefore, from the various sizes of the samples, we can state the data found below:

2 small food production organizations mentioned that their local municipality monitored them, and because the organizations are located in residential areas, they wanted to avoid any complaints from local people. Therefore, they need to do everything right, which is a characteristic of single-loop learning: primary effectiveness and achieving existing objectives (Argyris and Schön, 1996)

Furthermore, this study has 4 medium size organizations; the participants mentioned the higher standard they follow, for example, GMP or ISO. All of them state the future plan and next goal in their organizations. They are more careful in running a business, and their level of thinking involves problem prevention. Moreover, it clearly shows that their changes are part of the process of expanding the organization, for example, to expand the customer groups or have a plan to put the company in the stock market.

Lastly, there are 6 big manufacturers in this study; all of them have reached the ISO 14001:2015 Environmental Management standard. The management teams in the big organization divided their thinking into 2 strategies: 1) Reactive- keep the smooth operation, keep stakeholders satisfied, wait for the situation to happen, and then sort that specific situation. 2) Proactive-the organization has a mission to move forward and continue developing its Food Waste Management. Therefore, this plan involves organisational learning processes to succeed in the goal of sustainability (zero waste). This is relevant to how big manufacturers' managers explain their future thoughts regarding risk prevention, which shows in the present actions.
Furthermore, they mentioned that because they have a big organization, they have many stakeholders who are concerned and monitor their operations. Therefore, the error in their waste treatment can significantly impact local people and the environment. On the other hand, they also point out that they want to gain income from the waste, which is why they are working on developing new ways to reuse the waste into raw materials for new products. Moreover, the location of the factory also matters; if the factory is in or close to residential areas, the managers need to think more in a preventative way than the factories in the industrial zone with a facility area for waste treatment to avoid local people’s complaints.

4.2.2 The process of change in the organizations

As mentioned in the organizational change definition in Chapter 2.1, as a matter of attempting to transform practices, structures and assumptions (Seravalli & Witmer, 2021). The details in those 3 terms of changes can be provided here: 1) transform practices can be organization changing the way to do things, 2) structures: changing procedures and legitimate practices and 3) assumptions: changing the values and beliefs that underpin practices and structures.

Therefore, the dataset and thematic analysis allow the empirical argument to be developed around the themes reported from the data. Moreover, it produces a robust understanding of the dataset by demonstrating how various underlying data elements relate to the themes (Lochmiller, 2021). Thus, the researchers can see the process of changes in their organization relevant to RQ2 in how food and beverage production factories develop organizational change toward sustainable Food Waste Management. The changes in organization started from the management teams’ awareness of sustainable waste management. The awareness was raised from many factors, mainly from external pressure and the benefit of sustaining and expanding their businesses. Then, they develop the solutions for their Food Waste Management through the thinking process. Furthermore, the outcome of thinking can be seen when the leaders set new goals/missions that lead to changes in their operation and involve changes from organization members. An example can be seen in Participant 4 interview:

“We have our new mission in BCG-Economy (Bio Circular Gain), which means we want to use every resource to benefit our economy. We have Environmental Social Governance. We will do much more in the future.”

(P4, April 24 2023)

Participant 4 shows her thinking level in advance and has set up each step for the future goal and new strategy. Therefore, to achieve a new plan of using all resources from the production process, the whole organization must develop changes within the operation line, department and individual workers.

Moreover, the change process started with organization members who received an order from the manager to develop new ways to reuse the waste. This requires organisational learning in terms of thinking and testing the possibility. The learning process can go back and forth between the leaders and organization members. The stage is similar to the 3 levels of organization (individual, group, and organization) mentioned earlier by Crossan et al. (1999) in Chapter 2.1. When the leaders decide to change strategies, actions, procedures or legitimate
practices, organisational learning will transform into organisational change, which will be explained more in the next chapter.

Furthermore, Participant 5 pointed out that employee engagement is essential in the changing process because the transition can only be complete to reach organisational change with continuing learning and doing from organization members.

“The management team promoted activities to educate employees in waste management, which gained high engagement from everyone in our organization; that is where our success in changes comes from, and we continue the process of learning and adapting ourselves to be up to date with laws and the environment.”

(P5, April 24 2023)

However, from the interview, the researchers can see how leaders use their powers in organisational learning and how communication can impact the engagement of their employees. It leaves the reminder that power and communication are 2 terms that can’t be avoided in the process of organizational change. In addition, Kim (2017) stated that when organizational members experience large-scale changes with uncertainty and equivocality, pressures to deal with the complexity of their work can develop biases, which will affect the transition and success of the organization. Therefore, knowledge sharing and organisational learning for organization members are essential, even though the process may take longer time. Lopez et al. (2007) mention that structural change develops slower, and its outcome lasts permanently, which is relevant to sustainable development in each organization. This explanation shows the connection between data finding and the relationship between the process of organizational change and the loop of learning framework in Figure 6 that organization members are critical in the process of organisational change, and their consistent actions benefit the organization in remaining effective and maintaining competitive advantage.

Summary

From the dataset and the result of analysis, Industry law, changed norms, stakeholders’ expectations, corporate image, competitive advantage, and business expansion lead to change within the organizations. With support from the thematic analysis above, the authors can identify the themes in organizations’ actions, which gives us a better understanding of why the organizations develop changes in the operations of Food Waste Management. In this case, the primary influence is that the norms have shipped toward environmental concerns in local and international regulations/laws. Similarly, Teng and Wu (2018), who studied the organisation change in the manufacturing industry in Taiwan, mention that the Taiwan government and local businesses consider ISO 14001 as a ‘green passport’ granting entry to international markets and the various rationales have been proposed to explain why companies commit to environmental. In addition, the specific goal of each organization also influences the changes shown in the empirical data from this research.
Furthermore, relying on the literature on organizational change definition mentioned in Chapter 2, the dataset shows the pattern of change in all 3 forms: changes in practices, structures and assumptions. Those changes represent the organizational change processes in the organizations that participate in this study. Therefore, the primary influences of change (norms and regulations) stated in Chapter 4.2.1 affect how the managers think/handle the situations and develop the solutions that lead the organisational change toward sustainable Food Waste Management.

4.3 The relationship between organisational learning and organizational change

Ford and Ogilvie(1996) state that the greatest contrast between the systems-structural and interpretive views of organizational learning is their differing views of the legitimacy of creative action. Thus, this study's definition of organisational change involves a change in action and legitimacy, as stated earlier in Chapter 2. The researchers analysed the empirical findings compared with the previous study's theoretical. The framework from Ford and Ogilvie(1996) is shown in Figure 8. They explain that the underlying goal of organizational actors shifts towards learning by discussing interpretations and confronting the unknown with action. The process involves enacting and testing multiple alternative interpretations with various actions. Furthermore, the process subsequently influences expectations that guide future action-taking and changes.

![Figure 8: Implications of epistemological assumptions on organizational action and learning](Source: (Ford & Ogilvie, 1996, p.57))

On the other hand, the empirical from this study shows the relevant process from the primary goal toward the loop of learning. The method of information collecting and creative action toward reclaiming failure and gaining success came from the managers’ thinking. However, the researchers can see the gap between Ford and Ogilvie’s framework and our findings, which is the “next objective/ future goal” in the organisational change process. From our results, all participants identified their next plan/goal in the Food Waste Management area, from small to big changes. For example, some explained their new actions, and some stated the next mission.
“The next plan is to recycle the leftover sugar cane residue as a raw material to make paper; we are in the developing process. We are learning from the error situations, developing change and preventing the potential future mistakes that can happen. That is why we invest much money in new technology to support production in releasing the least waste possible.”

(P6, April 25 2023)

Participant 6 identified the next plan for using waste as raw material in a new product. Therefore, he needed to think about sorting problems and planning for the future together. How to sustain his operation, what can be improved is repeatedly questioning, showed his “collective mindfulness” as a characteristic of triple-loop learning (Georges & Witteloostuijn, 1999; Tosey et al. 2012). It is beyond the rule and regulation requirement and aims for sustainability (Kwon & Nicolaides, 2017).

The loop of learning assists as the measurement tool in the manager’s thinking; if they have a thinking level to achieve the existing objective or meet the regulations or if they think beyond the accepted limits and changes to a new strategy; lastly, if the leader has a level of continuous transformation process thinking. The level of a leader’s thinking directly impacts the future change in actions in the organization, such as new goals, tasks, training programmes, assignments and projects, which require participation from organization members in every department and role. The employees need to learn and update their skills to align with the change in the organisation. The organisational change will occur when all organisational members operate the differences in actions. The finding aligns with Romme & Van Witteloostuijn (1999) statement in Chapter 2.2.3 that organization members need to understand the opportunity and competencies to develop new processes. In addition, to reach sustainable change, the process of thinking and learning needs to be continued to sustain the efficiency of performances.

Moreover, the holistic thinking character is found in the findings. The manager did not only think about his organization but his whole supply chain. He evaluated this future from the comprehensive thinking that his organization could not be sustained without his suppliers.

“We even talk to our suppliers about adapting themselves to the sustainability concept. We need to move to sustainability together with our supply chain to keep our operation running smoothly.”

(P7, April 25 2023)

Participant 7 also showed a level of thinking beyond the existing situations. He set up the strategy to prepare his organisation’s members to adapt to changes that are not yet regulated. Future thinking leads to adapted policy and a new way of doing business, which requires changes in operation and staff behaviour. Therefore, thinking guides future action-taking and changes, as Ford and Ogilvie(1996) mentioned above. Finally, the organization changed toward sustainable operation. Moreover, the thinking in preventing risk by educating suppliers can start with the learning process among the organisation’s leaders in the supply chain. Thus, this learning outcome will create a more significant impact and benefit every organization that shares the same goal and participates in the changing process.
Therefore, the finding has shown the characteristic in the loop of learning and presents the relationship between leader thinking that can initiate new action, which impacts the organization members in changing their operation routines. This is the process of organisational changes, which can be seen in Figure 6 in Chapter 2.3. In addition, from this study's findings, the change process can also occur in the supply chain, not only within the organization. Moreover, this study has participants from various sizes organizations to test if operation sizes have some influence on organisational learning and organizational change. The finding is shown below:

“As a company owner, I need to follow the laws and worldwide trends; I read about sustainability in Paris Agreement. It inspired me to do more and do better. I started to change my operation ahead of the law and educated my employees about new practices in Food Waste Management. It took a lot of time for me in the in-house training process. But I believe it will benefit our company later, and if there is a change in the law, we are preparing ourselves. Importantly, I want to help with environmental problems as much as I can.”

(P1, April 23 2023)

Participant 1 is a leader in a small organization. Her thinking can be seen in the process of organisational learning to analyse the company’s performance in Food Waste Management. Her stories show that she continued her thinking to find a better solution and think about the future, including evaluating the possibility of changes in laws that would directly impact her operation. Therefore, she started the change process in her organization by changing how to treat food waste and educating her staff. It is relevant to the theory mentioned in Chapter 2.3. In repleting the question “why” to make the performances more cognitive and effective (Argyris, 1990; García-Morales, et al., 2008). Thus, from her dataset, the answer to the question ‘why’ is that she changed her way of treating food waste because she prepared her organization for future challenges and prevented the risk that can happen from external factors. Therefore, our findings show that the operation’s size does not impact the organisational change process from the lens of loop learning. Instead, the leader’s perspective is more critical.

Summary

Themes developed in the analysis process gave us distinct patterns in how managers think about the “next objective/ future goal” between the organizations with different levels of single-, double- and triple-loop learning. The managers who have double and triple-loop learning levels of thinking mentioned the next plan or their companies’ future goals. Therefore, those future plans create the need for changes in present actions, which influence the organizations to start the process of organisational change. Therefore, the loop of learning is the tool that helps managers develop practices in normal routines or solutions when they face challenges. However, the different actions are relevant to the level of thinking they use and the goal they have set. Furthermore, from the results stated above, the authors can present the discussion of this study in the next chapter.
5. Discussion

This chapter presents the findings of this study by describing responses to answer research questions. At the same time, the results will be compared with the existing theories and literature presented earlier in this paper. Finally, the findings confirmed the conceptual framework in Figure 6, Chapter 2.3.

5.1 RQ1. What are the current perspectives and actions of the Food and Beverage production factories in Thailand?

This study focuses on Food Waste Management from the industry perspective; the participants are the managers from 12 food and beverage manufacturers who participated in the semi-structured interview. The findings show that food and beverage organizations are concerned and aware of the consequences of the ways they treat their waste. All of them are up to date with laws and regulations regarding waste management. They admit that effective method to treat their waste is their responsibility. Therefore, every organization has reached the law’s requirement. However, each organization looks at sustainable Food Waste Management from different benefits, such as gaining a competitive advantage, increasing customer groups and preventing future risk. The current actions from the food and beverage industry are 1) following the existing regulations and finding solutions for challenges, 2) developing better methods and re-using waste, and 3) setting new strategies to achieve sustainable Food Waste Management such as zero waste.

Thus, the findings in the current actions have the quality of single-loop, double-loop and triple-loop learning as the definitions given in Chapter 2.3. Furthermore, the paradigm of organizational learning starts from achieving existing goals to changing routines or tools (Garci´a-Morales, et al., 2008) and continuing to develop to reach sustainability (Kwon & Nicolaides, 2017). Therefore, the organisational learning process by using the loop of learning in this study is aligned with the framework in Figure 6, Chapter 2.3.

5.2 RQ2. Why and how do Food and Beverage production factories develop organisational change toward sustainable Food Waste Management?

The results of this study show that changing norms with environmental concerns can influence other factors, such as laws and stakeholder expectations. At the same time, from a business perspective, having sustainable Food Waste Management can assist in competitive advantage (Teng & Wu 2018), business expansion and support company representation. Therefore, from the external pressure and business benefits mentioned above, the food and beverage organizations need to develop their changes.

The process of organisational change starts with the leaders educating themselves about new regulations and trends relevant to their business types. Then, in some circumstances, change is required because of the failures that need new solutions, and organizations are doing things right.
From a leader’s individual perspective, the process led to learning from an organisational perspective, which can be seen in the loop of learning between managers and organization members. The relationship between leaders and members is through assigning new tasks, changing routines, and consistently performing changes, as explained in Chapter 4.2. Thus, their actions have shipped to doing the right things. This step can develop a new structure in operation. Finally, organisational change occurs.

Moreover, the leaders continue the thinking process by analysing the outcome of the current practice and thinking ahead to the next step. This matter made the organizations develop sustainability in their Food Waste Management context. Therefore, the authors of this study propose that the starting point of the change process in organizations is the leader’s individual learning perspective. Then, the process of change is explained in Chapter 4.2.2

Furthermore, the study shows the similarity between the result behind the changes and 2 objectives stated in the framework: solutions for challenges/failure and competitive advantage. Therefore, this study supports the Framework in Figure 6 from its empirical data. Moreover, the relationship between managers and organization members is critical in the organisational change process. In addition, during the analysis, the researchers found that how leaders integrated their power in communicating and educating correlates with organization members’ engagement.

5.3 RQ3. How does the thinking process in Loop of Learning can assist in the process of organizational change?

According to Argyris & Schon (1978), single-loop learning involves changing methods and improving efficiency to obtain established objectives: “doing things right”, while double-loop learning concerns changing the objectives themselves: “doing the right things” (cited as in Cartwright, 2002).

The result of the study has shown that the organizational change process must involve the method of continually thinking in the loop of learning from an individual and organisational perspective. The full process of changes is written in Chapter 4.2.2.

Argris and Schon (1978) state that a loop of learning is a learning process that detects and corrects errors. Furthermore, Ellstrom (2010) defined the loop of learning as a change in organisational practice (routine and procedure, structure, method, system, technology, etc.); those changes are mediated through individual learning and problem sorting. Thus, the researchers found that from the nature of loop learning is a process that individuals and organizations can use to identify and reclaim problems. This process assists organizations to realise the need for changes and continue developing solutions for those matters. The outcomes of continuous thinking will present changes in action, which reach organisational change. In addition, our empirical data on organisational change is similar to organizational change definition from Seravalli and Witmer (2021), which was stated earlier in Chapter 2.1. Furthermore, the conclusion of this study and the theoretical contribution will be presented in the next chapter.
6. Conclusion

This chapter presents the conclusion of this thesis. Then, report the contribution in theoretical and practical implications, and lastly, give suggestions for future research.

6.1 Research Conclusion

The study aims to analyse the characteristics of loop learning in assisting the organizational change process and explain how it can support sustainable change in Food Waste Management. Therefore, from the answer to the research questions in Chapter 5, the study has achieved its aim. The authors can state the conclusion of this study that a loop of learning represents the thinking characteristics used by leaders and organization members continually. The purpose is to analyse and evaluate the need for changes to solve or prevent problems. Furthermore, the continued thinking process from leaders developed better solutions and changes in the field of Food Waste Management in the food and beverage production companies that participated in this study. Therefore, from our results, the change process started from the managers’ awareness, which came from the leader’s individual learning through the process of thinking. Then, the learning went through each level of employees until it developed guidelines for future action. In addition, the future goal will be identified to lead the change in practices, structures and assumptions, which is identified as organizational change. This is how this study explains the relationship between the loop of learning and organizational change.

6.2 Theoretical and Practical Implications

Theoretical Implications

The theoretical contribution of this study is achieved by clarifying the characteristics of loop learning levels and how they facilitate the process of organizational change, aligning with the need for academic research. The study delves into understanding how to initiate change and transition processes that align with the reproduction of existing operations, structures, and organizational assumptions, as mentioned in Chapter 1.2: research problem (Seravalli & Witmer, 2021). Our study collected data from a group of individuals in management roles within their respective organizations. The findings suggest that an individual leader's perspective on learning serves as the starting point for change and can significantly influence the transition of change within the organization. Simultaneously, the process of operation and development continues to evolve in pursuit of new goals and strategies.

Moreover, our statement can specify what Senior (2002) mentioned in Chapter 2.1; it is important for organizational change processes that management terms require higher managerial skills. Therefore, we identify that a high loop of learning skills is essential for leaders to lead the organisational change process.

Furthermore, our findings can contribute to the missing concept of triple-loop learning in Kwon and Nicolaides (2017) framework in Chapter 2.2.3. We added Transitioning and Holistic thinking in the framework because the leaders with triple-loop thinking skills clearly showed the level of their thinking as a whole: the whole supply chain and the whole
stakeholder's network. Furthermore, they investigated the possibility of transition from the relationship between their organizations and those concerned with their operations.

In addition, the holistic thinking definition given by Monga and John (2006) involves an orientation to the context or field as a whole, including attention to relationships between a focal object and the field. Thus, the result of this study contributes that the stories of triple-loop learning level managers represent Holistic thinking and transitioning in the organization. Therefore, the researchers develop the complete paradigm ship in the loop of learning, as shown in Figure 10

Figure 9: Paradigm shifts of Single-loop to Triple-loop learning  
Note. (A) Single-loop learning, (B) double-loop learning, and (C) triple-loop learning  
Source: Berne, T. (author) adapted from Kwon and Nicolaides (2017)

The Relationship with Theoretical Framework

Our findings deepen the current understanding of organisational change and organisation learning in the loop of learning methods. The relationship between this study’s results and the theoretical Framework in Figure 6 from Chapter 2.3 is explained below.

The important roles, such as leaders and organisational members, are mentioned repeatedly in the study and have shown their impact on the organisational change process. Therefore, those roles are presented in the Framework. Furthermore, organisational learning is used to support the process of organizational change in this study, which can be seen from 3 different levels: single, double and triple-loop learning in the Framework. The organizations in this study continue learning and doing changes in actions, which benefit their organizational change, operation and competitive advantage, which can be seen as outcomes in the Framework. Therefore, the Framework in Figure 6: The relationship between the process of organizational change and the loop of learning, was tested and verified by this research.

Practical Implications

From a practical perspective, the results have presented how to integrate organizational learning: a loop of learning into the process of organisational change. The study describes the different levels of loop learning thinking and their outcomes toward the changes in action. For example, the factories in the food and beverage production industry can use the findings in this study to start the process of change toward sustainable Food Waste Management. At the same time, they can stay current on the changes in food waste methods to increase their effectiveness in this area. Suppose more food manufacturers in Thailand can increase
efficiency in managing their waste. In that case, the challenges in Thailand’s SDG 12 will be improved and positively impact the other SDGs. Moreover, organizations in different industries can adopt and use organisational learning, a loop of learning methods in the process of change to accomplish existing and future objectives and goals.

6.3 Further Research

The statement mentioned at the end of Chapter 5.2 about how leaders integrate their power over organization members to receive high engagement needs to be clarified. Therefore, it is necessary to understand better the types of power suitable for the organisational change process and how those powers can result in employee engagement. The change in the organization can be seen in various forms. However, strategy change seems to have a critical impact on organisational change and needs to have high engagement from organization members. Moreover, to develop a new strategy, the leaders must go through the process of thinking and evaluating repeatedly.

Therefore, we suggest that future research add power as one of the critical factors in the change process in the organization and study further how those powers can support achieving the strategy. In addition, it would support academic study in management and organization if those powers can be identified in their distinctive and their outcomes.

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Appendices


Introducing questions
The interviewer will introduce herself and make the interviewee feel relaxed.
1) Can you please introduce your position, operation type and size?
2) Can you share with us the current Food Waste Management method?

Follow-up questions
Regarding the previous answer, the interviewer will use follow-up questions to determine if there are any changing processes in their food waste management.

Probing question
1) Can you clarify if your current food waste management method only aligns with the law and F&B factory standards, or does your company think feather to the next step? In other words, your company want to do better. (Loop of learning theory)
2) If there is any change, please explain in detail the process of changes (Organisational change theory)
3) Can you give the reason for those changes from your perspective?

Specifying questions
1) Can you share your company's approach, and what do you think about developing sustainable Food Waste Management? (Loop of learning theory)
2) Have you been in any decision-making about some changes in your Food Waste Management company? (Organisational change theory)
3) Can you identify factors that influence those changes in your company? (Organisational change theory)

Direct question
1) How does your factory develop change toward sustainable FWM, and why?

Indirect questions
1) In your own opinion, Do you think what will happen next in your company’s Food Waste management?
Interviewer: Thank you for joining me today first I’ll explain to you this is a part of our thesis paper, and the topic is the process of organizational change in FWM in the food and beverage production industry in Thailand from the lens of loop learning, so I'll not go deeper into the process but I would like to hear the perspective from your organization toward the FWM that is the theme and we don't expect you to say the inside company name or your name but however we would like to know the size of your factory is it a big one, medium, or small? We are more like hearing the perspective of your organization's learning process.

Participant 4: Thank you! For your partition my name Kanitha Saowarot. I work for Thai sugar internal company. Thai Sugar internal company is a company in the Thai Sugar group, and my position is the quality manager.

Interviewer: Would you say ist a big, small, or medium factory?

Participant 4: I think medium factory. We use the byproduct from the sugarcane process. The plant capacity is about 200kl/per day

Interviewer: I will go to the questions. Because you use the byproduct from sugar producing so you must have a lot of waste from the sugarcane that is already pressed so how will you deal with that?

Participant 4: We use molasses from sugarcane, the molasses from sugarcane is waste from a sugar factory that call a byproduct is better. A byproduct from a sugar factory.

Interviewer: How do you manage that?, what is your solution for that waste?

Participant 4: Molasses is liquid but we transport that from our sugar factory in our group and transport by truck transportation and use molasses to be the material in our factory.

Interviewer: from what I heard is more like you have a lot of factories in a contract so you not pressing the sugarcane by yourself but from some other company through your supply chain to your factory. Is that correct?

Participant 4: Yes, is from a sugar factory.

Interviewer: The molasses is already the waste from the sugar factory is that correct? So actually you use the waste from the other production to be your raw material?

Participant 4: Can I call it a byproduct? By-product from sugar process.

Interviewer: and is this an umbrella company? Which means is owned by the same owner. Because of your supply chain?

Participant 4: Yes.

Interviewer: That's very nice. Very clever! What is about the waste water?

Participant 4: Waste from internal production right?

Interviewer: water or something that you need to treat before you let it out?
Participant 4: we mixed molasses with water and some composition that enhanced the fragmentation process and send the fragmentation mash to distillation for distillate the internal to put it by the internal to get more quality of the internal.

Interviewer: Ok

Participant 4: The waste is liquid base, it contains some sugar compositions from molasses.

Interviewer: How do you deal with it because it's liquid? You release in the nature or it comes back into the production?

Participant 4: We can not use it again because this liqude has been washed from the process and has very brown colour. It will plenmented by bacteria.

Interviewer: Where the waters go? Because you said 200.000KL/ per day which mean it must be a new water coming our everyday and the water needs to go somewhere right? Where is the water is going?

Participant 4: Yeah the quantity of the waster in wash is about a 2000KL/ per day.

Interviewer: Where is the water go?

Participant 4: It's a lot of waste. First we collect it in and transport it to our biogas plant.

Interviewer: Are you selling this liquid?

Participant 4: No not selling.

Interviewer: Its just the method of waste management that you use?

Participant 4: Oh yeah.

Interviewer: So you paying them to treat your waste?

Participant 4: Not paying, i’m not paying because the biogas plan is in the company or that company is in ower group too.

Interviewer: Okey, it sounds like circular economy business?

Participant 4: Yeah yes its is. From sugar factory a the weste from sugar factory going our internal plan and the waste fro our internal plan goes to the biogas plan.

Interviewer: It's very good.

Participant 4: For biogas fragmentation to produce biogas to use in the genneratore to predusce electricity and we sell them to government.

Interviewer: So its not just use within the organazation but you have enugh to sell it to other source to is that correct?

Participant 4: yeah.

Interviewer: Can we say that the whole group is Zero waste?

Participant 4: Yeah! that is the objective of ower group.
Interviewer: Is reuse resources can bring more money? Or you feel like you want to have responsibility for the environment somehow by reusing the waste? Until it became a small amount of waste left or it even go to Zero waste? What is the reason behind the goal of zero waste? From your own perspective?

Participant 4: First, we have the company that using Circular economy, we can use anything in our process to produces more benefit and second, we need to eliminate over waste to more benefit to decrease or minimize the waste.

Interviewer: Do you feel like you do this because the norms are changed and you know people care more about the environment or you feel like it is the company’s priority?

Participant 4: The impact of a green economy or environment from the communities is having pressure to over business

Interviewer: Do you follow the environmental standards ex. ISO 14001. Do you have any environmental standards?

Participant 4: Yes, my company is certified in ISO 14001.

Interviewer: That's very nice! how long you’ve been working in this organization?

Participant 4: it's around 16 years.

Interviewer: That is really long, so can you give me an example of the organizational change within the process? Or Organizational change that your company moving forward to have like sustainable food waste management or waste management? Have you changed something no matter of its big or small change? Just you know some story so we can understand!

Participant 4: The new target of our new vision or even goal is the BCG economy. that is our big big target of my group.

Interviewer: What is BCG economy?

Participant 4: bioeconomy, circular economy, and green economy.

Interviewer: This is the first time I have hear lof it. We know about the circular economy but this is bioeconomy which makes sense. Is it like using everything that you can reuse?

Participant 4: Yeah, and sustainable products, that is the new vision of my company.

Interviewer: How long its been since you integrate a sustainable mission into the company?

Participant 4: Yeah we just started this year!

Interviewer: That is a good start! And what about another thing like the packaging? Are you using a plastics or do you sell them later?

Participant 4: No. I don't have any packaging but I fill it in the tracks to transportation.

Interviewer: Alright is it only a wholesale from the factory to another factory?

Participant 4: Yes, yes sugar factories
Interviewer: What we like to know is the strategy that already brings the difference in practice in terms of change! Do you have any examples that you would like to share with us to explain?

Participant 4: The business development department they have a mission to use everything such as waste or gas/any waste in our processes to make something different like decreasing the waste.

Interviewer: I got it, it shows in your production line that you generate a small amount of waste because of the strategy aim to reduce their waste. Do you find a solution for the existing waste or are you planning for the future waste? In terms of minimizing future risk before it happened? Do you have any strategy for that?

Participant 4: In our team, we have a mission of reuse, reduce, and recycle our waste to decrease the level of the waste in our process.

Interviewer: So you basically user the 3R recycle, reduce and reuse. That's very good.

Participant 4: In Thailand, we control by the government to manage the waste.

Interviewer: if you have ISO 14001, you must have control in your production at each level anyway.

Participant 4: Of all our products life cycle.

Interviewer: May I ask if you have any problem with the stakeholders or any individuals who leave around the factory? Is your factory close to the communities where the residential community or it’s farther from where people leave?

Participant 4: Nearby community.

Interviewer: Have you ever experienced that the stakeholders are not happy about maybe your waste?

Participant 4: No because, we transport the water for 60 km to eliminate it. Therefore, we don't have any problem with local people.

Interviewer: That's very nice. If you need to identify the factors that influence those changes in your company? What will you say? why you taking care of your waste so well you have the aim of zero waste and you have done everything so right! What is the drive for your organization?

Participant 4: First, we have a plan to register as public company in the stock market, we need to create a company image. And the second reason we have a target to build sustainable Organization for the people and the stakeholders.

Interviewer: Because you have a lot of sub-businesses that can help each other. Do you think that maybe the headquarter or owner already planned everything. I mean it’s a very smart business but is it planned this way? Do you think or its just happed from the situations: step by step process?

Participant 4: I think is both planned and step by step. We have a big target ahead of us.
Interviewer: Okay, that makes sense. And do you think that the resources in your company are one of the strong factors that made a big organization successful in terms of waste management? The resources can be financial resources that you have is enough to invest in a new business or you have a good teamwork?

Participant 4: First the management policy for this and yeah i think is the management policy.

Interviewer: This is the last question it's been really good, I got very good information. So in your own opinion, what do you think will happened next in your company in the area of FWM, do you think it will even develop further? Or you have a new ideas coming up for the future?

Participant 4: Future plan for business?

Interviewer: yeah future plan in the area of sustainable development?

Participant 4: The objectives of the company is a called ESG environment, social, and governance.I hope we go to ESG in the future.

Interviewer: Thank you so much for your time.

Note* All transcripts are available upon request. The interview transcript is in addition to a copy of the interview guide/questions.