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Tomsk State University
Institute of Economics and Management

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_____ Prof. M.S. Kaz, D.Sc.
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MASTER'S THESIS

CONTROLLING FOOD SAFETY MANAGEMENT SYSTEM OF ENTERPRISES

on the basis of the educational program for preparing master's students
38.04.02 Management
Viphada THAMMAVONGSA

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Tomsk 2017

MINISTRY OF EDUCATION AND SCIENCE OF THE RUSSIAN FEDERATION
NATIONAL RESEARCH
TOMSK STATE UNIVERSITY

Institute of Economics and Management

CLAIM
MPE leader
Dr. of Economics, Professor
_____M.S. Kaz

«15» November 2016

ASSIGNMENT

for the preparation ofMaster'sthesis

student Viphada THAMMAVONGSA

1. The topic of Master's thesis is to study
Controlling Food Safety Management System of Enterprise

2. The deadline for the student to submit a master's thesis to the dean's office:
15th June, 2017

3. Initial data for work
The purpose of the study is to determine the controlling food safety management system of enterprise.
The objectives of the study are:
1. How do enterprises control quality management system : ISO 9001: 2000?
2. How do enterprises control food quality management system based on Hazard Analysis & Critical Control Points (HACCP), and Good Manufacturing Practices (GMP)?
3. How do enterprises control quality standard as Global Food Safety Initiative (GFSI), International Food Standard (IFS), and International Organization for Standardization – ISO 22000?
Methodology:
1. Selection of the topic
2. Source of Data
3. Collection of Data
4. Analysis and Presentation of Data
5. Findings of the study
6. Final thesis preparation

4. Summary of the Master's thesis
1. The Concept of Food Safety
2. Global Food Safety Initiative (GFSI). International Food Standard (IFS). Hazard Analysis & Critical Control Points (HACCP). Good Manufacturing Practices (GMP).
3. Controlling Management. The Controlling Food Safety Management System within a Food Business.
4. Attitudes, Knowledge and Behavior of Russian and Lao Consumers toward Food Safety Consumer Behavior.

5. The name of the organization for which the assignment has been done
Food Business

6. The date of the assignment issue's is 15th November, 2016

The head of the Master's thesis

Associate professor		N.A. Redchikova
Position	*signature*	*initials, surname*

The assignment accepted for execution 14 November 2016
date, student's signature

ABSTRACT

About 2.2 million people die every year from food poisoning, diarrhea and foodborne diseases by consuming contaminated food and water. The purpose of this research is to study the controlling food safety management system of enterprises such as Coca-Cola Company, Nestlé Company and Unilever Company, and to determine the attitudes, knowledge and behavior of Russian and Lao consumers toward food safety. The research consisted of qualitative and quantitative investigations. The qualitative investigations are document analysis and interpretation of data, conceptual and theoretical work, writing up findings and conclusions. And the quantitative investigations undertaken in Laos and Russia by online survey asking about the attitudes, knowledge and behavior of consumers toward food safety among n = 146 people. Our results suggest that many enterprises recently improve their food safety management system in order to protect consumers altogether with the opportunity in getting into the high class market or international market. The increasing of foodborne illness is a drive for consumer to raise their awareness to the food safety issues. The presence of International Food Standard, the best practices and the trustworthiness of foreign certification, namely International Food Standard (IFS), Food Safety Management System (Good Practices & HACCP Requirements), BRC Food Certificated, Safe Quality Food (SQF) 2000, International Organization for Standardization (ISO 9001: 2000, ISO 22000:2005), European Eco-label, ISO 1400-Environmental Management Systems and ISO 24000-Social Responsibility are recognized as a safety guarantee for consumers. Our result further revealed that education, income and family status affected the attitude of consumers. Government should play important role in providing food safety agencies and encouraging these agencies to contribute the education of food safety. And the reinforcement should be introduced on the campus food safety campaigns as posters, advertising aids in the field of food safety on a daily basis. The attitude of consumers toward food safety depends on family status. And high income respondents tend to hold positive attitudes toward food safety. This study is the first to carry out an investigation of Russian and Lao consumers' attitudes, knowledge and behavior toward food safety.

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NTRODUCTION

At the present, the evolution of the economic environment is greatly expanded, mostly in term of using high technology to manufacturing and farming. Since the previous time, economic activity was oriented toward the manufactured product and the industrial revolution. Rural way of life began to disappear, methods of farming were improved, and machines are doing the work that people used to do. Thus, the current economy is characterized by the globalization activities and enterprises, the transmission of information, the constant evolution of technology, and the intense competition between companies that modify so radically the activity in many sectors. People worked hard to adjust in the uncertain global economic environment. People have not much time to take care of themselves, for example consuming food from markets, farmers and groceries instead of producing it for themselves. Consequently, the demand for food products were growing and the supply were surplus. The present of high competition from the opening of national markets provokes many companies to protect themselves from bankruptcy. Food supply seemly to be a big business or a manufacturer and began to develop ways to process the food and deliver it to the store. Modern technologies were used to boost up the number of food production and to preserve food for a long period in order to fulfill the need of world population. Hence, many manufacturing company worked so hard to compete with each other in order to achieve their goal as increasing profit, getting reputation, market share in the business world. However, the action of these companies created impact to people, especially the consumer, shareholder (suppliers, small businesses, farmers), and workforce. Humanity was replaced by egotism. Some companies tried to lower their cost, some concentrated only on profits and increasing production by using artificial chemical and toxic substance. The consequences of these activities bring new dilemma to human which are diseases. Unclean or unsafe Food which contaminates with toxins and chemicals causes more than 200 diseases - hypertension, diabetes, heart disease, kidney disease… About 2.2 million people die every year from food poisoning, diarrhea and foodborne diseases by consuming contaminated food and water [1]. Even there were standards or regulations for either processing or selling food, some food companies or businesses appear to ignore those regulations regarding to lower their cost and increase their production.

Because of the increase in large food manufacturing companies, businesses, and due to the increase of supervisory positions, business and industry have drawn attention to the need for proficiency in management skills. Improved abilities in the management area have been considered to allow for maximum efficiency in the production of goods and services and to increase profits.

However, several quality management systems were applied in the food industry. The most common used are Global Food Safety Initiative (GFSI), International Food Standard (IFS), Safe Quality Food (SQF) 2000 and International Organization for Standardization - ISO 22000 [2]. And currently, those quality management systems are used in the wrong approach. Consequently, the role of controlling takes place to check mistakes, to measure the actual performance in the process of defining standard, and to judge the accuracy of standards. There are some companies which are successfully in using quality management systems in the right approach. For example Nestlé, a global leader company in nutrition, health and wellness which helps improving the lives of millions people through products and services and job opportunities. Quality and Safety for Nestlé's consumers is their top priority. Nestle is best positioned to guarantee food safety and compliance with quality standards. Being a global leader provides not only a duty to operate and develop attentively, however also brings an opportunity to deliver long-term positive value for shareholder and society, so-called "Creating Shared Value", which includes 3 areas**.** One of them is nutrition which provides nutritious products what deliver real health benefits, affordable and accessible to consumers. This area includes 15 aims: (1) to build knowledge leadership in children's nutrition, (2) to lead the industry in nutrition and health research through collaboration, (3) to provide nutritionally sound products designed for children, (4) to help reduce the risk of under nutrition through micronutrient fortification, (5) to reduce sodium (salt) in our products, (6) to reduce sugars in our products, (7) to reduce saturated fats and remove trans-fats in our products, (8) to encourage consumption of whole grains and vegetables, (9) to deliver nutrition information and advice on all our labels, (10) to provide Portion Guidance for consumers, (11) to promote healthy diets and lifestyles, including physical activity, (12) to promote healthy hydration as part of a healthy lifestyle, (13) to provide education programmes for good nutrition and feeding practices, (14) to ensure responsible marketing communication to children, and (15) to market breast-milk substitutes responsibly [3]. Another company is Unilever, one of the biggest food manufacturer companies in the world. The company works with others organizations through partnerships that have the same potential to change thing with concentrating in food safety. The company has set tough targets under the principles of aiming to improve health and wellbeing, reducing environmental impact and enhancing livelihoods. Company has set seven areas to focus on which the second area aiming to improve the taste and nutritional quality of all products, to double the proportion of the product portfolio that meets the highest nutritional standards based on globally recognized dietary guidelines. In 2003, the company has launched the Nutrition Enhancement Programme to improve quality of foods. Over 30,000 products have been screened for level of salt, sugar, saturated fat and trans-fat. Moreover, Unilever also

had their own nutrition policy which has continuous efforts to: (1) Develop a deep understanding of consumers' nutrition and health needs and wants, (2) Know the nutritional composition and dietary role of our products and label our products in a consumer - friendly and meaningful way, (3) Optimize the nutritional composition of our products to meet consumer needs and wants, (4) Undertake and support scientific research to provide evidence for benefit claims for our products, (5) Ensure responsible communication about product benefits to health care professionals and consumers, (6) Seek external partnerships to develop mutual understanding and agree common approaches in nutrition and health programme [4].

Controlling is an important function of management process. Many food manufacturing companies were using food quality management systems in their production. However, there have been very few companies used those systems concerning the controlling food safety management .The problem was to determine the use of food quality management systems and the how enterprise control food safety management system of enterprise.

The primary objective of the study was to determine the controlling food safety management system of enterprise. Specific objectives were to study:

1) How enterprises control quality management system?
2) How enterprises control food quality management system based on Hazard Analysis & Critical Control Points (HACCP), and Good Manufacturing Practices (GMP)?
3) How enterprises control quality standard as Global Food Safety Initiative (GFSI), International Food Standard (IFS), and International Organization for Standardization – ISO 22000?

1. The Concept of Food Safety

Food safety relates to the quality of food during production, distribution, and consumption activities which guarantee the adulterated things in food. Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer. According to medical encyclopedia, food safety refers to the condition and practices that preserve the quality of food to prevent contamination and foodborne illnesses. Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness**.**

Basically (Kidshealth), food safety means knowing how to avoid the growing of bacteria and the contamination when buying, preparing, and storing food to prevent foodborne illness. Food safety is an crucial public health issue for all countries [5].

Food can be unsafe because of the way it is produced at the food production and processing, storage, transportation, marketing and consumption (Australia New Zealand Food Authority 2001) [6].

The liberal use of chemicals and toxins widens greatly and exceeds over the legal limit in production, inventory and distribution, and food processing which cause the sickness, and so-called foodborne disease. Foodborne illness or foodborne disease or food poisoning is any illness that results from consuming food contaminated with a toxic nature or infectious microorganisms such as pathogens, bio-toxins, and chemical contaminants in food. These microorganisms can produce disease to the health of thousands of millions of people which causes serious harm or even death. Serious outbreaks of foodborne disease have been documented on every continent in the past decades, illustrating both the public health and social significance of these diseases.

World Health Organization (WTO) defines foodborne illness as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food and every person is at risk of foodborne illness. In addition, WTO expressed that foodborne diseases are cause of morbidity and mortality, and impediment to socioeconomic development worldwide, and the full extent, burden of unsafe food, and burden arising from chemical and parasitic contaminants, has been unknown. Foodborne illness is a problem in both developing and developed countries. It is a strain on health care system which severely affects infants, young children, elderly and the patience [7].

Foodborne creates a vicious cycle of diarrhea, nausea and malnutrition which are the most common to kidney and liver failure, brain and neural disorders, and result to death. Likewise, it is a significant public health problem with major economic and social effects (Altekruse and Swerdlow 1996) [8].

In developing countries, foodborne diseases are likely to affect the growth of population mainly the infants and children. In addition, the chronic of foodborne illness creates an enormous expense in medical costs, national government costs to resist the disease. In the United States, according to the Economic Research Service, US Department of Agriculture estimated that a cost of between U.S. $5.6 billion to $9.4 billion in lost work and medical expenses resulted from seven foodborne pathogens [9].

In the European Union, the consequence of Salmonella infections caused approximately EUR €3 billion annually in Health Care System [10].

In Australia, about AU $2.6 billion per annual was estimated by Australia New Zealand Food Authority resulted from 11,500 daily cases of food poisoning around Australia and New Zealand. In the United Kingdom, approximately £45,000 was paid per case for care and treatment of people with the Mad Cow Disease (MCD), and £220,000 was paid to each family as part of the government's no-fault compensation scheme [11].

Toxic substances that are intentionally or unintentionally added in food can cause serious public health impacts in many countries. There are a lot of incidents that occurred worldwide because of the contamination of toxic substances. In the United States, the Centers for Disease Control and Prevention (CDC) estimated that foodborne diseases cause approximately 76 million illnesses annually, 325,000 hospitalizations, and 5,000 deaths [12].

In the USA, food safety awareness has been raised in 1883 by Harvey W. Wiley, M.D, chief chemist at United State Department of Agriculture (USDA) with seven objectives: 1) Collecting, arranging, and publishing statistical and other useful agricultural information; 2) Introducing valuable plants and animals; 3) Answering inquiries of farmers regarding agriculture; 4) Testing agricultural implements; 5) Conducting chemical analyses of soils, grains, fruits, plants, vegetables, and manures; 6) Establishing a professorship of botany and entomology; and 7) Establishing an agricultural library and museum [13]. These objectives were similar to the charges given the Department by the Congress in its legislation establishing the new agency. USDA is made up of 29 agencies and offices for example Animal and Plant Health Inspection Service (APHIS) which provides leadership in ensuring the health and care of animals and plants, Food Safety and Inspection Service (FSIS) that enhances public health and well-being by protecting the public from foodborne illness and ensuring that the nation's meat, poultry and egg products are safe, wholesome, and correctly packaged [14]. The main agencies involved at the federal level include the Food and Drug Administration (FDA) and the Food Safety Inspection Service (FSIS) of the United States Department of Agriculture (USDA). In the US, Each state has its own agencies and regulations related to food safety which each differ in their organization

and complexity. However, there are certain state agencies undertake inspections, under contract on behalf of the Food and Drug Administration (FDA). By Food Safety and Inspection Service announced that foodborne is a preventable public health challenge that causes an estimated 48 million illnesses and 3,000 deaths each year in the United States [15]. Those at greatest risk are infants, young children, pregnant women and their unborn babies, older adults and people with weakened immune systems (The History of Food Poisoning in the United States). For example in the USA in 1911 and 1922, over 2400 people got ill and 70 people died because of bacteria contaminated in raw milk. The deadliest outbreak in the U.S history occurred in 1924-1925, was illness from the harvested oysters in the sewer, 1,500 people fell ill, and 150 died [16].

In Europe, the first food hygiene rules were introduced in 1964. Since then, they have evolved into pro-active, coherent and comprehensive tools to protect human, animal and plant health as well as the environment. They also help to ensure that trade in food and feed happens smoothly. The deadliest incident in History was Mad Cow Disease (MCD, so called Bovine Spongiform Encephalopathy, started with the death of a cow on a farm in England during the early 1985. Mad Cow Disease is one of the most disgraceful cases of food poisoning throughout history. MCD have killed approximately 179,000 cattles in the UK, with a precaution about 4.4 million cattle [17]. Because of the widely spread of Bovine spongiform encephalopathy (BSE) in the UK and at least 28 countries in Europe since late 1980s to early 1990s, the European Commission has launched a public consultation on food law in 1996 that aimed to examine the effectiveness of EU food legislation from three angles: 1) the provision of a high level of protection and safety; 2) the functioning of the internal market; 3) and the provision of a simple and rational legal framework within which industry and trade could operate [18]. Then in 1997, the EU Novel Food Regulation (EC) 258/971 was introduced to protect public health with the primary purpose of introducing a rigorous food safety assessment into the regime controlling the introduction of Genetically Modified plants and their derivatives into the European market [19]. The European Commission aims to assure a high level of food safety and animal & plant health through coherent farm-to-table measures and adequate monitoring, while ensuring an effective internal market. The European Food Safety Authority (EFSA) was set up in 2002 to be enforced by the Member States, focusing on risk assessment and scientific advice in the field of food safety questions. For example some of the key elements: the responsibility of producers for safe food and the task of the Government to check that this responsibility is adequately met [20]. During 1996-2014, there are 12 countries that have been identified infection cases into human such as United Kingdom, France,

Ireland, United-States, Spain, The Netherlands, Portugal, Canada, Italy, Japan, Saudi Arabia, Taiwan. Recently, EU citizens benefit from some of the highest food safety standard in the world [21].

About 700,000 people die of foodborne and waterborne every year in the Asia-Pacific region (WHO 2004). In Bangladesh, 1,657,381 cases and 2,064 deaths from food contamination reported in 1998; in the Republic of Korea, 7,909 food poisoning cases reported in 2003; and in Thailand, about 120,000 food poisoning cases reported annually (FAO 2004). In China in 2008, nearly 300,000 infants sickened by tainted milk formula (Fred and Buzby 2009). In India, there are about 8,000 to 10,000 of food safety related cases annually and above 1,000 fatalities due to Food contamination with pesticide residues such as DDT, 2,2-bis(p-chlorophenyl)-1,1,1-trichloroethane (Battu, Singh and Kang 2004; Bhushan 2006) [22]. The Southeast Asia region, 20.1% distribution of Diarrhea diseases causes deaths among children less than five years after consuming contaminated food and water [Figure1]. In Philippine in 2015, almost 2000 people were the victims of fruit-flavored candies Wendy's Durian Candy. After investigating, this type of candy was not registered with the Food and Drug Administration of Philippine [23]. In Vietnam, the early 2016, about 650 people were affected by food poisoning in garment factory after having lunch at the factory canteen. According to Administration for Food Safety and Hygiene, 68% of cases occurred at publics canteen in industries zones is the carelessness during production and processing with ensuring food hygiene and safety before serving [24].

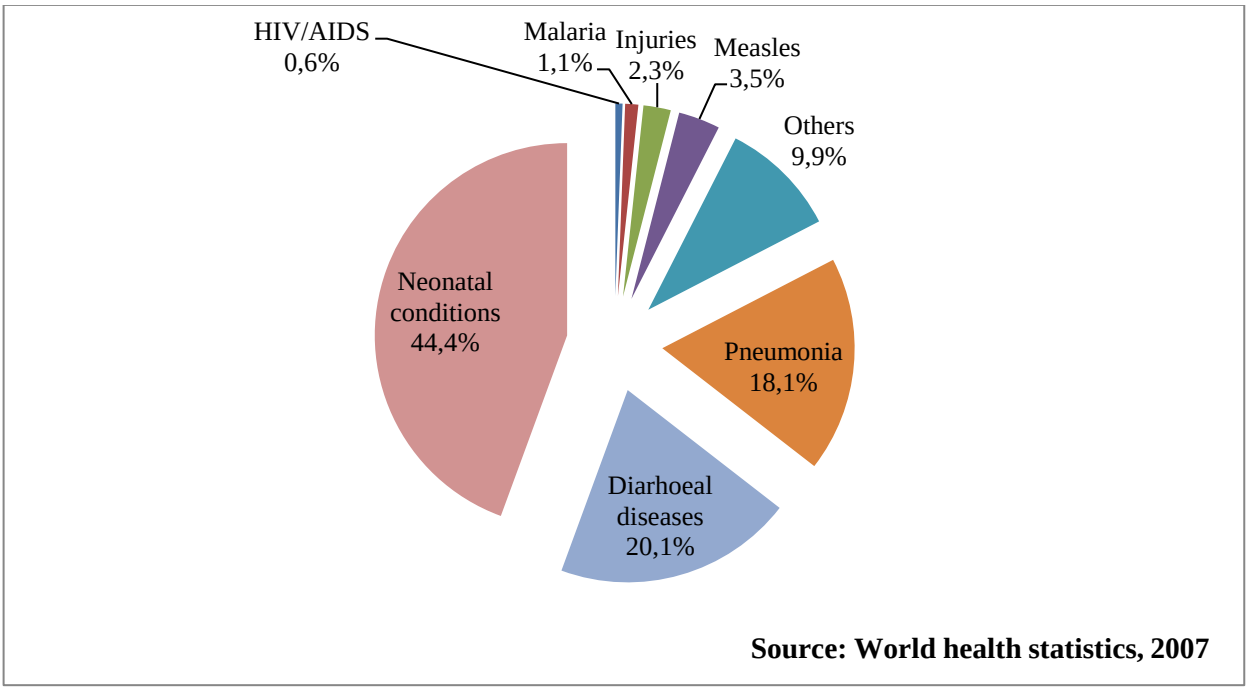


Figure 1 - Percentage distribution of causes of death among children less than five year in Southeast Asia

In Africa, diarrhea disease accounts for 18% of children less than five year deaths which are the highest segment among diseases [Figure2]. Unsafe food is lead to the deaths of an estimated 2 million people annually in the African Region. African countries reported that 3,221,050 suspected cholera cases to the World Health Organization, representing 46% of all cases reported globally between 1970 and 2011 [25].

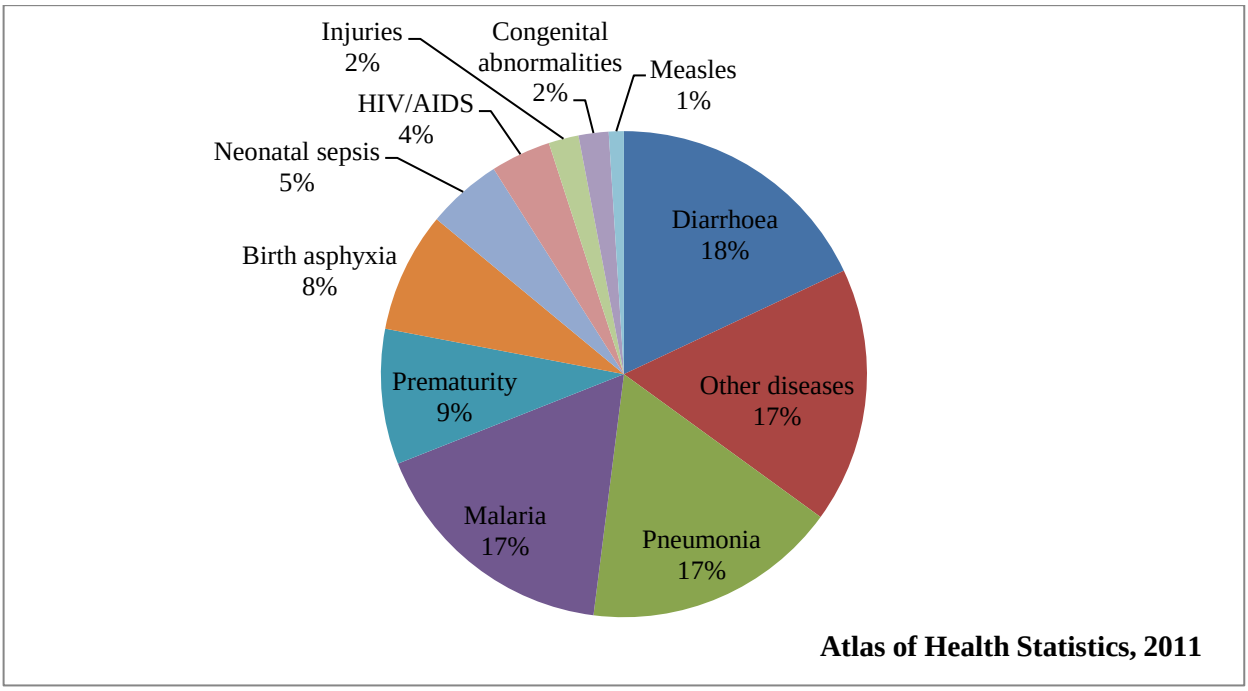
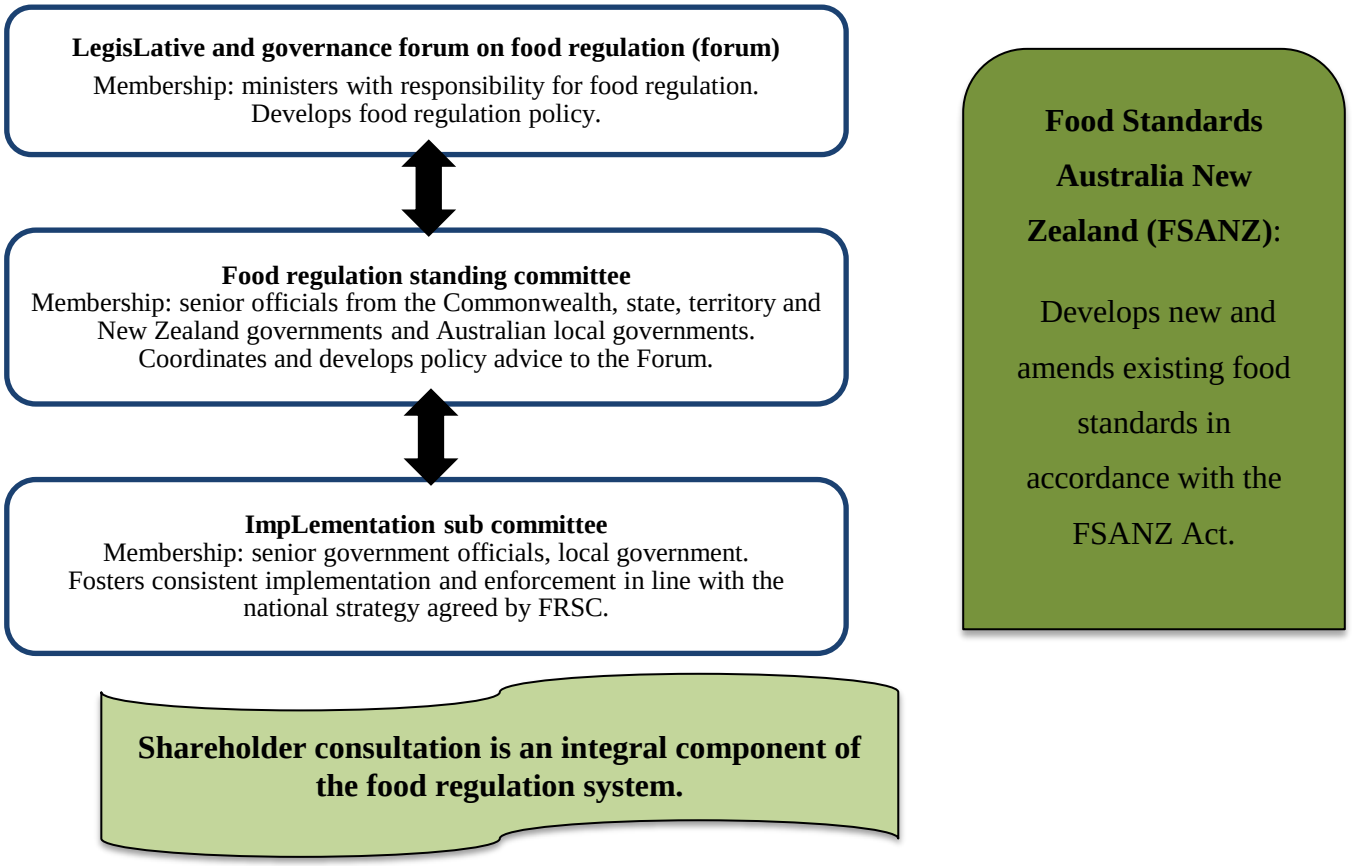


Figure 2 - Distribution of causes of death among children aged less than 5 years, 2008

And in 2014, more than 100,000 cases of cholera found in 22 countries resulting in over 1700 deaths. In Australia, food regulation was initially enacted to protect customers from unsafe food practices during the period of the admittance the Adulteration of Bread Act by colony of New South Wales in 1838. However, the regulation had not succeeded for more than 80 years [26]. In August 19, 1991, the National Food Authority Act was established to develop and review standards for food available in Australia as Australia's food regulatory body. The Legislative and Governance Forum on Food Regulation is a ministerial-level committee that sets the policy framework for the development of food standards. Food Standards Australia New Zealand (FSANZ) develops standards that have regard to this policy framework in consultation with other government agencies and with input from stakeholders to form a model food Act [Figure3].



Source: Australian Government Department of Health and Ageing 2012.

Figure 3- The food regulation system in Australia and New Zealand

Victoria region has been a leader in food safety regulation over nearly 150 years [Table 1]. The first food safety regulation called Victorian public health administration system, was enacted in 1854 (the Health Act 1854) by the Colony of Victoria. The objective of the Health Act 1854 is to ensure food consumed or produced safe consumption [27]. Moreover, the State of Victoria passed the Victorian Pure Food Act in 1905, the first overall Food Act developed in Australia. However, even Australia has a very strict food safety regulation; there still had food-poisoning incidents occurring in both Australia and New Zealand. For example in 2014, nearly 500 people fell ill because of consuming soy milk product contaminated with high level of iodine.

Table 1 - History of Food Regulation in Victoria

1854	Victorian public health administration system established by the Health Act 1854.
1863	Colony of Victoria passed Australia's first food Act – Act to Prevent the Adulteration of Articles of Food and Drink.
1901	Under the new Constitution at Federation food matters become a matter for state and territory legislation.
1905	The State of Victoria passed the Pure Food Act – the first overall Food Act developed in Australia.

1908	Prime Minister Alfred Deakin promised uniform food standards.
1914	Five Australian states had passed pure food legislation between 1905 and 1910. The Premiers' Conference proposed adoption of a set of food regulations by all states.
1950s–1980	From the 1950s, the states and territories supported the development of national uniform food legislation. The Commonwealth Model Food Act was agreed in 1980.
1984	This led to the Victorian Food Act 1984 which consolidated and amended laws relating to the preparation and sale of food, labeling, hygiene requirements and regulation, administration and enforcement of food laws.
1986–1996	National food and hygiene standards were established reinforcing the importance of food safety, including the Australian Food Standards Code 1986, Hazard Analysis Critical Control Points (HACCP) 1994 and national food hygiene standards in 1996.
1996–97	Serious food-borne illness outbreaks in Victoria led to the 1997 Victorian food hygiene strategy: a fresh approach. The Food (Amendment) Act 1997 followed to address food industry concerns about regulatory costs and a desire for greater flexibility. The amended Act required many food business owners to develop food safety programs for the state's 40,000 food premises. Victoria became the first Australian jurisdiction to apply the food safety risk management approach advocated by ANZFA.
2001	The Food Act 1984 was further amended to address both food industry concerns that the 1997 amendments were too onerous for small and medium size businesses, and local governments' concerns about their role in approving food safety programs. The amended Act continued the shift from more prescriptive regulation to a prevention and outcome-based approach.
2002	The Victorian Auditor General inquired into whether the food regulatory framework in Victoria efficiently and effectively minimized the risks of food-related illness. Recommendations included more consistent approaches to food safety management across the sector, improvements in councils' current operations and in the department's food recall practices, and greater emphasis on education to ensure that businesses were fully aware of their legislative responsibilities.
2007	The Victorian Competition and Efficiency Commission (VCEC) inquiry into food regulation in Victoria examined ways to simplify food regulation without compromising food safety, to clarify the roles of food industry participants, and to recommend best-practice enforcement approaches.
2009	The Victorian Parliament enacted major amendments to the Food Act 1984 to strengthen the governance and accountability of the food regulatory system and achieve greater consistency of approach. The amendments have been progressively implemented in three phases in July 2010, and March and July 2011.

Source: Department of the Parliamentary Library 2001, Food regulation in Australia: a chronology, no. 1 2001–02, Federal Government of Australia, Canberra.

2. Global Food Safety Initiative (GFSI)

Global Food Safety Initiative (GFSI) was launched at the CIES Annual Congress in May, 2000. CIES is the Food Business Forum managed by the association of the largest retailers worldwide. Global Food Safety Initiative represents continuous improvement in food safety management system to ensure confidence the delivery of safe food to finished consumers. The objectives of Global Food Safety Initiative are to converge between food safety standards through maintaining a benchmarking process for food safety management schemes, to improve cost efficiency in the entire food supply chain

through the common acceptance of GFSI recognized standards by retailers around the world, and to provide a unique international stakeholder platform for networking and the exchange of knowledge, information and the sharing of best food safety practices [28].

In September 2007, the Guidance Document 5th Edition of the GFSI was released. It represented food safety best practices upon criteria for food safety standards in the form of key element for food safety production, namely International Food Standard (IFS), Food Safety Management System (Good Manufacturing Practices & HACCP Requirements), BRC Food Certificated, Safe Quality Food (SQF) 2000, International Organization for Standardization (ISO 9001: 2000, ISO 22000:2005) [Figure 4] [29].

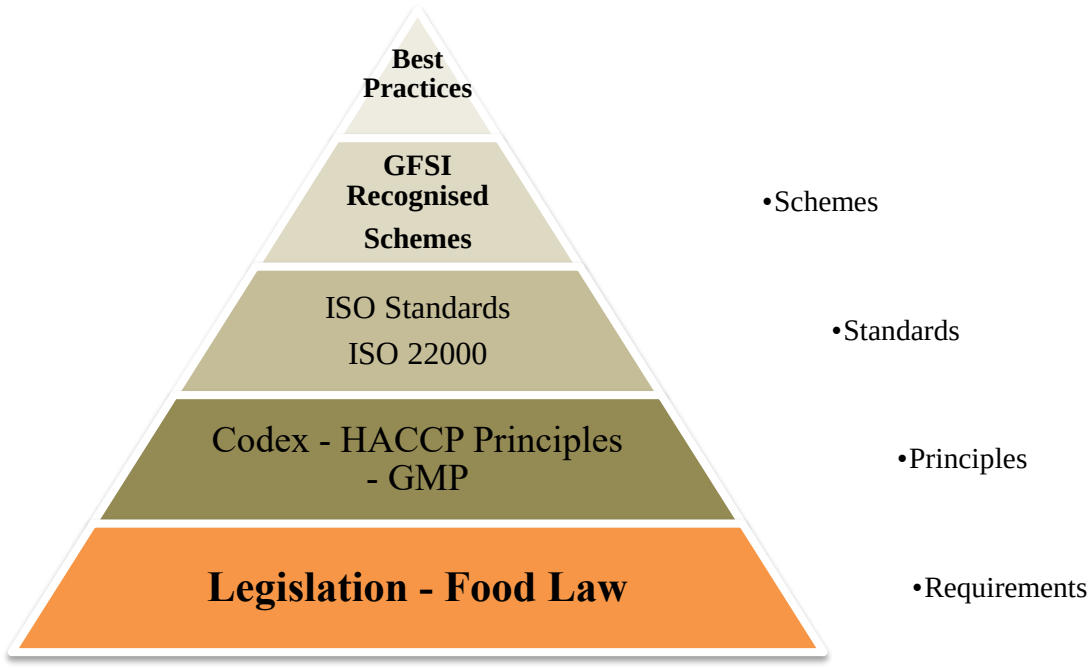


Figure 4 - Development of Schemes

2.1. International Food Standard (IFS)

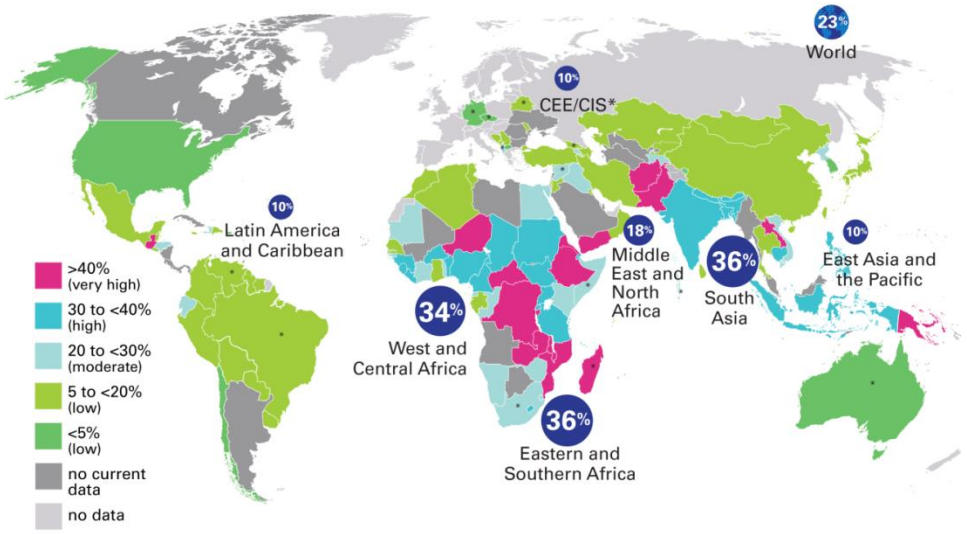
❖ Food and Agriculture Organization (FAO) and World Health Organization (WHO)

The FAO was founded in 1945 with the objectives to help eliminate hunger, food insecurity, and malnutrition, to make agriculture, forestry and fisheries more productive and sustainable, to reduce rural poverty, to enable inclusive and efficient agricultural and food systems, and to increase the resilience of livelihoods to threats and crises. These objectives are not only focusing on alleviating world hunger, but also on improving system of food safety and quality management. The organization

fulfills its role to promote food safety in a region where food insecurity, communicable diseases, political instability, nature disasters and other major concerns. FAO works with governmental authorities, with local industry through organization action plans of the global strategy to address the issues and problems identified for each objective. FAO has set up a Food and Nutrition Division that includes the Food Safety and Quality Service (ESNS) to maintain liaison on technical matters relating to food safety, quality and consumer protection [30]. FAO claims that food safety and food quality are not the different in some terms. “Food safety refers to all those hazards, whether chronic or acute, that may make food injurious to the health of the consumer [31]”. Food Quality points to all other properties that influence a product’s value to the consumer which includes negative properties such as waste or spoilage, contamination with filth, discoloration, off-odors and positive properties such as the origin, color, flavor, texture and processing method of the food. Food safety and Food quality at FAO has objectives to protect public health by reducing the risk of foodborne illness, to protect consumers from unsanitary, unwholesome, mislabeled or adulterated food, and to contribute to economic development by maintaining consumer confidence in the food system and providing a sound regulatory foundation for domestic and international trade in food.

The World Food Summit has taken place for the first time at FAO headquarters in Rome from 13 to 17 November 1996. The Summit contained of the highest level with representatives from 185 countries and the European Community. The objective of the Summit was to reaffirm the right of everyone at the highest political level to eliminate hunger and malnutrition, and to achieve sustainable food security for all people. The Adoption of the Rome Declaration on World Food Security and World Food Summit Plan of Action acknowledged that: “Food security exists when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life” [32]. For example in 2013, FAO, the European Bank for Reconstruction and Development (EBRD) and the Ukrainian Dairy Sector Working Group (UDSWG), worked together to help strengthen diary sector in Ukraine by introducing new quality and safety standards and by developing the investment case for industrialization. And “Improving Food Safety and Quality along the Chain” of FAO, the idea is to encourage a shared responsibility along the food chain. The campaign started from conducting meetings, seminars and workshops in all region of Africa, Asia and the Pacific, Latin America and the Caribbean, Eastern Europe, which help them strengthen national food controls systems and infrastructures. Moreover, FAO also provides tools and guidance to evaluate risk management options and supports food safety decision making, along with promoting good food safety practices at all stages of the chain [33].

The WHO is the United Nations Agency aiming for the protection of public health. The WHO's role in food safety is to protect the consumer from hazards in food. The objective of creating World Health Organization is to develop, establish and promote international standards with respect to food. The organization believed that every individual has a right to access to adequate, nutritious and safe food [34]. WHO estimates that worldwide foodborne and waterborne diarrhea diseases, and food poisoning taken together kill about 2.2 million people annually [Picture 1]. The cause of these illnesses is food hazard. The existing things in food which can create potential harm to consumer are food hazard. Food hazards will be introduced into food system during growing, harvesting, processing, packing and branding, carriage, storage, retailing, preparation and serving. On behalf of WTO, World Health Day was founded on 7th April 1948 and celebrates each year globally. It aims to raise people awareness about the health problem and further to promote food safety in order to help them live longer. Looking back to the previous campaigns on World Health Day in every year, WTO has done so many themes relating to food safety. For example World Health Day 2015, the theme was focused directly to food safety "From farm to plate, make food safe". The WHO helps and encourages governments, manufacturers, retailers to acutely be conscious of food safety and to take action in promoting this issue through public awareness campaigns. Furthermore, the WTO also stimulates consumers to ask questions, read label and follow the hygiene tips for assuring that they consume and buy safe and clean food [35].



Note: Malnutrition contributes to nearly half of all deaths in children under 5 and is widespread in Asia and Africa

Source: UNICEF Data, Monitoring the Situation of Children and Women

Picture 1- World Current Status of Malnutrition

On many occasions, FAO and WHO Member Countries expressed their desire to work together by holding the existing negotiation meetings, so that they could exchange information and experiences on food safety issues. The Codex Alimentarius Commission was established by FAO and WHO for a reason to set and apply the same food standards around the world, aiming to protect consumer health and to insure fairness in international trade. Today, the Codex standard has become global reference point for customers, food manufacturers, national food control agencies and the international food trade. Many agricultural food manufacturers follow principles from Codex Alimentarius to build consumer trust by making health claims on their food productions. Manufacturers should be aware of providing nutrition information in a transparent, clear and simple, which makes consumers trust the safety and quality of the food products they buy. Simultaneously they also take action to promote, to discuss and to share experiences on food issues that are of concern to everyone [36].

- World Trade Organization (WTO)

The World Trade Organization was established in 1st January 1995 at Geneva, Switzerland. Since then, there are 164 countries who are the member of this organization. The WTO is the only global international organization, the institutional foundation dealing with the rules of trade between nations. In other words, the WTO is the legal of the multilateral trading system which provides the principal trade agreements influencing on how government implement domestic trade legislation and regulations. The goal of the WTO is to facilitate producers of goods and services, exporters, and importers in negotiating trade agreements, and is also to eliminate all trade barriers among countries. There is a question by WTO [37]:

"How do you ensure that your country's consumers are being supplied with food that is safe to eat — "safe" by the standards you consider appropriate? And at the same time, how can you ensure that strict health and safety regulations are not being used as an excuse for protecting domestic producers?"

The World Trade Organization has set two specific WTO agreements concerning to food safety and animal and plant health and safety with product standards in general, namely the Agreement on Sanitary and Phytosanitary Standards (SPS Agreement) and the Agreement on Technical Barriers to Trade (TBT Agreement) [38]. The agreement on Sanitary and Phytosanitary Standards allows countries to set their own standards, and to use their own methods of inspecting products. This agreement includes basic provisions on control, inspection and approval procedures. The SPS Agreement encourages governments to enact national SPS measures according to international standards, guidelines and recommendation with reference to the Codex Alimentarius Commission of FAO and WHO, and with reference to zoonosis as those developed under the auspices of the Office International

des Epizooties (OIE). The agreement on Technical Barriers to Trade aims to ensure that regulations, standards, testing and certification procedures do not create unnecessary obstacles. Standards and regulation somehow can create obstacles to trade. Therefore, the TBT agreement decided to set out a code of good practice for both governments and non-governmental to prepare, adopt and apply voluntary standards. This agreement also plays important role in discouraging any methods that would give an unfair advantage in producing domestic goods. The TBT agreement encourages government of countries to recognize each other's procedures in order to avoid the twice testing, first by the exporting country and then by the importing country. The Technical Barriers to Trade Committee is dedicated to be an open platform for members to share the information and to discuss concerning to the regulations and their implementations.

The rules of the WTO for food safety policy are characterized based on the concept of risk analysis. It includes 3 components [39]:

1) Risk assessment – consists of a safety assessment, a quantitative or qualitative description which are designed to identify damage and probability due to the occurrence of hazard and food safety concern. Risk assessment is composed of four steps:

- Hazard identification
- Hazard characterization
- Exposure assessment
- Risk characterization

2) Risk management – based on the outcome of the risk assessment. Risk management grounds on the political decision on the accepted level of risk and on the choice of measures to implement this risk level. Risk managers have to consider the uncertainties identified in the risk assessment, and then implement appropriate measures or methods to manage these uncertainties.

3) Risk communication – an interactive process relating all interested parties in the risk analysis process, such as government, industry, academia, media and consumers. Risk communication includes an informative element, for instance the informative dimension requires the submission of all relevant information on risk assessment and management decisions.

❖ International Standards Organization - ISO 9001: 2000, ISO 22000:2005

International Standard Organization (ISO) is an independent, non-governmental international organization, founded in 1946 with delegates from 25 countries at Geneva, Switzerland, and officially began operations on 23 February 1947 as a UN agency. ISO is a network of the national standards institutes of 163 countries. ISO has published 21,614 International Standards and related documents,

concerning in almost every industry, from technology, to food safety, to agriculture and healthcare. ISO has performed a major role in facilitating international trade in goods and services for industrial and commercial companies. The benefits of ISO international standards are to ensure safety, to prove reliable and to show quality for products and services. For example ISO international standards help businesses in reducing cost by minimizing wastes and errors, and increasing productivity, and also are strategic tools for companies to access new markets, to level up the playing field for developing countries, and to facilitate free and fair global trade [40].

ISO 9000 series is a set of international standard for Quality Management and Quality Assurance that was developed in 1987 to help companies verify the quality system elements to be implemented to maintain an efficient quality system. The objective of ISO 9000 is to set up a quality management system in the organization in order to increase productivity, to reduce unnecessary costs, and to ensure quality of processes and products. ISO 9001 is a standard within ISO 9000 series. ISO 9001 become a well-known standard that based on quality management principles and was already certified over one million companies and organizations in over 170 countries. In 2000, ISO 9001: 2000 as the Quality Management Systems was established aiming to assist organization to demonstrate its ability to consistently provide product that meets customer and the applicable regulatory requirements, and to enhance customer satisfaction through the effective application of the system [41]. Quality Management Systems is the gathering of processes, documents, resources, and monitoring systems to manage the work of an organization to provide product and service quality.

ISO 9000, ISO 9001 and related ISO quality management standards are based on these seven quality management principles [42].

1) Customer Focus

Customer is a key target of every business. Business has to know and understand the target group of customer, the needs of customer in order to respond accurately the customer requirement. Having well comprehends the needs and the wants of customer makes business recognize how to manage resources appropriately. There are seven keys benefits of customer focus: to increase customer value, to increase customer satisfaction, to improve customer loyalty, to enhance repeat business, to enhance reputation of the organization, to expand customer base, and to increase revenue and market share. And there are some actions that organization must consider:

- To recognize direct and indirect customers as those who receive value from the organization.
- To understand customers' current and future needs and expectations.
- To link the organization's objectives to customer needs and expectations.

– To communicate customer needs and expectations throughout the organization.

– To plan, design, develop, produce, deliver and support goods and services to meet customer needs and expectations.

– To measure and monitor customer satisfaction and take appropriate actions.

– To determine and take actions on interested parties' needs and expectations that can affect customer satisfaction.

– To actively manage relationships with customers to achieve sustained success.

2) Leadership

Good leaders will establish unity and direction quickly in a business environment which enable to motivate and encourage people working well according to organization strategies, policies, processes and resources, in addition to minimize the misunderstanding or misperception within and between department. For leadership, there are four keys benefits: to increase effectiveness and efficiency in meeting the organization's quality objectives, to create better coordination of the organization's processes, to improve communication between levels and functions of the organization, and to develop and to improve the capability of the organization and its people to deliver desired results. And there are seven actions that organization must consider:

- To communicate the organization's mission, vision, strategy, policies and processes throughout the organization.
- To create and sustain shared values, fairness and ethical models for behavior at all levels of the organization.
- To establish a culture of trust and integrity.
- To encourage an organization-wide commitment to quality.
- To ensure that leaders at all levels are positive examples to people in the organization.
- To provide people with the required resources, training and authority to act with accountability.
- To inspire, encourage and recognize people's contribution.

3) Engagement of people

The involvement of people at all level within organization is an important key for organization to achieve its goal. These people will improve their ability into innovation and creativity capacity to complete the organization's quality objectives. Recognition, empowerment and enhancement of competence will make these people to have eager to participate in the continual improvement that ISO 9000 facilitates. There are six key benefits for engagement of people: to improve understanding of the organization's quality objectives by people in the organization and increased motivation to achieve

them, to enhance involvement of people in improvement activities, to enhance personal development, initiatives and creativity, to enhance people satisfaction, to enhance trust and collaboration throughout the organization, and to increase attention to shared values and culture throughout the organization. Actions that organization should recognize:

- To communicate with people to promote understanding of the importance of their individual contribution.
- To promote collaboration throughout the organization.
- To facilitate open discussion and sharing of knowledge and experience.
- To empower people to determine constraints to performance and to take initiatives without fear.
- To recognize and acknowledge people's contribution, learning and improvement.
- To enable self-evaluation of performance against personal objectives.
- To conduct surveys to assess people's satisfaction, communicate the results, and take appropriate actions.

4) Process approach

The best results are achieved when activities are understood and managed profitable together with the organizational resources. The best outcome of having the right process approach is to lower organizational costs by the effective use of resources, personnel, and time. Process approach provides 4 key benefits: to enhance ability to focus effort on key processes and opportunities for improvement, to be consistent and predictable outcomes through a system of aligned processes, to provide optimized performance through effective process management, efficient use of resources, and reduced cross-functional barriers, to enable the organization to provide confidence to interested parties as to its consistency, effectiveness and efficiency. And there are seven actions for process approach to deal with:

- To define objectives of the system and processes necessary to achieve them.
- To establish authority, responsibility and accountability for managing processes.
- To understand the organization's capabilities and determine resource constraints prior to action.
- To determine process interdependencies and analyze the effect of modifications to individual processes on the system as a whole.
- To manage processes and their interrelations as a system to achieve the organization's quality objectives effectively and efficiently.
- To ensure the necessary information available to operate and improve the processes and to monitor, analyze and evaluate the performance of the overall system.

- To manage risks that can affect outputs of the processes and overall outcomes of the quality management system.

5) Improvement

When there are a lot of competitors in the market, business should be more flexible to adapt in the competitive environment. So that continual improvement is an important principle for all businesses because business can maintain its levels of performance to adjust to the internal and external condition in order to gain an advantage over competitors and to create new opportunities for business. There are six keys of key benefits: to improve process performance, organizational capabilities and customer satisfaction, to enhance focus on root-cause investigation and determination, followed by prevention and corrective actions, to enhance ability to anticipate and react to internal and external risks and opportunities, to enhance consideration of both incremental and breakthrough improvement, to improve use of learning for improvement, and to enhance drive for innovation. Actions for business that can be taken:

- To promote establishment of improvement objectives at all levels of the organization.
- To educate and train people at all levels on how to apply basic tools and methodologies to achieve improvement objectives.
- To ensure people are competent to successfully promote and complete improvement projects.
- To develop and deploy processes to implement improvement projects throughout the organization.
- To track, review and audit the planning, implementation, completion and results of improvement projects.
- To integrate improvement considerations into the development of new or modified goods, services and processes.
- To recognize and acknowledge improvement.

6) Evidence-based decision making

Decisions are based on the analysis and interpretation of data and information. However, data and information should be carefully and in depth analyzed to prevent mistakes in decision making. Decision making somehow is complexity and hesitation. But it is essential to understand causes and affects relationships potential unintended consequences. The keys benefits are: to improve decision-making processes, to improve assessment of process performance and ability to achieve objectives, to improve operational effectiveness and efficiency, to increase ability to review, challenge and change

opinions and decisions, to increase ability to demonstrate the effectiveness of past decisions. In decision making process includes six actions to acknowledge:

- To determine, measure and monitor key indicators to demonstrate the organization's performance.
- To make all data needed available to the relevant people.
- To ensure that data and information are sufficiently accurate, reliable and secure.
- To analyze and evaluate data and information using suitable methods.
- To ensure people are competent to analyze and evaluate data as needed.
- To make decisions and take actions based on evidence, balanced with experience and intuition.

7) Relationship management

A good relationship creates value for every people, organization, suppliers. For organization, it is a crucial decision and action to have a harmonious relationship with interested parties as suppliers. For example during the period that organization needs to respond to customer needs or to meet market changes, suppliers are the paramount for organization to achieve its objectives. There are 4 keys benefits for relationship management: to enhance performance of the organization and its interested parties through responding to the opportunities and constraints related to each interested party, to bring common understanding of goals and values among interested parties, to increase capability to create value for interested parties by sharing resources and competence and managing quality-related risks, and to build up a well-managed supply chain that provides a stable flow of goods and services. And there are seven actions to perceive:

- To determine relevant interested parties (such as suppliers, partners, customers, investors, employees, and society as a whole) and their relationship with the organization.
- To determine and prioritize interested party relationships those need to be managed.
- To establish relationships that balance short-term gains with long-term considerations.
- To pool and share information, expertise and resources with relevant interested parties.
- To measure performance and provide performance feedback to interested parties, as appropriate, to enhance improvement initiatives.
- To establish collaborative development and improvement activities with suppliers, partners and other interested parties.
- To encourage and recognize improvements and achievements by suppliers and partners.

ISO 22000: 2005 was established in September 2005 due to the unqualified of the national initiative for the certification of HACCP in the Netherlands and Denmark. ISO 22000: 2005 was

originally developed as a risk management standard based on Hazard Analysis and Critical Control Points (HACCP). The standard includes requirements for prerequisite programs as good manufacturing practice (GMP), good agricultural practice (GAP), for the implementation of HACCP of Codex Alimentarius Commission and ISO 9001:2000 quality management system. Recently, ISO 22000:2005 is a standard that may applied in any aspects of the food chain [Figure 5], such as the animal feed producers, plant and cattle breeders, the food manufacturers, the transport and storage operators, retailers, the suppliers of additives and ingredients, the food processors, the producers of packages, the chemicals, the sanitary etc. [43]

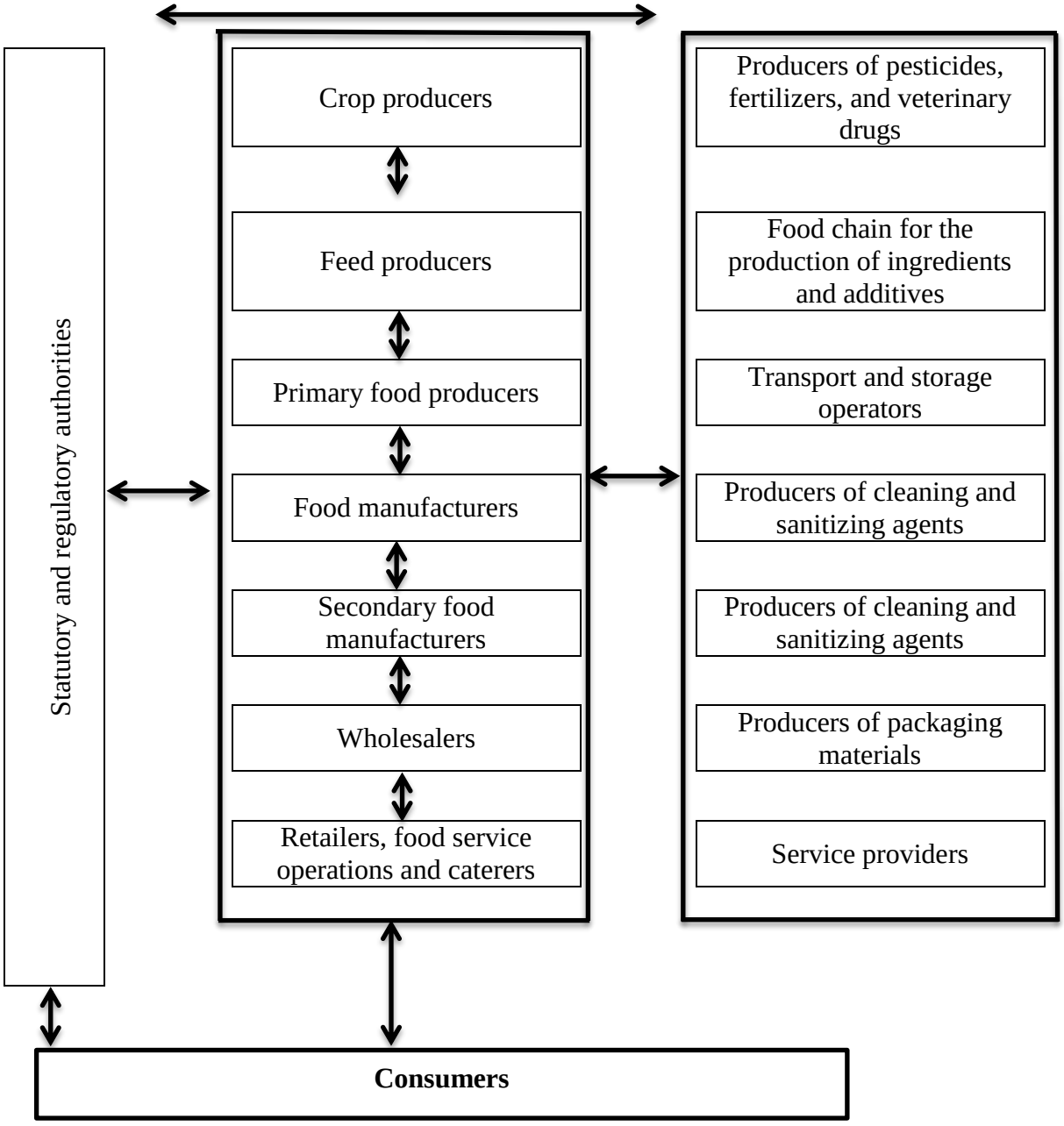


Figure 5 - The Communication within the food chain

ISO 22000:2005 specifies requirements to enable an organization to plan, implement, operate, maintain and update a food safety management system aimed at providing products that, according to their intended use, are safe for the consumer, to demonstrate compliance with applicable statutory and regulatory food safety requirements, to evaluate and assess customer requirements and demonstrate conformity with those mutually agreed customer requirements that relate to food safety, in order to enhance customer satisfaction, to effectively communicate food safety issues to their suppliers, customers and relevant interested parties in the food chain, to ensure that the organization conforms to its stated food safety policy, to demonstrate such conformity to relevant interested parties, and to seek certification or registration of its food safety management system by an external organization, or make a self-assessment or self-declaration of conformity to ISO 22000:2005[44].

Benefits of ISO 22000:2005, Food Safety Management [45]:

- To overcome many of the limitations of traditional approaches to food safety control.
- To identify potentially all conceivable, reasonably expected hazards.
- To capable of accommodating the changes.
- To help to target or manage resources to the most critical part of the food operation.
- Can promote international trade by equalizing food safety control and by increasing confidence in food safety.
- Applicable to whole food chain.

2.2. Hazard Analysis & Critical Control Points (HACCP)

In the 1960s, Hazard Critical Control Point (HACCP) system was conceived by the Pillsbury Company (American Grain processing company), the US National Aeronautics and Space Administration (NASA) and the U.S Army Laboratories to guarantee safe food for the astronauts in the first space missions 1961 [46]. HACCP has changed and developed over the years. Then, the World Health Organization (WHO) and Food and Agriculture Organization (FAO) integrated HACCP into the Codex Alimentarius as a tool for controlling and examining safe food production practices. HACCP has been adopted successively all over the world and recently becomes a crucial component in the International Trade, notably in the United States of America, Europe, Australasia, and The East, South and Southeast Asia. HACCP, food safety system management focuses on food businesses to ensure the safety of food from harvest to consumption. The concept, if implemented properly, businesses will get positive advantage from HACCP with a cost effective system for controlling food safety, with an

allocation of right ingredients through production, warehouse, and distribution to final consumer. In case, health risk for human consumption can be beforehand minimized as far as possible.

The HACCP system comprises of seven fundamental principles - Conduct a Hazard Analysis, Identify Critical Control Points, Establish Critical Limits, Establish Monitoring Procedures, Establish Corrective Actions, Establish Verification Procedures, and Establish Record Keeping Procedures. Successful implementation of HACCP depends on the comprehension and correct utilization of these principles [Figure 6]. HACCP application is applicable to all food sectors which has special material according to each sector, for example application guidelines, templates, models, Codex General Principles of Food Hygiene and Codes of Practice [47].

❖ Seven Principles of HACCP

1) Hazard analysis

First of all, businesses have to determine the food safety hazard - Biological, Chemical and Physical hazards at all stages of food productions. For example hazards from living organisms, toxic substances and objects added accidentally.

2) Identify Critical Control Points

A Critical Control Points (CCP) is a tractable point in the production chain taken to prevent food safety hazard, eliminate occurrence hazard that could cause harm to customer and to the business. CCP is a procedure which applies to prevent, eliminate or reduce a food safety hazard (Biological, Chemical and Physical hazards) in a food system – during growing, harvesting, processing, packing and branding, carriage, storage, retailing, preparation and serving.

3) Establish Critical Limits

When businesses have an identification of Critical Control Points (CCP), a critical limit should be established concerning to comprehend the limits of potential hazards. A critical limit is a measurement which defines maximum and/or minimum value at critical control points in order to prevent, eliminate or reduce to the acceptable levels.

4) Establish Monitoring Procedures of the Critical Control Points

Applicable monitoring procedures are indispensable actions to guarantee that the CCPs are under control. Businesses use monitoring procedures as a planned order to observe or measure to evaluate CCPs to generate a precise record for the future use. There are three main purposes of establishing monitoring procedures – to facilitate tracking the operation of food safety management, to determine the error occurring at CCP, and to provide written document for future use in verification.

5) Establish Corrective Actions

Corrective actions are remedial actions that help on dealing with deviations when CCP is out of control. Corrective actions include three main actions – to determine the root cause and restore control at the CCP, to make decisions on product disposition, and to prevent the reoccurrence of CCP failure by recording corrective actions which have been taken.

6) Establish Verification Procedures

Verification procedures are action plans to confirm that the HACCP system is working effectively. The verification actions include the verification of Good manufacturing Practice (GMP); a practice required to ensure the quality for production and quality control, the confirmation that CCPs are under control, the review of HACCP system in order to determine of the system is working correctly at the CCP, and the review of deviation and product disposition.

7) Establish Record Keeping and Documents Procedures

Record Keeping and Documents Procedures are essential documentation concerning to all records and procedures appropriate to the HACCP principles and their application. In addition, Record Keeping and Documents Procedures also include the HACCP system plan and its procedures, and HACCP instruction.

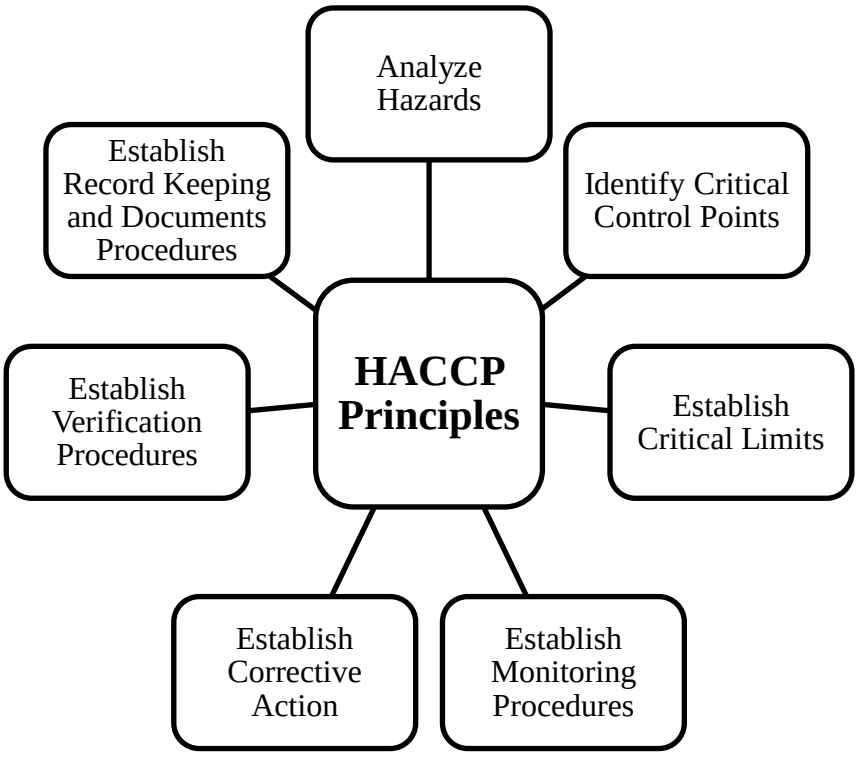


Figure 6 - The HACCP Principles

❖ The HACCP system application [Figure 7]

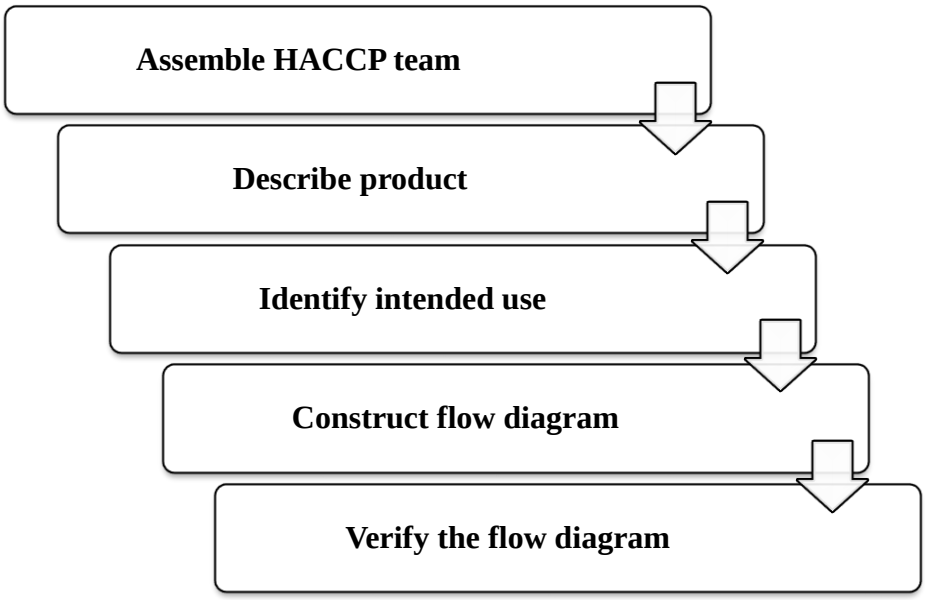


Figure 7 - The Logic Sequence for Application of HACCP

1) Assemble HACCP team

Team should include the appropriate individuals with expertise and specific knowledge to the product and process related to the development of an effective HACCP plan. The appropriate individual should be trained and understood the principles of HACCP, particularly identifying Hazards, determining critical control point (CCP) and defining critical limits. The most important reason about training is to help on evaluating the quality of team working and problem solving in HACCP team.

2) Describe product

After conducting HACCP team, team should perfectly understand the full and detailed description of product together with the group of consumers who might be incurred a risk. Description consists of the information about compositions, processing methods, warehouse conditions, and distribution methods.

3) Identify intended use

The identification of intended use is based on the uses of the product by the group of consumers. Due to the fact that there are some groups of consumers that need special care, for example group of consumers who have low resistance or food allergy at the nursing home, institutional feeding.

4) Construct flow diagram

The constructer of flow diagram is the HACCP team; team consider the danger of serious contamination from all steps in the production process, starting from selecting raw materials, processing, packaging, storage, and distribution to the end consumers.

5) Verify the flow diagram

HACCP team is responsible in verifying the accuracy and integrity of the flow diagram by comparing with the actual performance. During the corroborating, HACCP team may adjust the flow diagram in conforming to actual production process.

❖ HACCP implementation

HACCP is increasingly implemented in large food business and it is limitedly used in SMEs. In the UK and Europe, SMEs are less likely to invest in hygiene and food safety than large companies and are less likely to have HACCP in place [48]. The scale of business is crucial reason why SMEs owner has no motivation to achieve the best possible standard for the business and most of SMEs customers are the end user as in the case of retailers, it would be more pressure for these companies to apply HACCP due to the legislation and the regulatory system. This lack of motivation has been a significant reason that there has been little uptake of HACCP within small and micro businesses in particular. In the late 1990s, supermarkets began to encourage suppliers to use third-party auditors, approved by the retailers, to audit their safety and quality systems. The risen concerned about variations in the approach of different third-party auditors were high. So, to response these concerns, the major UK food retailers have agreed a common minimum standard for food safety and quality audits by using HACCP Principles as a management troubleshooting tool to investigate and to solve the food safety incidents that will arise on occasions [49].

In Europe, a dairy farmer cooperative in the south-west of Ireland, the Kerry Group is a world leader in food ingredients and flavor technologies, serving the food, beverage and pharmaceutical industries, and also a leading consumer foods processor and supplier in selected EU markets and a leading producer of consumer foods for selected European markets. Food safety is the top priority for the Kerry Group. All Kerry manufacturing units have HACCP systems in place to ensure that they continue to be effective in term of food safety. This system is still being developed at the time of maintaining the master copies of all documents and work instructions (including HACCP), but it is planned to activate this to all UK factories in the Ingredients Division in the near future [50].

In the USA, businesses chosen to implement HACCP with the responsibility of organizing these efforts with help from Corporate Food Safety. It is important for business leaders to believe in HACCP and drive implementation in their processing plants as a priority in their business. The basic goals business needed to achieve the goal of food safety are the implementation of HACCP and the standardizing GMPs. Two options were identified for accomplishing HACCP implementation.

1) Bring key members from all plants in the business together to train and develop HACCP programs. The advantage of using this approach is that implementation can be done quickly and efficient cross-communication between managers which allows for more standardized programs between plants. The disadvantage is that HACCP plans can become too generic, and without input from other members of the plant team, buy-in becomes difficult.

2) Assemble key members at each plant and introduce HACCP to one plant at a time. The advantage of using this approach allows the HACCP plan to be tailored to the needs of each plant and achieves greater buy-in from plant employees. The disadvantage is that the process is slower and cross-communication between locations is harder to achieve, resulting in diverse plans between plants that are producing the exact same product.

In the end, most Cargill businesses chose the second option as the means for HACCP implementation which, in retrospect, was the right choice [51].

In India, HACCP system was implemented to develop and sustain work in area of disease surveillance and food safety research. For example in the marine products of India [52]:

India is one of the world largest producer of food, the largest producer of fruits and the second largest producer of vegetables in the world. HACCP was introduced in the earlier 1990s for a reason to present Indian food manufacturers to outstanding foreign competition with higher standards of products safety and quality. HACCP systems was implemented in marine products manufacture in 1992, based on US Food and Drug Administration and EU regulations for seafood import. The system implementation process was divided into six phases:

1) An initial awareness and training program

Knowledge of food safety issues and microbiological hazards was very limited in the organization at that time. In the first phase of training involved an initial training and awareness programme for senior managers. Moreover, business and technical heads participated, along with factory management. About 20 people were trained in this initial phase. The underlying theme of training was that food safety is both a technical and a management issue and, to be most effective, has to be tackled through an appropriate management system such as a HACCP system. Training was carried out by staff from Hindustan Lever Research Centre (HLRC) as well as by experts from the Central Institute for Fisheries Education (CIFE). Subject areas covered the principles of food safety and the concept of safety by design, the philosophy of quality assurance, the management commitment to food safety, the Good Manufacturing Practice (GMPs) and Good Hygienic Practices (GHPs), the food microbiology, particularly foodborne pathogens, and the principles of sampling and analytical

methodology. The course was successful in winning the commitment of senior management to the HACCP programme and agreeing a schedule for the remaining phases.

2) A comprehensive HACCP training program

The personnel that were selected to form the HACCP implementation teams for a comprehensive HACCP training programme was for functional personnel. These teams included personnel from the production, supervisory, quality assurance, distribution and hygiene functions. All team members were selected on the basis of their expertise, including people who worked closely with day-to-day production operations. The training module covered the HACCP principles and the benefits of HACCP systems, the detailed implementation procedures, and the case studies illustrating HACCP implementation in practice. It was claimed that the teams proved extremely enthusiastic about the benefits of HACCP and were charged with the responsibility of cascading down the message of HACCP to shop-floor personnel, and to develop the appropriate training modules for line operators and workers.

3) Preliminary audits of all processing units

Preliminary audits of all processing units were conducted to estimate their state of readiness for HACCP implementation. Each factory was audited against internal Unilever standards for safe manufacture and those set by the Marine Products Exports Development Agency (MPEDA), a government body, and the Export Inspection Agency (EIA), the government's export audit and certifying agency. Where appropriate, individual buyer requirements were also used in the auditing process, particularly for larger customers. The result was to identify a wide variation in the quality of prerequisite systems. Key improvements in prerequisite systems included the improved control of staff access to the production line to prevent, for example, the risk of cross-contamination, the modification of the production line layout to ensure a logical raw material/product flow, the redesign of areas and procedures for receipt and handling of raw materials, the creation of designated high hygiene areas and procedures, the modification of anterooms to cold stores to ensure reduced levels of environmental contamination, and the establishment of microbiology testing facilities with trained analytical staff. A programme of improvements was agreed together with a schedule for completion. At the same time preliminary HACCP planning began with the preparation of draft process flow diagrams. It was suggested that major training need identified at this stage was the training of chemists in microbiological analysis, since most factories did not employ microbiologists.

4) Training of analytical personnel

Training of staff in microbiological analytical techniques was scheduled very soon after the preliminary audits of prerequisite systems. The purpose of this programme was to train analytical personnel in microbiological and analytical techniques for the purposes of Critical Control Point monitoring as well as local certification needs, and to enable them to subsequently set up a fully-fledged analytical facility in the factory. This was a comprehensive, hands-on training programme lasting ten days and covered all areas of microbiological analysis. The training programme contained the principles of microbial nutrition and growth, the sampling plans, the hands-on microbiological analysis, and the certification. The effectiveness of factory microbiological analytical facilities has subsequently been monitored during routine audits carried out in the factories. The Marine Products Exports Development Agency also routinely audits analytical systems and certifies analysts.

5) HACCP implementation itself

The first part of the HACCP implementation phase involved the finalizing and validating process flow charts, the identification of hazards and CCPs, the preparation of the final documentation for HACCP plans, particularly CCP monitoring and record-keeping documents, and the verification of HACCP plans at each of the factory sites. Once this stage was completed, one factory was chosen for pilot implementation. The choice of the factory was dependent on factors such as size of operations, level of preparedness and immediacy of need. The HLR microbiology team spent two to three days at the factory undertaking a comprehensive review of the HACCP plan. Data that was used to review hazard analysis included microbiological data from the factory, information from published literature, government and other agency surveys, and the opinions of microbiology and manufacturing experts within the industry. At the end of this process, the factory HACCP team took over responsibility for implementation. It was agreed that pilot implementation be carried out for a period of six months to work out all the wrinkles in the system and to ensure its smooth functioning. After three months and at the end of the six-month trial, the central HLR team reviewed the effectiveness of the HACCP plan. The main problems encountered were with proper documentation of CCP monitoring data. In order to ensure more effective documentation, generic CCP monitoring data sheets were created for use by shop-floor personnel. At the end of the six-month period, HACCP was fully and successfully implemented at the pilot site and well advanced at the other sites. Since the manufacturing processes as well as the product portfolio were very similar across all the factories, completion of HACCP implementation at other sites was able to proceed quite smoothly. Within 18 months of the initial training exercise in phase 1, HACCP implementation was completed at all marine products units.

6) Certification of HACCP systems

With the completion of phase 5, HACCP plans were submitted for certification audits by the EIA. The EIA bases its requirements for safe manufacture on a combination of EU as well as US FDA requirements. The EIA is also the approved certifying agency for HACCP in India. All HACCP plans were found to be compliant in audits carried out by EIA auditors. Since during phases 3 to 5 care was taken to ensure that factory operations were in conformance with all statutory requirements, only minor modifications were required after the EIA audits, confirming the success of the HACCP programme.

2.3. Good Manufacturing Practices (GMP)

Good Manufacturing Practices are the set of basis requirement for the manufacturing, processing, packing or storage of food to ensure its safety and wholesomeness. GMPs emphasized on preventing and eliminating the risk of food poisoning to consumers. A GMP is a quality assurance system that is practical for making food quality standard, and is trusted by consumers. Good Manufacturing Practices simplify record keeping, sanitation, cleanliness, personal qualification, equipment verification, process validation and complaint handling.

World Food Organization defined Good Manufacturing Practice as a system for ensuring that products are consistently produced and controlled according to quality standards. GMP is designed to reduce the risks involved in any pharmaceutical production that cannot be erased through testing the final product. Unexpected contamination of products can cause death or damage to health. Incorrect labels on package can result in effective treatment or adverse effects because of receiving the wrong medicine. GMP covers from the starting materials, premises and equipment to the training and personal hygiene of staff. World Food Organization has enacted explicit guidelines for Good Manufacturing Practice. Subsequently, many countries have invented their own requirements for Good Manufacturing Practice based on World Food Organization GMP. For example: in the Association of South-East Asian Nations (ASEAN), in the European Union and through the Pharmaceutical Inspection Convention have integrated their requirements to secure the food safety and to form food safety standards in their community [53].

According to U.S Food and Drug, the revision of Food Manufacturing Practices has lasted almost 20 years ago. Good Manufacturing Practice derived from a long history of the need for consumer protection. GMPs are regulations issued by authority of the Federal Food, Drug, and Cosmetic Act. There were no federal regulations to protect the public from dangerous products, and

technology was totally obsolete at the beginning of the 20th century. In 1906, the Bureau of Chemistry passes the 1906 Pure Food and Drugs Act. This act prohibited the interstate transport of unlawful food and drugs under penalty of capture the products and/or prosecution of the responsible parties. The basis of the law prohibited the addition of any ingredients that would substitute for the food, conceal damage, pose a health hazard, or constitute a filthy or decomposed substance, the presence and amount of eleven dangerous ingredients, including alcohol, heroin, and cocaine… Thereafter, due to loopholes in the law many food products were manufactured in poor-quality and fraudulent packaging continued to be produced. Consumers were often careless of what they were buying until they opened the products. Therefore, in 1933, the FDA decided to overhaul the 1906 Act. In 1938, The FDCA decided to provide to basis regulation for today's Food Good Manufacturing Practices with the 2 sections related to conditions where food has been manufactured; Section 402 (a)(3) - specifies that food has been manufactured under such conditions that it is unfit for consumption, and Section 402 (a)(4) - considers that food may be adulterated if it is prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth or rendered injurious to health. The Food Drug and Cosmetic Act (FDCA) started to work on draft GMP regulations by the mid-1960s with the objectives to describe general rules for maintaining sanitary conditions that must be followed by all food processing facilities to ensure that the statutory requirements of Section 402(a)(3) and (4) were met [54]. Since then, "The Food and Drug Administration (FDA), is currently evaluating its food GMPs regulations to ensure that they take today's technologies and food safety hazards into account. Current Food Good Manufacturing Practices (GMPs) are published in Title 21 of the Code of Federal Regulations, Part 110 (21 CFR 110)" [55]. Food GMP has developed crossed almost a century since 1906 by The Food and Drug Administration (FDA) [Table 2].

Table 2 - Food GMP Development Timeline

Food GMP Development Timeline	
Date	**Milestone**
1906	The Bureau of Chemistry passes the 1906 Pure Food and Drugs Act, prohibiting interstate commerce in misbranded and adulterated foods, drinks, and drugs
1933	FDA recommends revising the 1906 Pure Food and Drugs Act
1938	FDA passes the 1938 Federal Food, Drugs, and Cosmetics Act, which provides identity and quality standards for food
Mid 1960s	FDA decides to clarify the FDCA through GMP regulations
1968	FDA proposes food GMP regulations
1969	FDA finalizes food GMP regulations

Early 1970s	FDA considers promulgating industry-specific regulations
Late-1970s	FDA decides to revise the general GMPs rather than adopting industry-specific GMPs
1986	FDA publishes revised food GMPs
2002	FDA forms Food GMP Modernization Working Group
2004	FDA announces effort to modernize food GMPs
Source: Dunkelberger, 1995; FDA, 1981b.	

❖ Good Manufacturing Practices in Food Industry

In food industry, GMPs are being applied to maintain the certainty of safety in food production process. The system is based on four prescribed requirements [56]:

1) Personnel practices

Personnel practices are the set of precautions to be taken by the people who are involved during manufacturing, processing & packaging. Every people who are working in the food industry have to comprehend and implement basic principles of sanitation. The factory management should take all reasonable measures and precautions for disease control, cleanliness, education and training, and supervision. People or person who suffered from any disease, not wearing clean clothes, gloves, caps… shall be allowed to work in the factory.

2) Building facilities

Food processing plant should be located on a place where could avoid external pollutants, that easy to clean in order to prevent contamination. Because of its nature of stainless steel which is suitable for cleaning and disinfecting, it is the most common material using for constructing plants. The food processing plant has to have a sufficient space for the equipment & storage of materials including the personnel facilities as hand washing area, dressing, locker rooms, toilet etc., and it should be kept cleaned.

3) Equipment and utensils

All equipment and utensils shall be made of good materials and designed in a manner that can be hold/carried properly while using in the operations and could be cleaned easily. Ventilations inside the food processing plant are very crucial in order to minimize odors and vapors. The airflows also play important role in filter the incoming air to the factory and the filters should be changed frequently to avoid contamination. Water supply should be sufficient, safe at the appropriate temperature and pressure.

4) Production and process controls

The raw materials should be properly inspected and separated to be used in the manufacturing process. The raw material also has to be verified the levels of microorganisms. A proper storage space to maintain a particular temperature and humidity level shall be taken care well to avoid the contamination and the adulteration. The cleaning procedure is also one of the main responsibilities of the management for GMP in production process. The waste control has to be performed with the restricted rules and the loading space of waste should be planned in a way to easy to clean in order to avoid the contamination to the food area.

3. Controlling Management

According to James A.F. Stoner, "Management is the process of planning, organizing, leading and controlling the efforts of organization members and of using all other organizational resources to achieve stated organizational goals", meaning that management is a continuous process performed by managers in using the organizational resources, both physical as human to achieve the desired goals [57].

Mary Parker Follet defined management at early twentieth-century as the art of getting things done through people [58].

The management theorist, the father of modern management Peter Drucker looked at the work of manager as a whole. Drucker described the job of managers is to give direction, show leadership to their organizations, and to use organizational resources to pursue goals [59].

Richard Daft stated that "management is the attainment of organizational goals in an effective and efficient manner through planning, organizing, leading, and controlling organizational resources" [60]. Management is a continuous process of using workforces, capital, physical resources (building, machinery, vehicle and other materials), and information resources (books, journal articles, newspapers, thesis…) implemented by managers aiming to accomplish the desired goal of the organization. The management thinkers used to classify management function in different number of functions.

Henry Fayol 1916, a Frenchman who is considered the real father of modern management theory classified the study of management into the functional area by focusing on the relationship between personnel and its management. Henry Fayol identifies five functions such as planning, organizing, commanding, co-coordinating and controlling [61].

George Ro Terry, Principle of Management (1968) defined four functions as planning, organizing, actuating and controlling [62].

William H, Newman, Charles E, Summer and E. Kirby Warren, The Process of Management (1967) described functions as organizing, planning, leading and controlling [63].

Harold Koontz and Cyril O'Donnell, Management: A Systems and Contingency Analysis of Managerial Functions (1976) classified the management function as planning, organizing, staffing, directing, and controlling [64].

For the purpose of this study, the author would limit the discussion to the following five functions based on Harold Koontz and Cyril O'Donnell as planning, organizing, staffing, directing, and controlling. Controlling is the fourth basic functions of management process besides planning, organizing, and leading. Controlling refers to the measurement process and the corrective action of manager. Controlling is monitoring, finding deviation, comparing actual performance to expected performance and evaluating the organizational activities in order to achieve the organizational goal or objective.

Consequently, controlling management means the process of controlling the use of organizational resources to achieve the goal. The controlling management is characterized into 5 functions [65]:

An end function – A function occurs after the tasks have been performed and are verified to be in conformities with the initial plans.

A pervasive function – which means, it is adopted by managers at all levels and in all type of organizations and departments.

A forward looking – since effective control is not possible without considering past events and their performance, controlling is always forward looking to follow-up whenever required.

A dynamic process – because controlling necessitates taking corrective measures, changes are made and accepted wherever required.

A related to planning – Planning and Controlling are two integrated functions of management. Without one, other would be a meaningless exercise. Planning presupposes controlling and controlling succeeds planning.

Controlling Function of Management involved in 4 Steps [66]: [Figure 8]

Establishment of Control Standards – Within the organization’s overall strategic plan, managers define objectives and goals for every department, branch…Standards are criteria against which to compare organizational activities. For instance: Time standards, Cost Standards, Income standards,

Market share, Productivity, Profitability. Manager should carefully assess what they will measure and how they will define it. Standard should be defined clearly and precisely so that managers and workers can determine whether activities are on target.

Measurement of Actual Performance – Most of organizations prepare formal reports of quantitative performance measurements that managers review daily, weekly, or monthly. These measurements should be related to the standards set in the first step of the controlling function. Measurement of performance is an important part of controlling function. If deviation is detected earlier, it will enable appropriate action well in time. In most company, managers do no rely on quantitative measures. They get out seeing how things are going in the organization. Managers observe for themselves whether employees are participating in decision making and have opportunities to add to and share their knowledge.

Comparison of Actual and Standard Performance – The purpose of this comparison is to find out deviations and to determine the reason for such deviation. When performance deviates from a standard, managers must interpret the deviation. They are expected to dig beneath the surface and find the cause of the problem. Effective management control involves subjective judgment and employee discussions, as well as objective analysis of performance data.

Taking Corrective Actions - Managers also determine what changes are necessary; managers may encourage employees to work harder, redesign the production process, or fire employees. Managers in a participative control approach collaborate with employees to determine the corrective action necessary. Managers may take corrective action to change performance standards. Performance standards may need to be altered to make them realistic and provide motivation.

The controlling food safety management system is the process of controlling a systematic approach to control food safety hazards within a food business to ensure the safety of food before distributing to the end consumer.

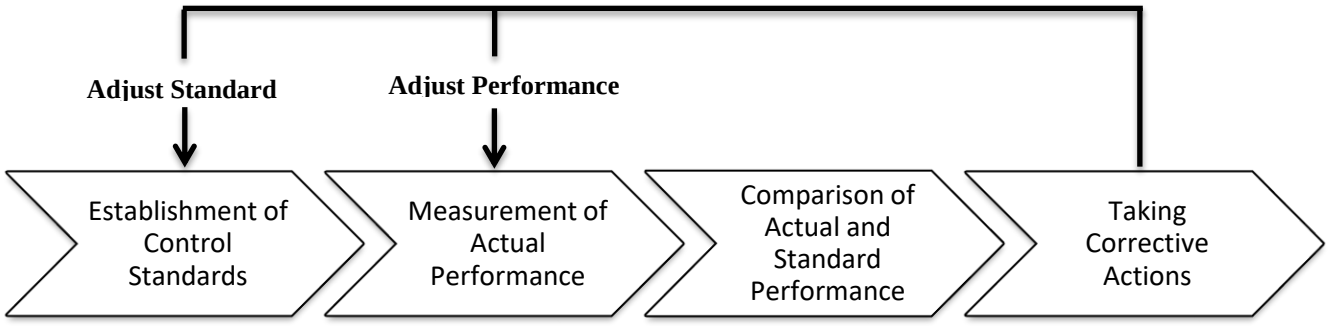


Figure 8 - Control Systems Model

3.1. Controlling Food Safety Management System of Coca-Cola Company

Coca-Cola Company is a multinational beverage corporation company from American. The Coca-Cola Company was founded in 1886 by John S. Pemberton and now had licensed more than 500 nonalcoholic beverage brands. Now the company is the world's largest beverage company for more than 130 years, the Headquarter is located in Atlanta, United States. The company has over 3500 products and serves 200 countries. The worldwide famous brands are Coca-Cola, Sprite, Fanta, Diet Coca-Cola, Coca-Cola Zero, Coca-Cola Light, Dasani, Minute Maid, Power Ride, Simply Orange, Fresca, and Vitamin Water [67]. Recently, Coca-Cola Company has more than 250 bottling partners worldwide aiming to grow up strong locally based relationships between Coca-Cola bottlers, and communities, including Eurasia and Africa, Europe, Latin America, North America, Pacific, Bottling Investments and Corporate [68]. Coca-Cola Company implemented three priorities for their product strategies, (1) to offer greater choice for consumers by introducing new products which have low calories and low sugar, and by raising awareness of no- and low-calories alternatives, (2) to provide more information by being more open about the calories and ingredients in products through clear guideline daily amount labeling, and (3) to ensure that products are sold and marketed responsibly. In Coca-Cola Company definition toward controlling, "managers need controlling to encourage other employees to be creative, innovative and aware toward their jobs" [69], meaning that managers are responsible in finding any opportunities for change to improve the quality of employees and products. Controlling activities in Coca-Cola Company include an evaluation of and supervision of workers to enforce the company rules and policies. In an evaluation of workers, the company engages in evaluating employees by analyzing employees' feedbacks on how the progress of the company. And in a supervision of workers, the company allocates employees in team to take control that quality of products in which produced to meet the required standards. High quality standard is very paramount for Coca-Cola Company to ensure that each product produced exactly the same in every branch around the world.

Quality and Safety Standard of Coca-Cola Company are driven by Global Food Safety Initiative (GFSI) certification as ISO standards to ensure consistency of Coca-Cola quality system around the world. The company provides sustainable food safety and quality performance through practice and certification of effective quality management systems, especially ISO 9001:2008, ISO 22000:2005, Food Safety System Certification 22000 (FSSC 22000) and The Coca-Cola Management System standards in all operations and PAS 223:2011 (Publicly Available Specification 223:2011, guidelines to

implement prerequisite programmes and design requirements for manufacturers dealing with the packaging of food products and beverages) where applicable [70].

Apart from Global Food Safety Initiative (GFSI) certification, Coca-Cola Company has implemented KORE Operating Requirement. KORE is the framework of governance and management system around which the Coca-Cola system enables sustainable performance that meets customer and consumer demands, drives continuous improvement, manages risk and enhances the Company's reputation [71]. To Coca-Cola Company, KORE is an integrated quality management program which focus to the area of food safety and encourages alignment with the highest international manufacturing standards, to ensure product integrity and quality and to protect our trademark while supporting strategies toward our 2020 Vision, to ensure the safety and well-being of our associates and partners and to be environmentally responsible, and to create a dialogue of honest information sharing between the company and our stakeholders [Figure 9]. KORE promotes the highest standards in products quality and safety, the environmental, and the occupational safety and health across the Policies, Standards, Specifications, Requirements and References of the Coca-Cola system.

Quality - The Company commitment to deliver quality effectively and efficiently focusing in five areas:

1) Supplier Management: Producing high quality products with the best raw material.

2) Global Standards: The Coca-Cola Company, company's supplier, and company's bottling partners have executed by Global Food Safety Initiative (GFSI) standard, ISO 9001 - Quality Management System Standards Certification; FSSC 22000 - Food Safety System Certification; ISO 14001 - Environmental Management Standards Certification; and OHSAS 18000 - Occupational Health and Safety Certification [72].

3) Global Governance. The Coca-Cola Company ensures that their products and services can meet the expectations of customers, consumers and other stakeholders.

4) Continuous Improvement across the company global system: The Coca-Cola Company has implemented the proactive evaluation and devoted their attention to emerging issues and trends affecting our products, customers and consumers, in order to keep improving their products and services to meet customers and consumers expectation.

5) Productivity: The Coca-Cola Company boosts their productivity by operating of the lowest-cost manufacturing and logistics while maintaining the company quality excellence.

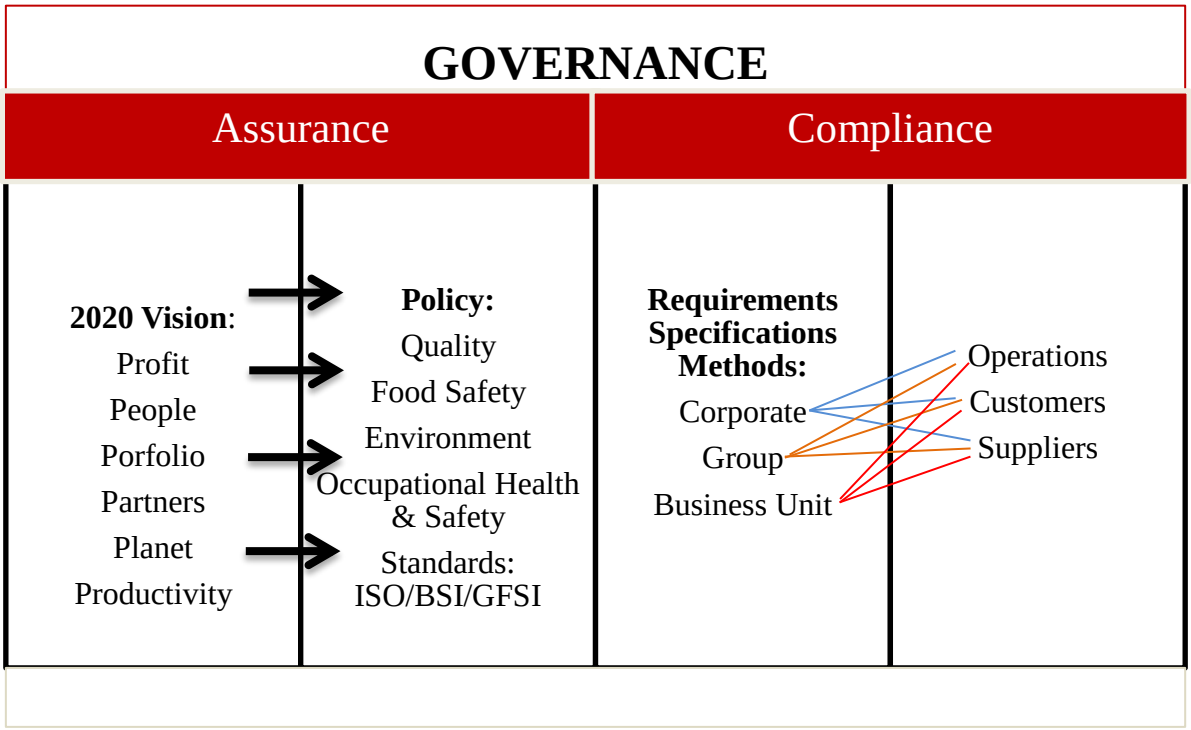


Figure 9 - KORE RELATIONSHIP MODEL

3.2. Controlling Food Safety Management System of Unilever

Unilever Company is the world's most consumed product brand. The company is one of the world's leading suppliers of fast-moving consumer goods. Unilever Company was founded by the merge of Dutch Margarine Union and British soap-makers Lever Brothers in 1929, and the company started to globalize their brands in the early and mid-1990s. Recently, the Unilever products are sold in over 190 countries and are used by 2.5 billion consumers every day. Unilever has more than 400 brands which are divided into three categories: home care brands, personal care brands and nutrition brands. Products in food and drink are sold about 136 brands worldwide. The worldwide famous food brands are Dairy products (Becel, Flora, Blue Band), the world's favorite ice-creams (Heartbrand, Magnum, Cornetto, Solero, Vienetta and Carte d'Or), Mayonnaise brand (Hellmann's, Amora, Calvé and Wish-Bone, Cooking brand (Knorr), Drink (Lipton). Thus, product safety is the top priority of Unilever. The company has established their personal ingredient standards in all level of production. The company ingredient standards are regulated by three key factors, namely law and regulations, the company internal safety assessments and the changing consumer preferences. Moreover, the Unilever Company

has a Safety and Environmental Assurance Centre (SEAC) including 200 world-class safety and environmental sustainability scientists to take responsible for the assessment Unilever's products' safety and environmental sustainability [73]. Safety and Environmental Assurance Centre plays a central role in delivering Unilever global commitment to developing products responsibly. Safety and Environmental Assurance Centre works together with many academic sectors including scientific organizations, leading academics, government scientists, other companies and trade associations. Working with those expert scientists helps SEAC evolving Unilever industry approaches to manage safety risk and environmental impact assessments of new Unilever products and processes [74].

Table 3 - Timeline of Uniliver Brand Portfolio Evolution

19th century	Although Unilever wasn't formed until 1930, the companies that joined forces to create the business we know today were already well established before the start of the 20th century.
1900s	Unilever's founding companies produced products made of oils and fats, principally soap and margarine. At the beginning of the 20th century their expansion nearly outstrips the supply of raw materials.
1910s	Tough economic conditions and the First World War make trading difficult for everyone, so many businesses form trade associations to protect their shared interests.
1920s	With businesses expanding fast, companies set up negotiations intending to stop others producing the same types of products. But instead they agree to merge - and so Unilever is created.
1930s	Unilever's first decade is no easy ride: it starts with the Great Depression and ends with the Second World War. But while the business rationalises operations, it also continues to diversify.
1940s	Unilever's operations around the world begin to fragment, but the business continues to expand further into the foods market and increase investment in research and development.
1950s	Business booms as new technology and the European Economic Community lead to rising standards of living in the West, while new markets open up in emerging economies around the globe.
1960s	As the world economy expands, so does Unilever and it sets about developing new products, entering new markets and running a highly ambitious acquisition programme.
1970s	Hard economic conditions and high inflation make the 1970s a tough time for everyone, but things are particularly difficult in the fast-moving consumer goods (FMCG) sector as the big retailers start to flex their muscles.
1980s	Unilever is now one of the world's biggest companies, but takes the decision to focus its portfolio, and rationalise its businesses to focus on core products and brands.
1990s	The business expands into Central and Eastern Europe and further sharpens its focus on fewer product categories, leading to the sale or withdrawal of two-thirds of its brands.
21st century	The decade starts with the launch of Path to Growth, a five-year strategic plan, and in 2004 further sharpens its focus on the needs of 21st century consumers with its Vitality mission.

To become such a world's largest consumer goods company, the company has developed and improved their strategy, vision and mission recently crosses three centuries [Table 3]. And from 2010

to present, the Unilever Company has present new strategy which is to make sustainable living commonplace by focusing in a long-term strategy of categories and brands that deliver growth to the benefit of all stakeholders. So, the company launches the Unilever Sustainable Living Plan as a sustainable business model in order to raise living standards of their consumers during the 21th century. The Unilever Sustainable Living Plan has goals to help more than a billion people improve their health and well-being, to reduce the environmental impact of the making and use of our products, to enhance the livelihoods of thousands of people in the supply chain. According to have desire to achieve the Unilever Sustainable Living Plan goals, Unilever Company play more attention to the quality and safety of their products especially of Foods and Drinks sites. A Global Food Safety Initiative (GFSI) benchmarked standard is used to certify or guarantee the quality and safety for Unilever products, namely the Food Safety System Certification 22000 (FSSC 22000). Food Safety System Certification 22000 is foundation for Food Safety Certification which includes HACCP, ISO 22000, and PAS 220 (Prerequisite programmes on food safety for food manufacturing). Quality in Unilever means to ensure the design and production of products meet our environmental, consumer safety and quality standards. Quality system starts in food supply chain from Buying, Making, and Delivery.

3.3. Controlling Food Safety Management System of Nestlé

Nestlé is one of the largest Food and Beverage Company in the world, founded in 1867 by Henri Nestlé. The company was initially sold infant foods, and then in 1905 the company merged with Anglo-Swiss to form as the Nestlé Group. Since it began over 130 years ago [Table 4], Nestlé quickly has enlarged to add more variety of products, which are chocolates, coffees, soups, yogurts, water and frozen foods in their portfolio [75]. Recently, Nestlé Company has factories or operations in almost every country in the world and employs environ 250,000 people from more than 70 countries to produce a great number of products with the high quality and acceptable for Nestlé consumers [76]. The famous brands all over the world are divided in different markets: Coffee (Nescafé, Taster’s Choice, Ricoffy, Nespresso), Water (Nestlé Pure Life, Nestlé Aquarel, Perrier, Vittel, Contrex, Arrowhead, Poland Spring), Other beverages (Nestea, Nesquik, Nescau, Milo, Carnation, Libby’s, Nestomalt, Nestlé), Shelf stable (Nestlé, Carnation, Milkmaid, La Lechera, Moça, Klim, Gloria, Svelty, Molico, Nestlé Omega Plus, Bear Brand, Coffee-Mate, milkpak, yogurt), Children Foods (Nestlé, La Laitière, La Lechera, Ski, Molico), Ice-cream (Nestlé, Antica Gelateria del Corso, Dreyer's/Edy's, Drumstick/Extrême, Maxibon/Tandem, Mega), Infant nutrition (Nestlé, Nan, Lactogen, Nestogen,

Cerelac, Neslac), Performance nutrition (PowerBar, Pria, Musashi), HealthCare nutrition (Nutren, Clinutren, Peptamen, Modulen), Bouillons, soups, seasonings, pasta,sauces (Maggi, Buitoni, Thomy, Winiary, Torchin), Frozen foods (Stouffer's, Lean Cuisine, Hot Pockets, Buitoni, Maggi), Refrigerated products (Nestlé, Buitoni, Herta, Toll House), Chocolate and biscuits (Nestlé, Crunch, Cailler, Galak/Milkybar, Kit Kat), Cosmetics (Biotherm, Body Shop , Cosmence, Garnier, HelenaRubenstein, Innéov , La Roche-Posay, Lancôme, L'Oreal , Matrix , Maybe line , Metamorphosis, Plenitude , Red ken), Pet food (Arthur's, Bakers, BETA, Bonio, Felix , FriskiesGo-Cat , Go-dog, Pro Plan, Purina , Spiller'sWinalot), Cereals (Cheerios & Honey Nut Cheerios, Cinnamon and GoldenGrahams ,Clusters, Cookie CrispShreddies, Fibre 1, Fitnesse ,Force FlakesFruitful ,Golden Nuggets , Nesquik cerealShredded Wheat including: Bite size, Fruitful, Honey Nut, Shred dies: Coco and frosted).

Table 4- The Evolution of Nestlé

1867	Henri Nestlé founded the company in Vevey, Switzerland.
1898	Nestlé purchases its first factory outside of Switzerland - Viking Milk factory in Norway.
1905	Nestlé merges with Anglo-Swiss Condensed Milk Company.
1929	Nestlé merges with Peter-Cailler-Kohler Chocolates Suisses S.A.
1938	Nestlé launches Nescafé - the world's first instant coffee.
1947	Nestlé merges with Alimentana S.A. with the brand Maggi
1962	Nestlé purchases Findus.
1974	Nestlé becomes a significant shareholder in the Cosmetics Company L'Oréal.
1977	Nestlé purchases Alcon, manufacturer of eye care products and kits.
1985	Nestlé purchases the Food Company Carnation.
1988	Nestlé purchases the confectionary company Rowntree Mackintosh and the pasta company Buitoni-Perugina.
1992	Nestlé purchases the mineral water Company Perrier.
1998	Nestlé purchases Spillers pet foods business.
2000	Nestlé sells the Findus brand in all countries except for Switzerland.
2001	Nestlé merges with Ralston Purina, the premier pet food company in North America, and with unique expertise in the dry dog food area

Quality and Safety are Nestlé's top priority for the company consumers. The company has applied those to the entire portfolio, from foods and beverages to all systems and services. Nestlé Quality Policy describes commitments to build trust by offering products and services that match consumer expectation and preference, to comply with all internal and external food safety, regulatory and quality requirements, to gain a zero-defect, no-waste attitude by everyone in our company, and to make quality a group-wide objective. Quality Management System is the platform that Nestlé uses globally to guarantee food safety, compliance with quality standards and to create value for consumers. Nestlé Quality Management System (NQMS) proceeds from farm to fork, meaning that company works together with farmers to control the quality of raw material by educating farmers the best farming practices. The Nestlé Company's internal Quality Management System is audited and verified by independent certification bodies to prove conformity to internal standards, ISO norms, laws and regulatory requirements. Quality Management System not only ensures the access to high quality raw materials, it thus helps farmers to protect themselves and to increase their income as well. Good Manufacturing Practices or Critical Control Points, and Hazard Analysis and Critical Control Points (HACCP) system are used to guarantee the quality and safety of Nestlé's products. Because those systems cover all aspects of manufacturing, including standard operating procedures, people management and training, equipment maintenance, and handling of materials. In addition, HACCP plans and systems are verified by external certification bodies as the international ISO 22000:2005/ISO 22002-1 standards [77].

There are some steps that Nestlé makes advances to ensure quality and safety for their products, which are [78]:

- Materials

All raw materials that company uses to produce Nestlé products are well checked and controlled along the entire supply chain, from farmers and suppliers, to ensure the safety and quality of raw materials. The procurements and procedures are based on strict regulations and the latest scientific knowledge that company set. If raw materials are unqualified, Nestlé Company rejects them.

- Preparation

All manufacturing facilities of Nestlé Company are designed to be exactly the same around the world in order to ensure the highest quality and safety standards of their products. Nestlé Company takes an intensive care the flow of ingredients and products in and out of the factories to prevent foreign bodies from entering products, and to enable the management of allergens. For example to separate equipment, utensils, and operation zones for different ingredients.

❖ Processing

All processing techniques consciously formulate with the scientific approach to produce the safest possible products. For example to produce products in appropriate quantities of nutrient to avoid any harm as over or under dosage, to process food at optimum temperature to retain its nutritious value, while removing dangerous microorganisms and preventing the formation of chemical contaminants.

❖ Testing

Nestlé Company tests their products more than one hundred million time a year to testify product conformity with internal and external standards as ISO norms, laws and regulatory requirements, and the international ISO 22000:2005/ISO 22002-1 standards.

❖ Packaging and Transportation

Nestlé Company takes responsibility to all released products from factory to their destination. For example, the condition of storing and transportation e.g. the correct temperature of different products that Nestlé Company provided. Additionally, the packaging of Nestlé products is prepared in a safe condition with the instruction manual of products, the manufacture and expiration date and detailed information on ingredients as allergen risks to consumers.

4. Attitudes, Knowledge and Behavior of Russian and Lao Consumers toward Food Safety

4.1. Consumer Behavior

Consumer behavior reflects the totality of consumers' decision with respect to the acquisition, consumption, and disposition of goods, services, time, and ideas by human decision making units over time [79] [Figure 10]. Consumer behavior is the study of the processes involved when individuals, groups, or organization select, purchase, use, secure or dispose of products, services, ideas or experiences to satisfy needs, desires and the impacts that these processes have on the consumer and society. A consumer may purchase, use and/or dispose of a product, but these functions may be performed by different people [80]. Consumer behavior is the behavior that consumers display in searching for, purchasing, using, evaluating, and disposing of products and services that they expect to satisfy their needs [81].

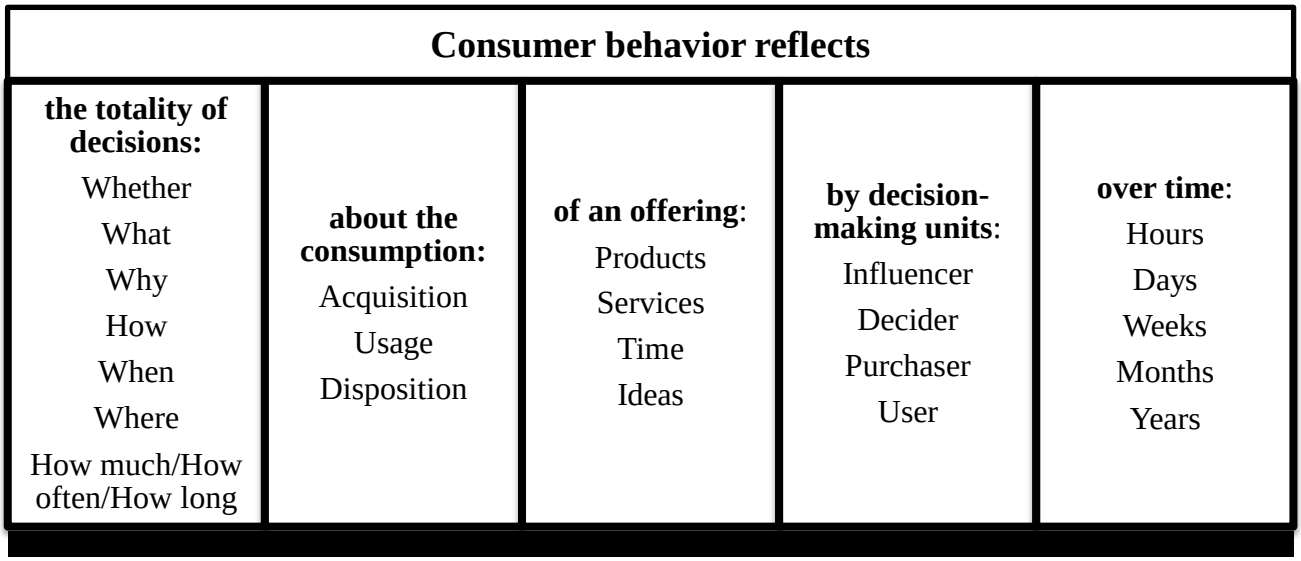


Figure 10 - The definition of Consumer Behavior

The most popular approaches to consumer behavior divided into behaviorist, cognitive, and psychodynamic categories.

- Behaviorist Approach

Behaviorist approach is consumer behavior influenced by external events and a specific pattern of behavior can be learned because of external factors, actions, thoughts and feeling [82].

- Cognitive Approach

Cognitive approach is consumer behavior perceived of individuals as 'information processors' acknowledge the impact of environment and social experience in the processing of information resulting in individuals behaving in certain ways as consumers. Contemporary Cognitive Psychology has identified and developed a wide range of factors including: perception, learning, memory, thinking, emotion and motivation [83]. The development of cognitive psychology in general is credited with the introduction of Stimulus-Organism-Response model [Figure 11]. Stimulus-Organism-Response models suggest a linear relationship between the impact of stimuli on inactive organism, and as a result of the impact the organism responses in a certain manner.

Figure 11 -Stimulus-Organism-Response Model of Decision Making

❖ Psychodynamic Approach

"Psychodynamic Approach includes all the theories in psychology that see human functioning based upon the interaction of drives and forces within the person, particularly unconscious, and between the different structures of the personality" [84]. Psychodynamic approach is determined by biological drives, rather than individual cognition, or environmental stimuli. In addition, there are some assumptions from psychodynamic approach.

- Behavior and feelings are powerfully affected by unconscious motives.
- Behavior and feelings as adults (including psychological problems) are rooted in our childhood experiences.
- All behavior has a cause (usually unconscious), even slips of the tongue. Therefore all behavior is determined.
- Personality is made up of three parts (i.e. tripartite): the id, ego and super-ego.
- Behavior is motivated by two instinctual drives: Eros (the sex drive & life instinct) and Thanatos (the aggressive drive & death instinct). Both these drives come from the "id".
- Parts of the unconscious mind (the id and superego) are in constant conflict with the conscious part of the mind (the ego). This conflict creates anxiety, which could be dealt with by the ego's use of defense mechanisms.
- Personality is shaped as the drives are modified by different conflicts at different times in childhood (during psychosexual development).

Factors that influence consumer behavior are [85]:

1) The Psychological Core: Motivation, Ability and Opportunity, Exposure, Attention and Perception, Categorizing and Comprehending Information, and Forming and Changing Attitudes.

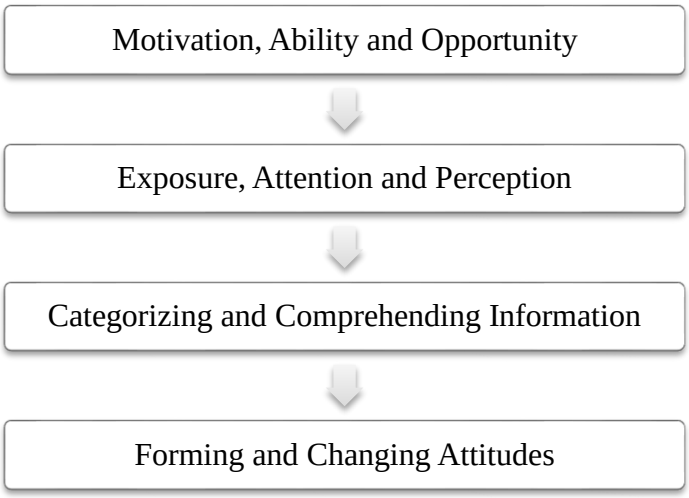


Figure 12 - The Psychological Core

Motivation is affected by the object of motivation which is personally relevance, consistent with value, goals, and needs, risky, and/or moderately inconsistency with human attitudes. However, motivated consumers need to have ability and opportunity to achieve a goal. As Figure 12 shows that knowledge and experience, cognitive style, intelligence, education, age, and monetary resources affect ability to achieve goals, while time, distraction, amount of information, complexity, and repetition affect opportunity to achieve goals.

Exposure, perception, and attention have an impact to consumers. In everyday life, consumers are regularly exposed to many different types of information. Since consumers think that their motivation, ability, and opportunity are high, consumers will expose to, perceive, and attend to any information that consumers believe is relevant to them.

Consumers acquire meaning from their environment by categorizing the things that consumers perceive in their environment and grasping the meaning of these things in a wider context. Understanding categorization and comprehension involves cognizance how consumers describe the objects that consumers perceive and attend to their knowledge.

Based on information consumers perceive, attend to, categorize, and comprehend, consumers may form or change attitude toward new offering or novel behaviors. Attitudes can be described in terms of their favorability, accessibility, confidence or strength, persistence or endurance, and resistance. Attitudes are overall evaluations that express how much we like or dislike an object or an action. Attitudes are learned, and they tend to persist over time. Our attitudes reflect the overall evaluation of how much we like the concept based on the set of associations linked to it. Similarly as we have schemas for brands, products categories, advertisement, type of stores, people, activities, and countries [86]. Solomon defined attitude in marketing terms as a general evaluation of a product or service formed over time. An attitude can satisfy a personal motive, and at the same time, affects the shopping and buying habits of consumers [87]. Consumer attitude is a composite of a consumer's beliefs, feeling, and behavioral intentions toward some object within the context of marketing. A consumer attitude can hold either negative and positive beliefs or feelings toward a product or service, Definition by Dr. Lars Perner (2010) [Figure 13] [88].

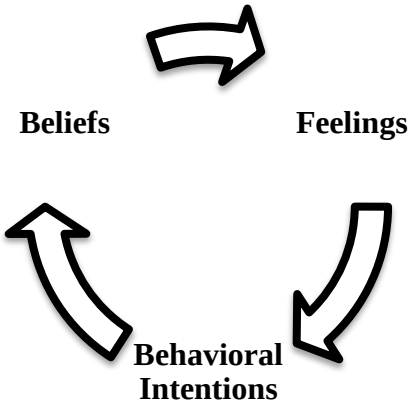


Figure 13 - The composition of Consumer's Attitudes

2) The Process of Making Decisions: Recognizing Consumption Problems and Searching for Information, Making Judgments and Decisions, and Making Post-Decision Evaluations [Figure 14].

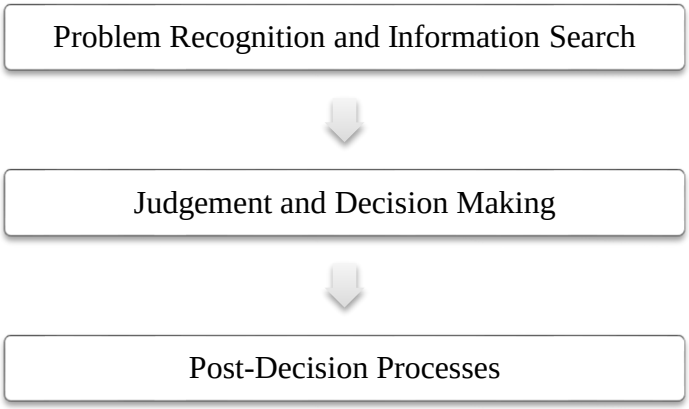


Figure 14 - The Process of Making Decisions

Consumers begin by engaging in some form of problem recognition and information search. The first step is problem recognition, problem that consumers need to be solved. The second step is to search for information either from internal sources (information, experiences, and feelings from memory), and external sources (information, experiences, and feelings that consumers acquire from external search).

Based on the information consumers gather from the information search, consumers will perform judgment and decision making. Connected to psychological core, when consumers have high motivation, ability and opportunity, consumers are more likely to use complicated decision rules, and to use simplified heuristics while motivation, ability and opportunity are low.

When consumers ‘expectations are met, consumers will feel satisfied. This feeling occurs after making decision. Consumer’ satisfaction is both a subjective feeling and an objective evaluation that a decision has accomplished a need or goal of consumers. While consumer’ dissatisfaction is negative feelings and an evaluation that a decision has not accomplished a need or goal of consumers.

3) The Consumer’s Culture: Regional, Ethnic, and Religious Influences, Social Class Influences, Age, Gender and Household Influences, Reference Groups and Social Influence, and Psychographics: Values, Personality, and Lifestyles [Figure 15].

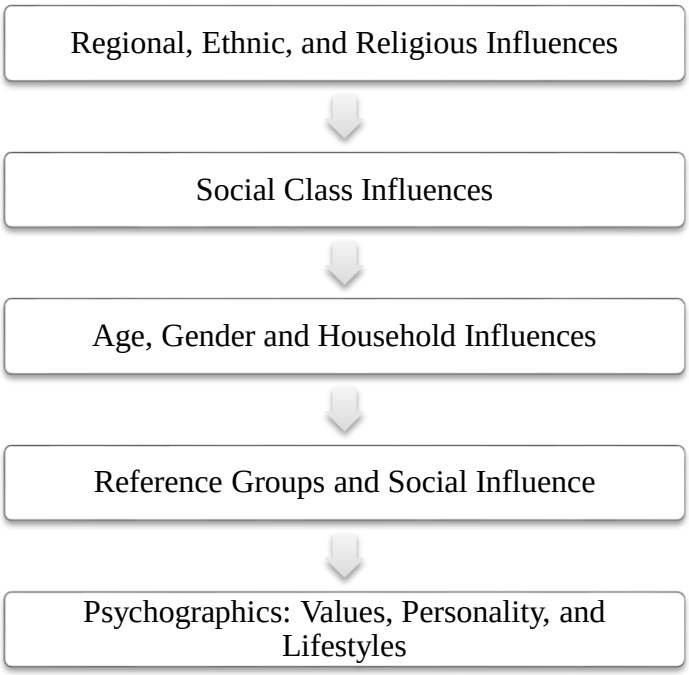


Figure 15 - The Consumer’s Culture

Differences of regional, ethnic, and religious are three major aspects of culture that have important effects on consumer behavior. Consumption patterns may not be similar in various regions of the world. For example consumers’ membership in various region and ethnic groups can have affected consumer’s decisions.

Group of individual in a society in different levels of status might be influenced norm, value and behavior of group members. Social class are influential because members of a particular class commonly share life experiences, value and behavior patterns, and there can be variation within groups. Social class consumption is conceded into three majors in general: Conspicuous consumption (the acquisition and display of luxury goods and services which consumers desire to show their class status), Status symbol (luxury goods and services), Compensatory consumption (deficiency or

difficulty in life, but attempt to make up for a lack of esteem or self-actualization by purchasing desired status symbols), and the meaning of money (symbol of security, power, love and freedom).

Age, gender and household play important role in consumer behavior. Age is a factor in acquisition and consumption in different generations, namely Teens, Generation X, Baby boomers, 50 and older. Gender roles are changing recently. Men and women are equal. Women tend to be more professional and independent, while men consider being more caring and sensitive. Men and women have different traits, information processing and decision styles, and consumption patterns. Household members perform different roles in the decision making. For example Gatekeeper (members of a household who collect and control important information to the decision), Influencer (members of a household who desire to express their opinions and influence the decision), Decider (a person or persons who determine which product or service will be chosen), Buyer (member or members who purchase(s) the product and service), and User (members who consume the product).

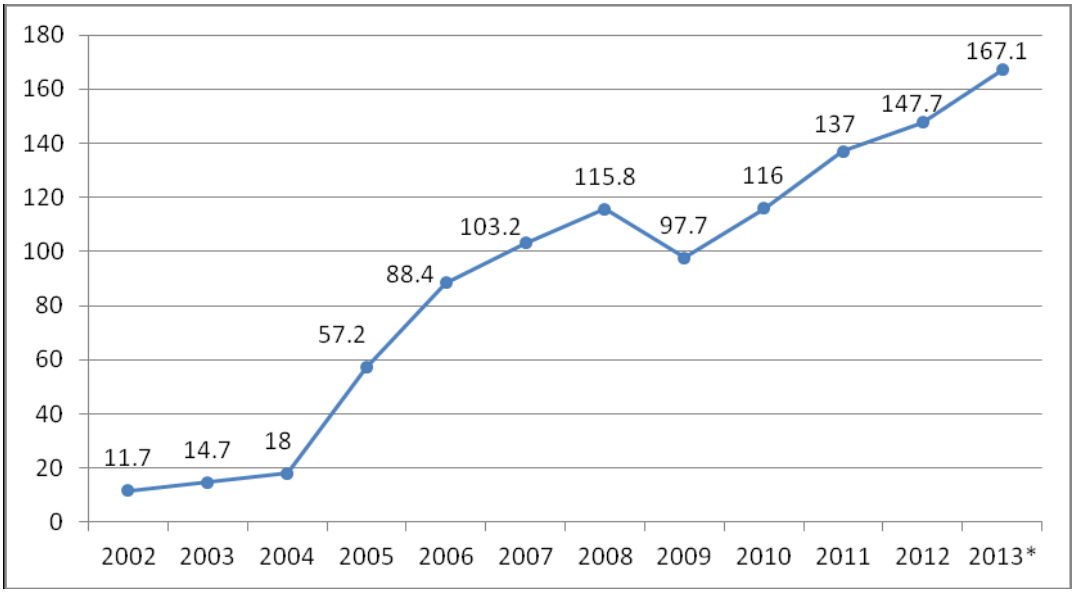
Members of groups who are in the same group of consumers can have influence on consumer behavior, so called as reference groups. Reference group is a set of people whom individuals compare themselves to guide their attitudes, knowledge, values, and behaviors. For example an aspirational reference group (a rock band, a younger brother aspire to be like his older brother or other older children), an associative reference group (member of university club, sport club, group of friends), and an dissociative reference group (group members that the individual would not like to be like, or that the individual disapprove of their attitudes, values, and behaviors).

Psychographics refers to describe consumers in the basic of their psychological characteristics. Psychographics indicated values, personality, and lifestyles of consumer. Values are enduring beliefs about things that are important in giving a good or desirable behavior. Personality is the consistent response to environmental stimuli and reflects the study of patterns of behaviors, tendencies, qualities, or personal dispositions that make one individual different from one another. There are five approaches to study of personality, namely a psychoanalytic approach (study personality from a set of dynamic, the result of unconscious internal struggles in individual mind), a trait theory (study personality from a set of personality characteristics), a phenomenological approach (study personality from a consumer's interpretation of life events), a social-psychological theory (study personality from the interaction of individuals in social situation), and a behavioral approach (study personality from past rewards and punishments). Lifestyle is pattern of behavior which is represented by consumer's activities, interests, and opinions.

4.2. Attitudes, Knowledge and Behavior of Russian Consumers toward Food Safety

Russian Federation is the world's largest country covering more than one-eighth of the Earth's inhabited land area with an area of 17,098,242 square kilometers and a population of 146 million people (in 2016) [89]. About 49.4 percent of territory is forests, of which 13.1 percent is agricultural land, 7.3 percent is arable land for crops as wheat, maize, and rice that are replanted after each harvest, 0.1 percent is permanent crops for crops as citrus, coffee, and rubber that are not replanted after each harvest including land under flowering shrubs, fruit trees, nut trees, and vines, but excluding land under trees grown for wood or timber, and 5.7 percent is permanent pasture, and of which 36.5 percent is the rest (2011 est.) [90]. According to the Statistics from International Federation of Organic Agriculture Movements (IFOM, 2017) report that the amount of land used for organic production increased from 126,847 to 385,140 hectares between 2011 and 2015 [91]. The increase of the land used show that Russian Federation tends to pay more attention the organic agriculture. The study of Gorshkov about the organic agriculture in Russia found that the principles of environmentally friendly agriculture as agriculture without the use of synthetic herbicides, pesticides, and mineral fertilizers, was introduced in many farm in Russia because that was the actual agricultural activity using in conventional farming [92]. According to the classification by the USDA (2005), agricultural holdings are classified into three types: agricultural enterprises with an average size of nearly 5,000 ha, private farms with an average size of about 50 ha, and private household plots with a maximum size of 2 ha that produce for either personal consumption or sale at local markets. However, only large agricultural enterprises are investing in organic agricultural and production [93]. In the Russian Federation, there are statutory rights and government bodies which are to protect consumers' rights. But these laws cannot be treated as effective because the intended effect has not been reached with its help. For this reason, Russian people appear not to trust to local system of certification which most of ingredient lists are not comparable to the facts. In November 2012, however, Russian industry and government collaborated on a draft law "On Manufacture of Organic Agricultural Products and Modification of the Legislative Acts of the Russian Federation" that was introduced by the Russian Ministry of Agriculture. For this reason, the market of organic product is expected to expand in the next coming years and organic packaged food sales are expected to grow [94]. According to the United States Department of Agriculture (USDA) Foreign Agricultural Service (2013), organic sales accounted for about $148 million in 2012 which is 7.8 percent growth compared to 2011 in Russia [95]. Accordingly, experts

estimate future sales of organic products could reach $167 million in 2013 and up to $225 million in 2015 [Figure 16].



Source: Euromonitor International from trade sources/national statistics, *- Forecast

Figure 16 - Russia: Organic Products Sales, 2002-2013, U.S. Million Dollars

The law "On Manufacture of Organic Agricultural Products and Modification of the Legislative Acts of the Russian Federation" is anticipated to come into force in 2015 which is expected to boost development of the Russian organic market in coming years and provide a benchmark for consumers who buy products labeled, “organic”. On September 10, 2014, National Organic Standard Terms and Definitions were signed and approved by the Russian State Duma. The standard defines the organic production (sources meeting the requirements of the organic production: the organic agriculture, the forestry, the water ecosystems and the apiaries), types of organic foods (Natural (unprocessed) organic food, Processed organic food, Organic food of plant origin, Organic food of animal origin, Organic bee food products, and Food products with organic ingredients), and etc. [96].

The finding of Oliver Meixner, Rainer Haas, Yana Perevoshchikova, and Maurizio Canavari (2014) that consumers have a few knowledge concerning to organic certification and organic labels because they are not familiar with organic labels and standards. Russian consumers were concerned about Genetically Modified Organism (GMO) products and risks of pesticide residues in fruits and vegetables [97] [Table 5]. That the reason why there are a lot of products claiming that they are not containing any GMO or pesticide residues.

Table 5 - Respondents' knowledge in Saint-Petersburg, Russia about organic labels

Labels	Label description	Known label	Unknown label	… is an organic label	… is not an organic label
	Agrosophia's (Moscow) eco-label "Pure Dew"; standard developed according to EU Regulation 2092/91 (www.biodynamic.ru)	35.0%	65.0%	26.3%	73.7%
	St. Petersburg Sign of Quality; voluntary certification on quality; no organic label (http://quality.spb.ru)	29.7%	70.3%	3.3%	96.7%
	Voluntary life cycle eco-labeling program "Vitality leaf", based on ISO 14024 (http://www.ecounion.ru/en/site.php?&blockType=251)	25.0%	75.0%	16.7%	83.3%
no organic label	Sign of quality "Natural product", issued by Council of Public Quality Control of Saint-Petersburg;	17.0%	83.0%	15.0%	85.0%
	EU organic label	16.0%	84.0%	17.0%	83.0%
	US organic label	10.3%	89.7%	29.7%	70.3%
	JAS label; organic certification system for Japan	5.3%	94.7%	9.3%	90.7%

Price is an absolute barrier for Russian consumers' willingness to buy organic products. Because of the high price of organic products, consumers prefer to buy local products more than imported organic products. It has been found out that local production makes agriculture more environmentally friendly (Sirieix, Kledal & Sulitang, 2011) [98] or because it supports the local

economy (Hughner, Mcdonagh, Prothero, & Stanton, 2007; Zander & Hamm, 2010) [99]. Thus, Russian consumers who live in the small cities appear to grow fruits and vegetables in their garden which they guarantee with no chemical substances or pesticide. Russian people who live in the big cities have evinced a conscious on healthier and organic products and they are willing to spend their rising incomes on organic products for themselves and their children. Organic products typically cost more expensive than their conventional equivalents about 20 to 400 percent. Therefore, the main consumers of organic food and beverage products are the medium to high income urban habitants. These consumers tend to be well educated and thus more knowledgeable about how diet influences health [100] [Table 6].

Table 6: Organics Consumer profile by The Comcon Company

The Comcon Company, a market research firm, found that the largest consumers of organic products in Russia are:	
Profile of Organics Consumers	
Age	Between the age of 25 and 45
Education level	Highly educated
Income status	High and middle class
City	Moscow or Saint-Petersburg
Factors influence consumer purchases of organic products:	Greater disposable income
	Concern for their health and fitness
	Concern for their children's health
	Reduced level of free medical services
	Negative publicity about genetically engineered (GE) ingredients in food
	Negative publicity about "unhealthy" ingredients in packaged food
	Negative publicity about the use of chemicals in traditional agriculture
	Publicity from Western cultures that brands an organic lifestyle as "fashionable."

As reported by market research of AgriCapital, in Moscow supermarkets, about 60 percent of the customers are willing to pay more for products if their packaging contains a special "organic" sign

[101]. The recent finding (Janssen & Hamm, 2012) points out that consumer awareness of the organic certification logo and positive attitudes towards the underlying scheme are of crucial importance for the success of an organic label [102]. However, Russian market is filled with products that have no formal approval labels or certification. The AgriCapital survey also shows that 45 percent of Russian manufacturers apply the words "BIO", "natural" or "eco-friendly" on their labels without any appropriate certification [103]. It has been proved that even among people who hold positive attitudes towards organic food; a lack of trust reduces the likeliness of purchase (Aertsens, Verbeke, Mondelaers &Van Huylenbroeck 2009; Thøgersen, 2007) [104].

Organic products are currently available only in premium supermarkets, as well as some specialized organic food shops located in the largest cities, Moscow and Saint-Petersburg, such as Azbuka Perekrestok Green, Metro Cash & Carry, Globus Gourmet, Azbuka Vkusa, Seventh Continent and others. To meet the demand of organic products, products are mainly imported from Germany, France and Italy, which significantly increases the final prices [105]. Organic products tend to be considered as a premium product while entering to the Russian market.

4.3. Attitudes, Knowledge and Behavior of Lao consumers toward Food Safety

Laos is a landlocked country in Southeast Asia bordered with Vietnam, Cambodia, Thailand, Myanmar, and China with an area of about 236,800 square kilometers (230.800 square kilometers is land, and 6000 square kilometers is water) and a population is about 6.8 million (2015 estimate) [106]. Agriculture land is 10.6 percent of territory, 6.2 percent is arable land for crops as rice, peanuts and maize that are replanted after each harvest, 0.7 percent is permanent crops for crops as coffee, rubber, wood or timber, and 3.7 percent is permanent pasture. Forest cover 67.9 percent of territory and other 21.5 percent is the rest (2011est.) [107]. According to the National Poverty Eradication Programme (NPEP), Lao government has an aim to accelerate its national economic development with a long-term development objective in the eight national development priority programs as lifting the country from the status of least-developed country (LDC) by 2020 [108]. In the eight national development priority programs, the objectives of the government for the agriculture sector are to achieve food self-sufficiency; to increase agricultural exports through diversification, commercialization and to process (cash crops, livestock, forest products); to stabilize slash-and-burn agriculture by land allocation for upland farmers, to terrace, and to support alternative agricultural activities including agroforestry and livestock; to increase rural incomes and stabilize food availability by expanding irrigated areas in both

the wet and the dry seasons and improving operation and maintenance; to study and survey of agriculture, forest, land and water resources, rehabilitation of research stations, development of new technologies; to improve human resource development in agricultural related fields (upgrading technical skills, and vocational training) [109].

According to Sipaseuth K. and W. Roder, 2004, there are four different agricultural systems for organic production [110].

1) The upland fallow rotation (slash-and-burn) system

This system of production is largely used for producing rice for home consumption, job's tear or pearl barley, sesame and maize for export. Although those products are not formally certified, they are often referred to as "organically grown".

2) Wild products collected in the forest and fallow lands

Most of products are collected mainly for home consumption, to sell at the local markets and rarely for exports. Wild products collected including bamboo shoot, banana inflorescence, and wild cardamom (Use as spice in food).

3) Fruits produced without any external inputs

Most of fruits are produced without any external inputs, either for home consumption, to sell at the organic markets and at the local markets

4) Market driven organic production

The systems 1-3 are "organic by default", meaning that the products are grown and collected naturally which are usually not certified as "organic".

Lao government together with the Ministry of Agriculture and Forest support organic agriculture by developing standards and legislation for organic agriculture and introducing a local certification system (Manual on Lao Organic Agriculture Certification, 30-12-2005). These actions aim to contribute a change from conventional system to organic system, involving discontinuation of subsidies for plant protection chemicals since 1993, promotion of IPM, setting up of bio-fertilizer factories, promotion of bio-pesticides, introduction of pesticide free zones, and NGO programs focusing on organic agriculture. The Ministry of Agriculture and Forestry (MAF) has an important role in increasing the supply of goods for both domestic and foreign markets by launching the promotion of clean agriculture including four production systems: conventional traditional agriculture without chemical inputs, safe conventional chemical agriculture, good agricultural practices (GAP), pesticide free agriculture, and organic agriculture.

The “new agriculture” defined as the organic agriculture by Ministry of Agriculture and Forestry (MAF). The “new agriculture” is led by private entrepreneurs in value chains linking producers to consumers of high value and often very specialized products. The “new agriculture” helps smallholder farmers to access to consumers in high value markets in Europe, Japan, and North America by the value-chain linkages through local and regional traders and agribusiness SME, and agro-processors to global value chains. Certified organic agriculture as organic agriculture labeling, European Eco-label, ISO 1400-Environmental Management Systems and ISO 24000-Social Responsibility are the important instruments to provide consumers in high value markets quality assurance, traceability, transparency, and accountability. MAF aims to promote organic agricultural development strategy in the Mekong corridor where few agro-chemicals have been applied, especially Mekong lowlands, and to support the development of certified organic agriculture with an alternative set of trading standards to mainstream commodity markets that can improve the environmental and social performance of agriculture [111]. Due to the globalization, the economy becomes more formally integrated into regional and global trade relationship with ASEAN Free Trade Area (AFTA), World Trade Organization (WTO), Greater Mekong Subregion (GMS), etc. The institutions and capacities of staff in the field of production would be strengthened and developed to meet the international requirements and regulation. For example to increase the cost of the products, the quality of the products, to create brand names, to be more flexible with the international flows of information, the need of consumers, technology, financial capital and the significant increasing of world population [112]. The development of Laos’s organic agriculture has been promoted both by rural development NGOs and by private sector enterprises interested to gain access to premium markets. Almost all NGOs in Laos are foreign NGOs that having offices and development projects in the country. These foreign NGOs introduced the concept of sustainable agriculture and organic farming to Laos since the late 1990s [113]. In collaboration with the Lao's Department of Agriculture (DOA), had developed national organic standards since 2004 based on IFOAM Basic Standards [114] [Table 7].

Table 7 - Key milestones of Lao organic agricultural development

PROFIL was initiated by Helvetas (Switzerland), working in collaboration with the Lao's Department of Agriculture (DoA)	Year 2004
PROFIL contracted the Earth Net Foundation (Thailand) to assist the organic agriculture development in Lao through series of capacity building activities including setting up internal control system, organic rice farming, establishing an organic certification body	Year 2005

[30 Dec] Ministry of Agriculture and Forestry approved the organic agriculture standards	
Lao Farmers Products received the first organic certification for its organic tea project [Dec] PROFIL initiated an organic farmers' market at the That Luang parking lot in Vientiane, started as a once a month event but now being held twice a week	Year 2006
First two organic coffee groups (i.e. Sinouk Coffee and Jhai Coffee Farmer Association) were certified Lao Certification Body (LCB) was approved by DoA LCB joined the Certification Alliance (an Asian-wide regional platform of organic certification bodies) [till 2009] International Trade Center (ITC) launched the project "Support to Trade promotion and Export Development in Lao PDR" focusing on supporting organic agriculture development in Lao PDR	Year 2008
LCB started offering organic inspection and certification services DoA established Standard and Accreditation Division	Year 2009
LCB was moved from CADC to the Standard and Accreditation Division UNCTAD launched technical support activities for organic agriculture under the UN Inter Agency Cluster on Trade and Productive Capacity "Enhancing sustainable tourism, clean production and export capacity in Lao People's Democratic Republic"	Year 2011

Source: Khotsimeuang, Soukkavong (2012) personal interview, Deputy Director, Clean Agriculture Development Center, Department of Agriculture, Ministry of Agriculture and Forestry, Lao Government, Vientiane.

About 83% of the population of the Lao PDR is rural and 66% depend on subsistence agriculture. Traditional production systems are based on low external inputs and many of the agriculture products are organic by default. Organic agriculture in Laos has good potential, both for local consumption and the export market. Laos has a range of conditions which favor organic production for in-country consumption and export including: the low external input systems presently used allows for easy conversion to an organic system, Lao products have a reputation for having low levels of pesticide residues, hill environments offer opportunities for "out of season" fruit and vegetable production. Products with high potential include: forest products, rice, vegetables, coffee and fruits (Phouvong Chittanavanh, Khamxay Sipaseuth, and Walter Roder, Helvetas, 2003). The survey conducted by the project of Helvetas (Switzerland) "The promotion of organic farming and marketing in Lao PDR (PROFIL)" has found that Lao consumers and traders are aware of the concept of organic

agriculture. Most of respondents said that they have purchased organic products with traders or producers they know selling organic products, which means that fresh products produced by small farmers without the input of chemicals or for products collected in the forest. And none of those items are presently certified as "organic" spontaneously. For this reason, Lao consumers appear not to be aware to the concept if certification and the legal implication of the organic label. The finding of awareness for the concept of organic agriculture that the largest proportion (40%) equated "organic agriculture" to "natural agriculture" a term which probably describes the traditional farming systems with no external inputs, especially the upland fallow rotation system, the collection of wild products or the production of traditional fruits.

The point of view toward buying organic products is that Lao consumers would like to buy if organic products are available in the reasonable price. In the same way as Russia, the organic product price is a considerable influence in the willingness of Lao consumers buying. However, consumers with higher education and good income would be ready to pay higher prices. Health related and safety is the main reason to consumers for buying organic products.

The domestic organic market in Laos seems to grow rapidly since the first launch of weekend organic farmer's market organized by PROFIL at Wat ThatLuang, Vientiane, in 2006, another two farmer market in XiengKhouang and LuangPrabang. The market has expanded significantly the number of farmers participating, the range of products, market frequency, and sales volume. And the AgroAsie Shop that sell some organic products, such as rice, and vegetables in Vientiane around the end of 2011 [115].

Table 8 - The Current and Potential Organic Projects in Laos

Who	No. of farmers	Products	Target Market	When	Note
Laos Farmer Product (LFP)	204, (189 ha)	Tea	Laos, EU	Since 2006	Tea also certified fairtrade since 2006
Sinouk Coffee	2, (70.6 ha)	Coffee, Tea	EU	Since 2008	Assisted by Profil & APO
Jhai Coffee Farmer Cooperative	589, (1,543.93 ha)	Coffee	Laos, New Zealand, US	Since 2008	Already certified fairtrade since 2005 Technical assistant from New Zealand In the process of getting certification
Green Field Miller Group	390, (433.37 ha)	Rice	Laos, EU	2008	Assisted by PRORICE In the process of getting certification
Vientiane Vegetables	111	Vegetables	Laos	2008	Assisted by PROFIL Being monitored by LCB and PROFIL through ICS programme

Vang Vieng Organic Farm	4	Mulberry tea	Laos	2008	Assisted by Profil & PADEC Said to be interested in organic certification
Lao Mountain Coffee	-	Coffee processor	Laos	???	May be interested in organic certification
Arrowny corporation ltd	2,500, (800 ha)	Rice	Japan	Since 2003	Claimed to have 2nd party certification by the Japanese importing company, not sure whether it is organic or just safe production
Coffee-OXFAM	200???	Coffee	Laos, Japan	???	--
Paxong Development Enterprise Export-Import	493 ha	Vegetables	Thailand, Korea	???	Owned by Ms. Impeng Samountee
Wilaikul International Group	???	Soybean	???	???	--
STE Lao-International Import-Export	9	herbs and fresh vegetables	Japan	???	--

Based on information from "Project Local Certification Organization Development Workshop and Advance Training Course on Internal Control System, PROFIL and PRORICE" in Vientiane 2008, table 8 shows commercial organic production in Laos. Those in the blue box are already certified or in the process of getting certification, those in grey box are said to have strong interest and those in white box have expressed some kind of interest before.

4.4. The Comparison between Russian and Lao Consumer Attitudes, Knowledge and Behavior toward Food Safety

- Profile of Lao respondents

The results of our survey concerning general demographic characteristics of the respondent are listed in Table 9. The majority of respondents were female (60%) within the average age range of 18 years to 24 years of age (73%). In the view of education, 81% of respondents had a Bachelor's Degree, 4% of respondents had completed High School Graduate, 5% of respondents had done Associates or technical degree, 10% of respondents had Master's degree and no one had completed Professional or PhD degree. Most of Lao people prefer to live with parents rather than having their own house. So

most of respondent of this survey lived with their parents (74%) and 4% of respondents could not replied about their family status. More than half (55%) of respondent were an employed with an average income between 1.6 million kips to under 3.2 million kips (11.900 ruble to 24.800 ruble) per month (32%), and 10% could not respond about the salary.

Table 9 - Demographic characteristics of respondents

Demographic characteristics	Number of Respondent (n= 73)	Percentage
1. Gender		
Male	29	40%
Female	44	60%
2. What age group you belong to:		
18 years- 24 years	57	78%
25 years- 45 years	13	18%
46 years- 55 years	1	1%
56 and above	2	3%
3. What is your highest education level:		
High School Graduate	3	4%
Bachelor's degree	59	81%
Master's degree	7	10%
Associates or technical degree	4	5%
Professional or PhD degree	0	0%
Others		
4. What is your employment status:		
Employed	40	55%
Retired	2	3%
Unemployed	0	0%
Full-Time Student	2	3%
Self- employed	2	3%
Part-Time Student	27	37%
Others	0	0%
5. Which of the following best describes your household:		
Living with parents	54	74%
Living alone	10	14%
Two or more adults and no children	1	1%
One or more adults and children	5	7%
No response	3	4%
6. Which of the following categories best describes your monthly household income:		
Below 800.000 kips (6.000 ruble)	9	12%
800.000 kips to under 1.6 million kips (6.000 ruble to 11.900 ruble)	18	25%
1.6 million kips to under 3.2 million kips (11.900 ruble to 24.800 ruble)	23	32%
3.2 million kips to under 6.4 million kips (24.800 ruble to 47.600 ruble)	12	16%
6.4 million kips or more (47.600 ruble or more)	4	5%
No response	7	10%

❖ Food buying, Attitudes and Habits of Lao respondents

In Table 10 showed the food buying, attitudes and habits of Lao respondents. In this study, 42% of respondents weekly or more often shopped for food, for either themself or others in their household, while 5% of respondents had never done. More than half (52%) mainly shopped for food, bought for either themself or others in their household in the market, and 22% of respondents prefer to buy food or dine in the restaurant. Respondents believed that they would find a lot of fresh foodstuffs such as fresh meat, vegetable in the market rather than shopping for food at the supermarkets and specialist retailers such as butcher shop, poultry shop. When shopping, 41% and 40% of respondents sometimes checked country a foodstuff has been grown or produced, and checked if a foodstuff is organic, respectively. There were only 19% and 18% of respondents always checked to each country a foodstuff has been grown or produced, and if a foodstuff is organic. Most of respondents often checked if the package is damage (32%) and when 32% of respondents always checked. The majority of respondents (44%) were lack of awareness toward checking the refrigerator temperature in a store, where yoghurt, cheese, fresh meat are kept, so that they never checked what refrigerator temperature was, while 10% of respondents always checked. Most of products in Laos had no information of nutrition on package. This reason makes Lao people ignored to check the presence of artificial additives and the presence of vitamins, minerals, fibers; 44% and 36% of respondents were sometimes checked the presence of artificial additives and the presence of vitamins, minerals, fibers, respectively. More than half (63%) of respondents claimed that the duration of transport of raw meat from time of purchase to home is very important, while 3% of respondents didn't know. Because most of respondent (74%) lived with parents according to Table 9, so that parents prepared food for them in their household (59%), 20% of respondents were cousins who were their brothers or sisters, and 2% of respondents prepared food for themselves. Most of respondents (40%) weekly or more often prepared food, bought for either themself or others in their household, 15% of respondents prepared and bought food every day, and 5% of respondents never did. Respondent were asked about their feeling while preparing food for their household, 36% of respondents were enjoyed it, 34% of respondents were neither enjoyed nor not enjoyed, and 1% of respondents didn't enjoy it at all.

Table 10 -Respondents' Food buying, Attitudes and Habits

Question	Response	Number of Respondent (n= 73)	Percentage
1. On average, how often do you shop for food, for either yourself or others in your household?	Never	4	5%
	Less than monthly	8	11%
	Monthly or more often	19	26%
	Weekly or more often	31	42%
	Every day	11	15%

2. On average, where do you mainly shop for food, bought for either yourself or others in your household?	Market	38	52%
	Supermarket	9	12%
	Restaurants	16	22%
	Specialist retailers such as butchers shop, poultry shop	6	8%
	Others	4	5%
3. How often do you check in which country a foodstuff has been grown or produced?	Never	11	15%
	Sometimes	30	41%
	Often	18	25%
	Always	14	19%
4. How often do you check if a foodstuff is organic?	Never	21	29%
	Sometimes	29	40%
	Often	10	14%
	Always	13	18%
5. How often do you check if the package is damage?	Never	6	8%
	Sometimes	21	29%
	Often	23	32%
	Always	23	32%
6. How often do you check the refrigerator temperature in a store, where yoghurts, cheese, fresh?	Never	32	44%
	Sometimes	25	34%
	Often	9	12%
	Always	7	10%
7. How often do you check the presence of artificial additives?	Never	28	38%
	Sometimes	32	44%
	Often	5	7%
	Always	8	11%
8. How often do you check the presence of vitamins, minerals, fibers, etc.?	Never	23	32%
	Sometimes	26	36%
	Often	16	22%
	Always	8	11%
9. How important is the duration of transport of raw meat from time of purchase to home?	Not important	9	12%
	Quite important	16	22%
	Very important	46	63%
	Don’t know	2	3%
10. Apart from yourself, who else do you prepare food for in your household? (Can answer more than one option)	Parents	66	59%
	Partner	12	11%
	Friends	5	5%
	Children	4	4%
	Cousin	22	20%
	No one	2	2%
11. Do you enjoy preparing food for your household? Would you say that you	Enjoy it a lot	19	26%
	Enjoy it	26	36%
	Neither enjoy nor not enjoy it	25	34%
	Do not enjoy it	2	3%
	Do not enjoy it at all	1	1%
12. How often do you prepare food, bought for either yourself or others in your household?	Never	4	5%
	Less than monthly	13	18%
	Monthly or more often	16	22%
	Weekly or more often	29	40%
	Every day	11	15%

- Food Safety Behavior and Food Safety Awareness of Lao respondents

  Food Safety Behavior

Respondents were asked about their food safety behavior (Table 11). The majority of respondents (62%) always washed hands after touching raw chicken meat, raw meats or fish, just 7% sometimes washed. Always wash hands for at least 20 seconds with soap and warm, running water before and after handling food could help prevent foodborne [116]. Most of Lao people had only one or two cutting(s) board(s) at home, for example one for vegetables and one for just meats. Respondents (32%) sometimes separated cuttings boards or knives for just raw chicken meat, raw meats or fish, 14% of respondents always separated, and 22% of respondents never did. Our finding showed that more than half of respondent (52%) tend to always rinse cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food, 25% of respondents were most of the time rinsed and while 1% of respondent were never rinsed. Obviously, Lao people were accustomed to clean and prepare things beforehand. Some of them had someone to arrange everything for a person who will just cook, like chef, mother... Mostly children were the one who do this duty for their mother. Respondents (36%) sometimes left cold food out of the fridge for more than 4 hours, while 22% of respondents rarely leaved and 5% of respondents were always. And about defrosting frozen foods outside the fridge, respondents (36%) were most of the time defrosted food at the room temperature, 23% of respondents were always, while 21% of respondents were sometimes. This finding showed that Lao people had lack of knowledge about defrosting food. According to the Food Safety and Inspection Service in the United States Department of Agriculture (USDA) informed that there are three safe way to thaw food: (1) in the refrigerator, (2) in cold water, and (3) in the microwave. Moreover, they also suggest that perishable foods should not be thawed at room temperature for more than two hours, not be defrosted on the counter or in hot water [117]. Putting cooked meats back into the same plates that used to store raw meats without washing them first was something that Lao people never did more than half of respondents (73%), 11% of respondents were rarely, while 1% of respondents were always did. Most of Lao people recognized that pouring marinades that contained raw meat over cooked meat was not proper to consume. Respondents (71%) were rarely poured marinades that contained raw meat over cooked meat, 16% of respondents were sometimes mixed marinades that contained raw meat with cooked meat. In the past when there was no refrigerator, Lao people always left and stored foods at room temperature and in the cabinet kitchen for all day long. Thus, at the present, even there are so many type of refrigerator, Lao people still get used to the same method of storing and leaving food and

some of them are change. In this finding, 33% of respondents were sometimes left hot foods at room temperature for more than 4 hours, 26% of respondent were most of the time, while 1% of respondents were always left. About the temperature of refrigerator, the Food Safety and Inspection Service in the United States Department of Agriculture (USDA) acknowledged that bacteria grow rapidly at the temperature between 40 and 140 °F (4.4444...℃ and 60 ℃) [118]. Nearly 100% of respondents didn't know about the temperature of refrigerator, 90.4% of respondents responded that storing food at 5℃, 7℃, 8℃, 10℃, 15℃, 28℃ were safe, but it wasn't correct according to the Food Safety and Inspection Service in the United States Department of Agriculture (USDA), while 9.6% of respondents responded below 0℃, 0℃, 3℃ which are correct.

Table 11 - Respondents' Food Safety Behavior

Question How often you do any of the following things when preparing food. How often do you?	Response	Number of Respondent (n= 73)	Percentage
1) Wash your hands after touching raw chicken meat, raw meats or fish	Always	45	62%
	Most of the time	19	26%
	Sometimes	5	7%
	Rarely	4	5%
	Never	0	0%
2) Use separate cuttings boards or knives for just raw chicken meat, raw meats or fish	Always	10	14%
	Most of the time	15	21%
	Sometimes	23	32%
	Rarely	9	12%
	Never	16	22%
3) Rinse cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food	Always	38	52%
	Most of the time	18	25%
	Sometimes	9	12%
	Rarely	7	10%
	Never	1	1%
4) Leave cold food out of the fridge for more than 4 hours	Always	4	5%
	Most of the time	15	21%
	Sometimes	26	36%
	Rarely	16	22%
	Never	12	16%
5) Put cooked meats back into the same plates that used to store raw meats without washing them first	Always	1	1%
	Most of the time	4	5%
	Sometimes	7	10%
	Rarely	8	11%
	Never	53	73%
6) Pour marinades that contained raw meat over cooked meat	Always	4	5%
	Most of the time	5	7%
	Sometimes	12	16%
	Rarely	52	71%
	Never	0	0%

7) Leave hot foods at room temperature for more than 4 hours	Always	1	1%
	Most of the time	19	26%
	Sometimes	24	33%
	Rarely	15	21%
	Never	14	19%
8) Defrost frozen foods outside the fridge	Always	17	23%
	Most of the time	26	36%
	Sometimes	15	21%
	Rarely	12	16%
	Never	3	4%
9) What temperature is your refrigerator set at?	Don't know (5℃, 7℃, 8℃, 10℃, 15℃, 28℃ which are not correct)	66	90.4%
	Below 0℃	5	6.8%
	0℃	1	1.4%
	3℃	1	1.4%

Food Safety Awareness

Respondents were asked about food safety awareness when preparing food (Table 12) comparing to Food Safety Behavior (Table 11). More than half of respondents (55%) admitted that washing hands after touching raw chicken meat, raw meats or fish was very safe, 30% of respondents affirmed it was safe, and 3% of respondents claimed it was very unsafe. The recent research of Safefood showed that 80% of people didn't wash their hands thoroughly after handling raw mince, 84% didn't thoroughly wash their hands after handling raw chicken while preparing a warm chicken salad and 26% of people had raw meat bacteria on their hands after preparing food [119].

When preparing food, 36% of respondents claimed that it was safe to separate cuttings boards or knives for just raw chicken meat, raw meats or fish, 34% of respondents were likely consider that it was very safe, while 3% of respondents thought it was very unsafe. The research of United States Department of Agriculture at Food Safety and Inspection Service found that if there is only one cutting board or knife for either raw chicken meat, raw meats or fish, it betters to wash them with hot, soapy water before and after each use; then rinse with clear water and air dry or pat dry with clean paper towels [120].

More than half of respondents (52%) justified that rinsing cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food was very safe, while 22% of respondents said it was just safe, and 4% of respondents claimed it was very unsafe. The study by

Safefood showed that there were contaminated bacteria at the food that used the same cutting boards, knives and plates for raw chicken, raw meats or fish [119].

About leaving cold food out of the fridge for more than 4 hours, more than a quarter of respondents (42%) responded that it was neither safe nor unsafe, 27% of respondents were very unsafe, while 7% of respondents were very safe. The United States Department of Agriculture at Food Safety and Inspection Service provides Food Safety Information on How Temperatures Affect Food, suggested that leaving food out too long at room temperature can cause bacteria, and should not leave food out of refrigeration over 2 hours [118].

Most of respondents (47%) thought that putting cooked meats back into the same plates that used to store raw meats without washing them first were very unsafe, 21% of respondents for neither safe nor unsafe, and 5% of respondents for just safe. Academy of Nutrition and Dietetics showed that one of 10 Common Food Safety Mistakes is to putt cooked or ready-to-eat foods back on a plate that held raw meat, because it can cause cross-contamination. Foodborne pathogens from the raw meat can easily spread to ready-to-eat foods and cause food poisoning [116].

Pouring marinades that contained raw meat over cooked meat was very unsafe responded of 38% of respondents, 33% of respondents also believed it was unsafe, while 3% of respondents claimed it was very safe. The U.S. Department of Health & Human Services claimed that germs from the raw meat (or seafood) can spread to the cooked food. So it is very unsafe to mix raw meat marinade on cooked food [121].

According to table 11 for leaving hot foods at room temperature for more than 4 hours, this finding showed that respondents 42% likely to assert that it was neither safe nor unsafe to leave hot food outside for more than 4 hours, 29% of respondents considered it was unsafe, while 4% claimed it was very safe. Regarding to the food storing habit of Lao people, they weren’t conscious of the bacteria growing during 4 hours. In addition, the finding had showed that Lao people was not certain about defrosting frozen foods outside the fridge. Respondents (47%) were neither safe nor unsafe, but 27% of respondents claimed it was safe, while 4% of respondent were likely to agree that it was very safe to thaw frozen foods outside the fridge. Cooked food sitting at room temperature is in what the USDA calls the "Danger Zone," which is between 40°F and 140°F (between 4°C and 60°C) [118].

In the last question, respondents were asked about the temperature of fridge where can store cold food. The author gave information sample (8 degree Celsius or above (46 degrees Fahrenheit)). Most of respondents (42%) believed it was neither safe nor unsafe, 29% agreed it was safe, and 7% of respondents affirmed it was very unsafe.

Table 12 - Respondents' Food Safety Awareness

Question How safe (mean that is not likely to cause food poisoning) is it to do the following things?	Response	Number of Respondent (n= 73)	Percentage
1) Wash your hands after touching raw chicken meat, raw meats or fish	Very Safe	40	55%
	Safe	22	30%
	Neither Safe nor Unsafe	7	10%
	Unsafe	2	3%
	Very Unsafe	2	3%
2) Use separate cuttings boards or knives for just raw chicken meat, raw meats or fish	Very Safe	25	34%
	Safe	26	36%
	Neither Safe nor Unsafe	19	26%
	Unsafe	1	1%
	Very Unsafe	2	3%
3) Rinse cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food	Very Safe	38	52%
	Safe	16	22%
	Neither Safe nor Unsafe	13	18%
	Unsafe	3	4%
	Very Unsafe	3	4%
4) Leave cold food out of the fridge for more than 4 hours	Very Safe	5	7%
	Safe	10	14%
	Neither Safe nor Unsafe	31	42%
	Unsafe	20	27%
	Very Unsafe	7	10%
5) Put cooked meats back into the same plates that used to store raw meats without washing them first	Very Safe	4	5%
	Safe	4	5%
	Neither Safe nor Unsafe	15	21%
	Unsafe	16	22%
	Very Unsafe	34	47%
6) Pour marinades that contained raw meat over cooked meat	Very Safe	2	3%
	Safe	7	10%
	Neither Safe nor Unsafe	12	16%
	Unsafe	24	33%
	Very Unsafe	28	38%
7) Leave hot foods at room temperature for more than 4 hours	Very Safe	3	4%
	Safe	8	11%
	Neither Safe nor Unsafe	31	42%
	Unsafe	21	29%
	Very Unsafe	10	14%
8) Defrost frozen foods outside the fridge	Very Safe	3	4%
	Safe	20	27%
	Neither Safe nor Unsafe	34	47%
	Unsafe	13	18%
	Very Unsafe	3	4%
9) Store cold foods at 8 degree Celsius or above (46 degrees Fahrenheit)	Very Safe	7	10%
	Safe	21	29%
	Neither Safe nor Unsafe	31	42%
	Unsafe	9	12%
	Very Unsafe	5	7%

❖ Profile of Russian respondents

The results of our survey concerning general demographic characteristics of Russian respondent are listed in Table 13. The majority of respondents were female (66%) within the average age range of 18 years to 24 years of age (60%). In the view of education, 41% of respondents had a Bachelor's Degree, 19% had completed High School Graduate and Associates or technical degree, 12% had Master's degree and 19% of respondents had completed Professional or PhD degree. More than half (53%) of respondent were a part-time student with an average income between 47.600 ruble or more per month (36%), and 5% could not respond about the salary. Most of Russian respondents lived alone rather than living with their family. So most of respondent of this survey lived alone (34%), 26% of respondents lived with their parents and 7% of respondent could not replied about their family status.

Table 13 - Demographic characteristics of respondents

Demographic characteristics	Number of Respondent (n= 73)	Percentage
1. Gender		
Male	25	34%
Female	48	66%
2. What age group you belong to:		
18 years- 24 years	44	60%
25 years- 45 years	23	32%
46 years- 55 years	3	4%
56 and above	3	4%
3. What is your highest education level:		
High School Graduate	14	19%
Bachelor's degree	30	41%
Master's degree	9	12%
Associates or technical degree	2	3%
Professional or PhD degree	14	19%
Others		
4. What is your employment status:		
Employed	30	41%
Retired	1	1%
Unemployed	1	1%
Full-Time Student	2	3%
Self- employed	0	0%
Part-Time Student	39	53%
Others	0	0%
5. Which of the following best describes your household:		
Living with parents	19	26%

Living alone	25	34%
Two or more adults and no children	18	25%
One or more adults and children	6	8%
No response	5	7%
6. Which of the following categories best describes your monthly household income:		
Below 800.000 kips (6.000 ruble)	1	1%
800.000 kips to under 1.6 million kips (6.000 ruble to 11.900 ruble)	6	8%
1.6 million kips to under 3.2 million kips (11.900 ruble to 24.800 ruble)	19	26%
3.2 million kips to under 6.4 million kips (24.800 ruble to 47.600 ruble)	17	23%
6.4 million kips or more (47.600 ruble or more)	26	36%
No response	4	5%

❖ Food buying, Attitudes and Habits of Russian respondents

In Table 14 showed the food buying, attitudes and habits of Russian respondents. In this study, 47% of respondents weekly or more often shopped for food, for either themself or others in their household, while 1% of respondents had never done. Nearly 100% of respondents mainly shopped for food, bought for either themself or others in their household in the supermarket, and 7% of respondents in the market. When shopping, 47% and 40% of respondents sometimes checked country a foodstuff has been grown or produced, and checked if a foodstuff is organic, respectively. There were only 11% and 22% of respondents always checked to each country a foodstuff has been grown or produced, and if a foodstuff is organic. Most of respondents always checked if the package is damage (58%), when 22% of respondents often checked. The majority of respondents (58%) never checked what refrigerator temperature in a store, where yoghurt, cheese, fresh meat are kept, while 1% of respondents always checked. Respondents of 45% and 44% were sometimes checked the presence of artificial additives and the presence of vitamins, minerals, fibers, respectively. Respondents (45%) claimed that duration of transport of raw meat from time of purchase to home was quite important, while 18% of respondents didn't know. Russian respondents said that their parents prepared foods for them in their household (37%), 21% of respondents were partner, and 16% of respondents prepared food for themselves. Most of respondents (52%) weekly or more often prepared food, bought for either themself or others in their household, and 27% of respondents prepared and bought food every day. Respondent were asked about their feeling while preparing food for their household, 42% enjoyed it, 29% enjoyed it a lot, and 1% didn't enjoy it at all.

Table 14 -Respondents' Food buying, Attitudes and Habits

Question	Response	Number of Respondent (n= 73)	Percentage
1. On average, how often do you shop for food, for either yourself or others in your household?	Never	1	1%
	Less than monthly	0	0%
	Monthly or more often	5	7%
	Weekly or more often	34	47%
	Every day	33	45%
2. On average, where do you mainly shop for food, bought for either yourself or others in your household?	Market	5	7%
	Supermarket	68	93%
	Restaurants	0	0%
	Specialist retailers such as butchers shop, poultry shop	0	0%
	Others	0	0%
3. How often do you check in which country a foodstuff has been grown or produced?	Never	15	21%
	Sometimes	34	47%
	Often	16	22%
	Always	8	11%
4. How often do you check if a foodstuff is organic?	Never	7	10%
	Sometimes	29	40%
	Often	21	29%
	Always	16	22%
5. How often do you check if the package is damage?	Never	3	4%
	Sometimes	12	16%
	Often	16	22%
	Always	42	58%
6. How often do you check the refrigerator temperature in a store, where yoghurts, cheese, fresh?	Never	42	58%
	Sometimes	20	27%
	Often	10	14%
	Always	1	1%
7. How often do you check the presence of artificial additives?	Never	11	15%
	Sometimes	33	45%
	Often	15	21%
	Always	14	19%
8. How often do you check the presence of vitamins, minerals, fibers, etc.?	Never	19	26%
	Sometimes	32	44%
	Often	16	22%
	Always	6	8%
9. How important is the duration of transport of raw meat from time of purchase to home?	Not important	4	5%
	Quite important	33	45%
	Very important	23	32%
	Don't know	13	18%
10. Apart from yourself, who else do you prepare food for in your household? (Can answer more than one option)	Parents	33	37%
	Partner	19	21%
	Friends	18	20%
	Children	3	3%
	Cousin	3	3%
	No one	14	16%
11. Do you enjoy preparing food for your household? Would you say that you	Enjoy it a lot	21	29%
	Enjoy it	31	42%
	Neither enjoy nor not enjoy it	17	23%

	Do not enjoy it	3	4%
	Do not enjoy it at all	1	1%
12. How often do you prepare food, bought for either yourself or others in your household?	Never	0	0%
	Less than monthly	7	10%
	Monthly or more often	8	11%
	Weekly or more often	38	52%
	Every day	20	27%

- Food safety Behavior and Food Safety Awareness of Lao respondents

  Food Safety Behavior

Respondents were asked about their food safety behavior (Table 15). The majority of respondents (79%) always washed hands after touching raw chicken meat, raw meats or fish, just 10% sometimes washed. Respondents (29%) always separated cuttings boards or knives for just raw chicken meat, raw meats or fish, 18% of respondents never separated, and 12% of respondents most of the time did. Our finding showed that most of respondent (79%) tend to always rinse cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food, 10% of respondents were most of the time rinsed and while 1% of respondent were never rinsed. Respondents (36%) never left cold food out of the fridge for more than 4 hours, while 32% of respondents rarely leaved and 3% of respondents were always. And about defrosting frozen foods outside the fridge, respondents (62%) were never defrosted food at the room temperature, 18% of respondents were rarely, while 1% of respondents were always. More than half of respondents (75%) never put cooked meats back into the same plates that used to store raw meats without washing them first, 12% of respondents were sometimes, while 3% of respondents were always did. Respondents (70%) were never poured marinades that contained raw meat over cooked meat, 11% of respondents were rarely and only 3% of respondents were always mixed marinades that contained raw meat with cooked meat. In this finding, 30% of respondents were sometimes left hot foods at room temperature for more than 4 hours, 22% of respondent were rarely, while 12% of respondents were always left. Most of respondents (84%) didn't know about the temperature of refrigerator, respondents responded that storing food at 5℃, 6℃, 7℃, 10℃, 16℃, 18℃ were safe, but it wasn't correct according to the Food Safety and Inspection Service in the United States Department of Agriculture (USDA), while 7% of respondents responded below 0℃, 0℃, 2℃, 3℃.

Table 15 - Respondents' Food Safety Behavior

Question How often you do any of the following things when preparing food. How often do you?	Response	Number of Respondent (n= 73)	Percentage
1) Wash your hands after touching raw chicken meat, raw meats or fish	Always	58	79%
	Most of the time	4	5%
	Sometimes	7	10%
	Rarely	2	3%
	Never	2	3%
2) Use separate cuttings boards or knives for just raw chicken meat, raw meats or fish	Always	21	29%
	Most of the time	9	12%
	Sometimes	15	21%
	Rarely	15	21%
	Never	13	18%
3) Rinse cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food	Always	58	79%
	Most of the time	7	10%
	Sometimes	5	7%
	Rarely	2	3%
	Never	1	1%
4) Leave cold food out of the fridge for more than 4 hours	Always	2	3%
	Most of the time	8	11%
	Sometimes	14	19%
	Rarely	23	32%
	Never	26	36%
5) Put cooked meats back into the same plates that used to store raw meats without washing them first	Always	2	3%
	Most of the time	3	4%
	Sometimes	9	12%
	Rarely	4	5%
	Never	55	75%
6) Pour marinades that contained raw meat over cooked meat	Always	2	3%
	Most of the time	6	8%
	Sometimes	6	8%
	Rarely	8	11%
	Never	51	70%
7) Leave hot foods at room temperature for more than 4 hours	Always	9	12%
	Most of the time	15	21%
	Sometimes	22	30%
	Rarely	16	22%
	Never	11	15%
8) Defrost frozen foods outside the fridge	Always	1	1%
	Most of the time	4	5%
	Sometimes	10	14%
	Rarely	13	18%
	Never	45	62%
9) What temperature is your refrigerator set at?	Don't know (5℃, 6℃, 7℃, 10℃, 16℃, 18℃ which are not correct)	61	84%
	Below 0℃	5	7%

	2℃	1	1%
	3℃	3	4%
	4℃	3	4%

Food Safety Awareness

Russian respondents were asked about food safety awareness when preparing food (Table 15) comparing to Food Safety Behavior (Table 14). Most of respondents (45%) admitted that washing hands after touching raw chicken meat, raw meats or fish was very unsafe, 34% of respondents affirmed it was unsafe, and 7% of respondents claimed it was very safe, safe, and neither safe nor unsafe, respectively. When preparing food, 32% of respondents claimed that it was very unsafe to separate cuttings boards or knives for just raw chicken meat, raw meats or fish, 29% of respondents were likely consider that it was unsafe, while 5% of respondents thought it was very safe. More than half of respondents (56%) justified that rinsing cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food was very unsafe, while 27% of respondents said it was just unsafe, and 5% of respondents claimed it was very safe. About leaving cold food out of the fridge for more than 4 hours, more than a quarter of respondents (44%) responded that it was unsafe, 25% of respondents were neither safe nor unsafe, while 7% of respondents were very safe and safe, respectively. Most of respondents (52%) thought that putting cooked meats back into the same plates that used to store raw meats without washing them first were very unsafe, 34% of respondents for unsafe, and 1% of respondents for very safe. Pouring marinades that contained raw meat over cooked meat was very unsafe responded of 52% of respondents, 30% of respondents also believed it was unsafe, while 4% of respondents claimed it was very safe and safe for each. Leaving hot foods at room temperature for more than 4 hours, this finding showed that respondents 44% likely to assert that it was neither safe nor unsafe to leave hot food outside for more than 4 hours, 19% of respondents considered were unsafe; while 10% claimed it was very safe. Respondents (45%) were neither safe nor unsafe, but 19% of respondents claimed it was unsafe, while 1% of respondent were likely to agree that it was very safe to thaw frozen foods outside the fridge. In the last question, respondents were asked about the temperature of fridge where can store cold food. The author gave information sample (8 degree Celsius or above (46 degrees Fahrenheit)). Most of respondents (37%) believed it was unsafe, 23% agreed it was very unsafe, and 5% of respondents affirmed it was very safe.

Table 16 - Respondents' Food Safety Awareness

Question How safe (mean that is not likely to cause food poisoning) is it to do the following things?	Response	Number of Respondent (n= 73)	Percentage
1) Wash your hands after touching raw chicken meat, raw meats or fish	Very Safe	5	7%
	Safe	5	7%
	Neither Safe nor Unsafe	5	7%
	Unsafe	25	34%
	Very Unsafe	33	45%
2) Use separate cuttings boards or knives for just raw chicken meat, raw meats or fish	Very Safe	4	5%
	Safe	6	8%
	Neither Safe nor Unsafe	19	26%
	Unsafe	21	29%
	Very Unsafe	23	32%
3) Rinse cutting boards, knives and plates used for raw chicken, raw meats or fish before using them for other food	Very Safe	4	5%
	Safe	3	4%
	Neither Safe nor Unsafe	5	7%
	Unsafe	20	27%
	Very Unsafe	41	56%
4) Leave cold food out of the fridge for more than 4 hours	Very Safe	5	7%
	Safe	5	7%
	Neither Safe nor Unsafe	18	25%
	Unsafe	32	44%
	Very Unsafe	13	18%
5) Put cooked meats back into the same plates that used to store raw meats without washing them first	Very Safe	1	1%
	Safe	0	0%
	Neither Safe nor Unsafe	9	12%
	Unsafe	25	34%
	Very Unsafe	38	52%
6) Pour marinades that contained raw meat over cooked meat	Very Safe	3	4%
	Safe	3	4%
	Neither Safe nor Unsafe	7	10%
	Unsafe	22	30%
	Very Unsafe	38	52%
7) Leave hot foods at room temperature for more than 4 hours	Very Safe	7	10%
	Safe	8	11%
	Neither Safe nor Unsafe	32	44%
	Unsafe	14	19%
	Very Unsafe	12	16%
8) Defrost frozen foods outside the fridge	Very Safe	1	1%
	Safe	12	16%
	Neither Safe nor Unsafe	33	45%
	Unsafe	14	19%
	Very Unsafe	13	18%
9) Store cold foods at 8 degree Celsius or above (46 degrees Fahrenheit)	Very Safe	4	5%
	Safe	9	12%
	Neither Safe nor Unsafe	16	22%
	Unsafe	27	37%
	Very Unsafe	17	23%

To summary, in this study, consumer attitude is one of the important components to set up food safety policy in a community. This study investigated Russian and Lao consumer attitudes, knowledge and behavior toward food safety, then compared the results. Both Lao and Russian respondents of our study are not familiar with the importance of maintaining food such as the temperature of the fridge, the defrosting practices, poor method of cooked food. In our study, more than half of Lao and Russian respondents said that they always washed their hands after touching raw chicken meat, raw meats or fish. However Russian respondents claimed that it was unsafe to wash their hands after touching raw chicken meat, raw meats or fish, while Lao respondents said it was very safe. This shows that Russian respondents were lack of knowledge concerning cross-contamination, and knowledge in consideration of hand hygiene.

CONCLUSIONS

Food safety is the most widely recognized policy and action in many countries nowadays whether developed, developing and underdeveloped countries. Food safety ensures that food is clean, no toxic chemicals and guarantees that consumers will not affect by foodborne illness. Many international organizations including some big food manufacturers, food suppliers, academia, and public health agencies perform vigorous actions and policies to promote food safety in many countries.

The concept of food safety is to preserve the quality of food during production, distribution, and consumption activities to prevent contamination and foodborne illnesses or foodborne disease. It was revealed that there were a lot of outbreaks or incidents of foodborne disease and killed more than 2 million people around the world, mainly in the developing and underdeveloped countries. The common diseases that create serious harm are diarrhea, nausea and malnutrition. Food safety has been a big issue in every continent in the past decades, and the solutions also have been evolved in different approaches regarding to each country which were adjusted to use in many sectors, especially in food manufacturing.

Quality management system is applied in the quality assessment in the food industry, aiming to protect consumers and gain their trust in safe food production and distribution. The application of quality management system allows businesses in the food industry the competitive advantage in the market, and the quality guarantee. The quality management systems in the food industry includes: Quality standard as Global Food Safety Initiative (GFSI). Global Food Safety Initiative (GFSI) is set of standards which are now used around the world, with a growing number of certificates issued every year. Global Food Safety Initiative represents food safety best practices and standards, which are International Food Standard (IFS), Quality Food (SQF) 2000 and International Organization for Standardization - ISO 22000)), and Food safety management (Hazard Analysis & Critical Control Points (HACCP), and Good Manufacturing Practices (GMP)).

International Food Standard (IFS) includes the activities of international organization as Food and Agriculture Organization (FAO), World Health Organization (WHO), World Trade Organization (WTO), and International Standards Organization - ISO 9001: 2000, ISO 22000:2005.

FAO and WHO, there are some common between their activities focusing in food safety and quality around the world. For example the campaign “Improving Food Safety and Quality along the Chain” of FAO, World Health Day of WHO, and the Codex Alimentarius Commission that FAO and

WHO work together to set and apply the same food standards around the world, which protect consumer health and insure fairness in international trade.

On behalf of WTO, the agreements concerning to food Safety and animal and plant health and safety allow member countries to set their own standards, and to use their own methods of inspecting products before distributing to the other countries. WTO facilitates member countries about regulations, standards, testing and certification procedures in order to avoid any unnecessary obstacles occurring when importing and exporting goods.

International Standards Organization as ISO 9001: 2000, ISO 22000:2005 are implemented in the quality and safety assessment of all business subjects in the food industry more than 160 countries to ensure safety, reliable and quality for products and services. For example ISO 9001: 2000, the quality management systems with seven quality management principles: customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making, and relationship management to direct the work of an organization to provide product and service quality. Quality Management Systems (QMS) are used to control the quality and safety of products to make sure that all aspects of a business are working efficiently and managing cost effectively. And ISO 22000: 2005, the food safety management system, has requirements to enable an organization to plan, implement, operate, maintain and update a food safety management system of the food chain with Good Manufacturing Practice (GMP), Good Agricultural Practice (GAP), for the implementation of HACCP of Codex Alimentarius Commission and ISO 9001:2000 quality management system. Moreover, ISO 22000: 2005 also represents a model for the improvement of food industry business management based on risk management.

Hazard Analysis & Critical Control Points (HACCP) and Good Manufacturing Practices (GMPs) are Food Quality Management System that the World Health Organization (WHO) and Food and Agriculture Organization (FAO) applied to guarantee the health and food safety and has increased their role largely during the last decade in order to change consumer requirements, raised competition, to diversity the environmental issues and governmental interests.

The World Health Organization (WHO) and Food and Agriculture Organization (FAO) successfully combined HACCP with the Codex Alimentarius to control and examine safe food production practice with seven fundamental principles, namely Conduct a Hazard Analysis, Identify Critical Control Points, Establish Critical Limits, Establish Monitoring Procedures, Establish Corrective Actions, Establish Verification Procedures, and Establish Record Keeping Procedures. Therefore, the application of HACCP includes in five steps: to assemble HACCP team, to describe

product, to identify intended use, to construct flow diagram and to verify diagram. HACCP is increasingly implemented in the food industry around the world. For example the SMEs in UK and Europe, HACCP is implemented in SMEs lesser than large companies due to the scale of business and the motivation of SMEs owners. The world leader consumer foods processor as Kerry Group applied the HACCP food safety management system in their manufacturing units. In the USA, with the help of Corporate Food Safety, business leaders were driven the HACCP implementation in their processing plants as a priority in their business by bringing key members from all plants in the business together to train and develop HACCP programs, and by assembling key members at each plant and introduce HACCP to one plant at a time. In India, the HACCP food safety management system was introduced in the earlier 1990s to present Indian Food manufacturers to outstanding foreign competition with higher standards of products safety and quality. Additionally, Good Manufacturing Practice (GMP) is disciplinary system for the manufacturing, processing, packing or storage of food to ensure its safety and wholesomeness. With the help of GMP, all businesses in the food industry may control all the process of manufacturing firstly from materials, premises and equipment to the training and personal hygiene of staff, which based on four prescribed requirements: Personnel practices, Building facilities, Equipment and Utensils, and Production and Process control. For example the Association of South-East Asian Nations (ASEAN), the European Union, and the Pharmaceutical Inspection Convention integrated GMP to secure the food safety and to form food safety standards in their community. In the USA, GMP regulations were introduced to protect consumers with the addition of any ingredients that would substitute for the food products.

The controlling management is used to help company to control food safety management system within a food business to ensure the safety of food before distributing to the end consumer. Controlling management is characterized into 5 functions: End Function, Pervasive Function, Forward Looking, Dynamic Process, and Related to Planning. Moreover, controlling management function involved in 4 Steps: Establishment of Control Standards, Measurement of Actual Performance, Comparison of Actual and Standard Performance, and Taking Corrective Actions.

Food safety management system provides a preventative approach to identify, prevent and reduce food-borne hazards (National Environment Agency) [122]. Food safety management system performs role in minimizing the risk of food poisoning and in making food safe for consumption. A well designed food safety management with applicable control measures can help food institutions contribute food hygiene regulations to ensure that food prepared for sale is hygienic and safe for consumers. Apart from food safety management, Global Food Safety Initiative also represents

continuous improvement in food safety management system to ensure confidence the delivery of safe food to finished consumers through food safety best practices as Good Practices & HACCP Requirements), BRC Food Certificated, Safe Quality Food (SQF) 2000 International Food Standard (IFS), International Organization for Standardization (ISO 9001: 2000, ISO 22000:2005). Therefore, it was notified that:

- Coca-Cola Company controls their food safety management based on Global Food Safety Initiative (GFSI), namely ISO 9001:2008, ISO 22000:2005, FSSC 22000, The Coca-Cola Management System standards in all operations, and PAS 223:2011 (Publicly Available Specification 223:2011) which ground on the Coca-Cola Company operating requirement, so called KORE, a framework of governance and management system that help Coca-Cola Company to promote the highest standards in products quality and safety, the environmental, and the occupational safety and health across the Policies, Standards, Specifications, Requirements and References of the Coca-Cola system. The Company commitment to deliver quality effectively and efficiently concentrating in five areas: Supplier Management, Global Standards, Global Governance, Continuous Improvement across the company global system, and Productivity.
- To become a world's largest consumer goods company, Unilever Company has improved their strategy related to food safety management by the Unilever Sustainable Living Plan as a sustainable business model. Unilever Company implements a Global Food Safety Initiative (GFSI) benchmarked standard to certify or guarantee the quality and safety for Unilever products, namely Food Safety System Certification 22000 (FSSC 22000), HACCP, ISO 22000, and PAS 220 (Prerequisite programmes on food safety for food manufacturing). Moreover, Unilever Company also has a Safety and Environmental Assurance Centre (SEAC) as an approach to safety and sustainability to provide independent scientific evidence and guidance to identify and manage risk for consumers, workers and the environment, safety of products and supply chain technology, environmental impacts, and sustainability of Unilever's brands, products and Supply Chain.
- Quality and Safety are Nestlé's top priority for the company consumers. Nestlé has internal and external quality management system. Internal quality management system includes independent certification bodies as internal standards, ISO norms, laws and regulatory requirements. External quality management system, however, includes certification bodies as the international ISO 22000:2005/ISO 22002-1 standards. Nestlé also implements Good Manufacturing Practices (GMP) or Critical Control Points (CCP), and Hazard Analysis and Critical Control Points (HACCP) system to guarantee the quality and safety of Nestlé's products. Moreover, Nestlé Company takes responsibility

to ensure quality and safety for their products in five steps: starting with materials, preparation, processing, testing, and packaging and transportation.

It was revealed that attitudes, knowledge and behavior between Russian and Lao Consumers toward Food Safety are both similarities and differences in term of the organic production and the land used for the organic agriculture, and the organic products in the market.

Based on the research, it showed that the amount of land used for organic production increased from 126,847 to 385,140 hectares between 2011 and 2015, meaning that Russian consumers turn their attention to the organic agriculture. And for the reason of the principles of environmentally friendly agriculture as agriculture without the use of synthetic herbicides, pesticides, and mineral fertilizers in the actual agricultural activity using in conventional farming make Russian agriculture as an organic agriculture unintentional, which is risen the interest of large agricultural enterprises to invest in organic agricultural and production in Russia. The market of organic product is expected to expand and organic packaged food sales are expected to grow after a draft law "On Manufacture of Organic Agricultural Products and Modification of the Legislative Acts of the Russian Federation" of Russian Ministry of Agriculture. For example organic sales accounted for about $148 million in 2012 which is 7.8 percent growth compared to 2011 in Russia, and expected to reach $167 million in 2013 and up to $225 million in 2015.

The law "On Manufacture of Organic Agricultural Products and Modification of the Legislative Acts of the Russian Federation" was enforced to use in 2015. The law focuses directly on defining the meaning of organic production, types of organic foods and the important of product labels.

The finding of Oliver Meixner, Rainer Haas, Yana Perevoshchikova, and Maurizio Canavari (2014) showed that Russian consumers are not familiar with organic certification and organic labels, so that can lead to the unsubstantiated claims about the GMO or pesticide residues added in the products. And based on research of AgriCapital found that 45 percent of Russian manufacturers apply the words “BIO”, “natural” or “eco-friendly” on their labels without any appropriate certification. This can decrease the trust of Russian consumers to buy the organic products from Russia.

Most of organic products are mainly imported from Germany, France and Italy with the high cost to meet the high demand of Russian consumer. The different profile of Russian consumers also affects the behavior of consumer. For example Russian consumers who live in the big city as Moscow or Saint-Petersburg tends to be willing to buy organic products due to the available of organic products only in premium supermarkets and some specialized organic food shops as Azbuka Perekrestok Green, Metro Cash & Carry, Globus Gourmet, Azbuka Vkusa, Seventh Continent and others. However,

Russian consumers who live in the small cities appear to buy local products instead of imported organic products, or local Russian consumers prefer to grow fruits and vegetable in their garden with no chemical substances or pesticide.

However, Organic agriculture in Laos has good potential, both for local consumption and the export market. There are four systems for organic production in Laos, which are the upland fallow rotation (slash-and-burn) system, wild products collected in the forest and fallow lands, fruits produced without any external inputs, and market driven organic production. It showed that Lao production systems are traditional systems based on low external inputs; low levels of pesticide residues and many of the agriculture products are organic by default. Lao government and Ministry of Agriculture and Forest works together to develop the organic agriculture by providing legislation, and by advancing the standard for organic agriculture. The Ministry of Agriculture and Forestry of Laos (MAF) has launched four production systems to promote clean agriculture, namely conventional traditional agriculture without chemical inputs, safe conventional chemical agriculture, good agricultural practices (GAP), pesticide free agriculture, and organic agriculture. The "new agriculture" system by Ministry of Agriculture and Forestry of Laos encourage smallholder farmer to access to new and high value market as in Europe, Japan, and North America. Moreover, this system also helps in developing the regulation and international standards as ISO 1400-Environmental Management Systems and ISO 24000-Social Responsibility, organic agriculture labeling in order to get into regional and global market.

The surveys conducted by PROFIL found that the awareness of Lao consumers toward food safety have been on the rise since mid-2000s [123]. Lao consumers buy organic products with traders or producers who they know that selling organic products and most of organic products are fresh products which produced by small farmers without the input of chemicals or for products collected in the forest.

Lao consumers do not pay more attention to organic label or organic certification, due to the well comprehension of the traditional farming systems. The price of organic products influences the willingness of buying of Lao consumer. The research showed that Lao consumers are willing to buy if organic products are available in the reasonable price. However, the domestic organic market in Laos grow rapidly since the first launch of weekend organic farmer's market organized by PROFIL at Wat ThatLuang, Vientiane, in 2006, another two farmer markets in XiengKhouang and LuangPrabang. And the AgroAsie Shop that sell some organic products, such as rice, and vegetables in Vientiane around the end of 2011.

The result received from our survey reported that education, income and family status affected the attitude of consumers. Consumers should have education in the field of food safety on a daily basis. And the government also should provide food safety agencies and encourage these agencies to contribute the education of food safety. For example, the reinforcement should be introduced on the campus food safety campaigns as posters, advertising aids. It revealed that high income respondents tend to hold positive attitudes toward food safety. This type of respondents has a preventative lifestyle who tries to find the best things for their life such as healthy eating, education on personal hygiene rules. Our results further suggested that the attitude of consumers toward food safety depends on family status. The advices of family member inspire consumers to form attitude, behavior, and habit. The difference between Russian and Lao consumers is the willingness to buy organic products. Because most of organic products from Russia are imported from other countries which can increase the price of organic products in the domestic markets, and because of the income status and education level of Russian consumers which influence consumer to purchase of organic products. The similarity is the awareness of organic label, especially consumers in rural area.

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APPENDIX A - Milestones in the evolution of food standards

Milestones in the evolution of food standards	
Ancient times	Attempts are made by early civilizations to codify foods
Early 1800s	Canning is invented
Mid-1800s	Bananas are first shipped to Europe from the tropics
1800s	• The first general food laws are adopted and enforcement agencies established • Food chemistry gains credibility, and reliable methods are developed to test for food adulteration
Late 1800s	A new era of long-distance food transportation is ushered in by the first international shipments of frozen meat from Australia and New Zealand to the United Kingdom
Early 1900s	Food trade associations attempt to facilitate world trade through the use of harmonized standards
1903	The International Dairy Federation (IDF) develops international standards for milk and milk products. (IDF was later to be an important catalyst in the conception of the Codex Alimentarius Commission)
1945	FAO is founded, with responsibilities covering nutrition and associated international food standards
1948	WHO is founded, with responsibilities covering human health and, in particular, a mandate to establish food standards
1949	Argentina proposes a regional Latin American food code, Código Latinoamericano de Alimentos
1950	Joint FAO/WHO expert meetings begin on nutrition, food additives and related areas
1953	WHO's highest governing body, the World Health Assembly, states that the widening use of chemicals in the food industry presents a new public health problem that needs attention
1954–1958	Austria actively pursues the creation of a regional food code, the Codex Alimentarius Europaeus, or European Codex Alimentarius
1960	The first FAO Regional Conference for Europe endorses the desirability of international – as distinct from regional – agreement on minimum food standards and invites the Organization's Director-General to submit proposals for a joint FAO/WHO programme on food standards to the FAO Conference
1961	The Council of the Codex Alimentarius Europaeus adopts a resolution proposing that its work on food standards be taken over by FAO and WHO
1961	With the support of WHO, the United Nations Economic Commission for Europe (UNECE), the Organisation for Economic Co-operation and Development (OECD) and the Council of the Codex Alimentarius Europaeus, the FAO Conference establishes the Codex Alimentarius and resolves to create an international food standards programme
1961	The FAO Conference decides to establish a Codex Alimentarius Commission and requests an early endorsement by WHO of a joint FAO/WHO food standards programme
1962	The Joint FAO/WHO Food Standards Conference requests that the Codex Alimentarius Commission implement a joint FAO/WHO food standards programme and create the Codex Alimentarius
1963	Recognizing the importance of WHO's role in all health aspects of food and considering its mandate to establish food standards, the World Health Assembly approves establishment of the Joint FAO/WHO Food Standards Programme and adopts the Statutes of the Codex Alimentarius Commission
Source: Report of the First Meeting of the Joint FAO/WHO Expert Committee on Nutrition, 1950	

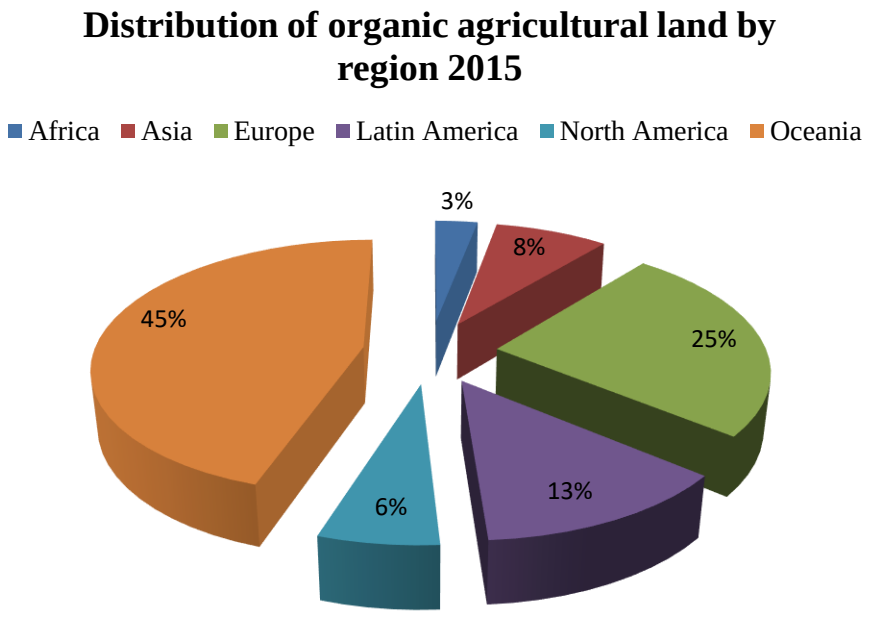
APPENDIX B – World: Organic agriculture land (including in-conversion areas) and regions 'shares of the global organic agricultural land 2015

Region	Organic agricultural land	Regions' shares of the global organic agricultural land
Africa	1,683,482	3%
Asia	3,965,289	8%
Europe	12,716,969	25%
Latin America	6,744,722	13%
North America	2,973,886	6%
Oceania	22,838,513	45%
Total*	50,919,006	100%

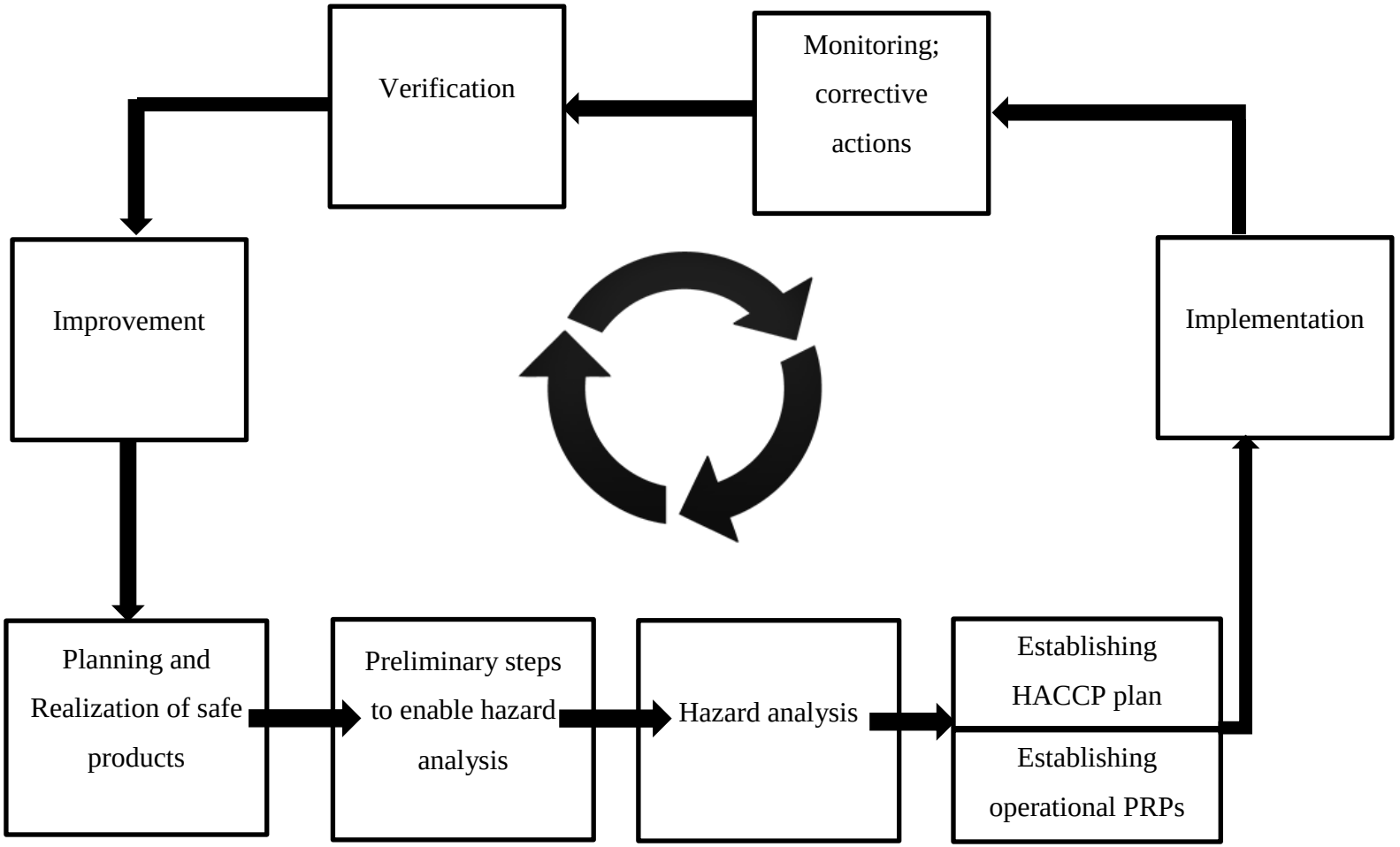
Source: FIBL survey 2017

Note: Agricultural land includes in-conversion areas and excludes wild collection, aquaculture, forest, and non-agricultural gazing areas.

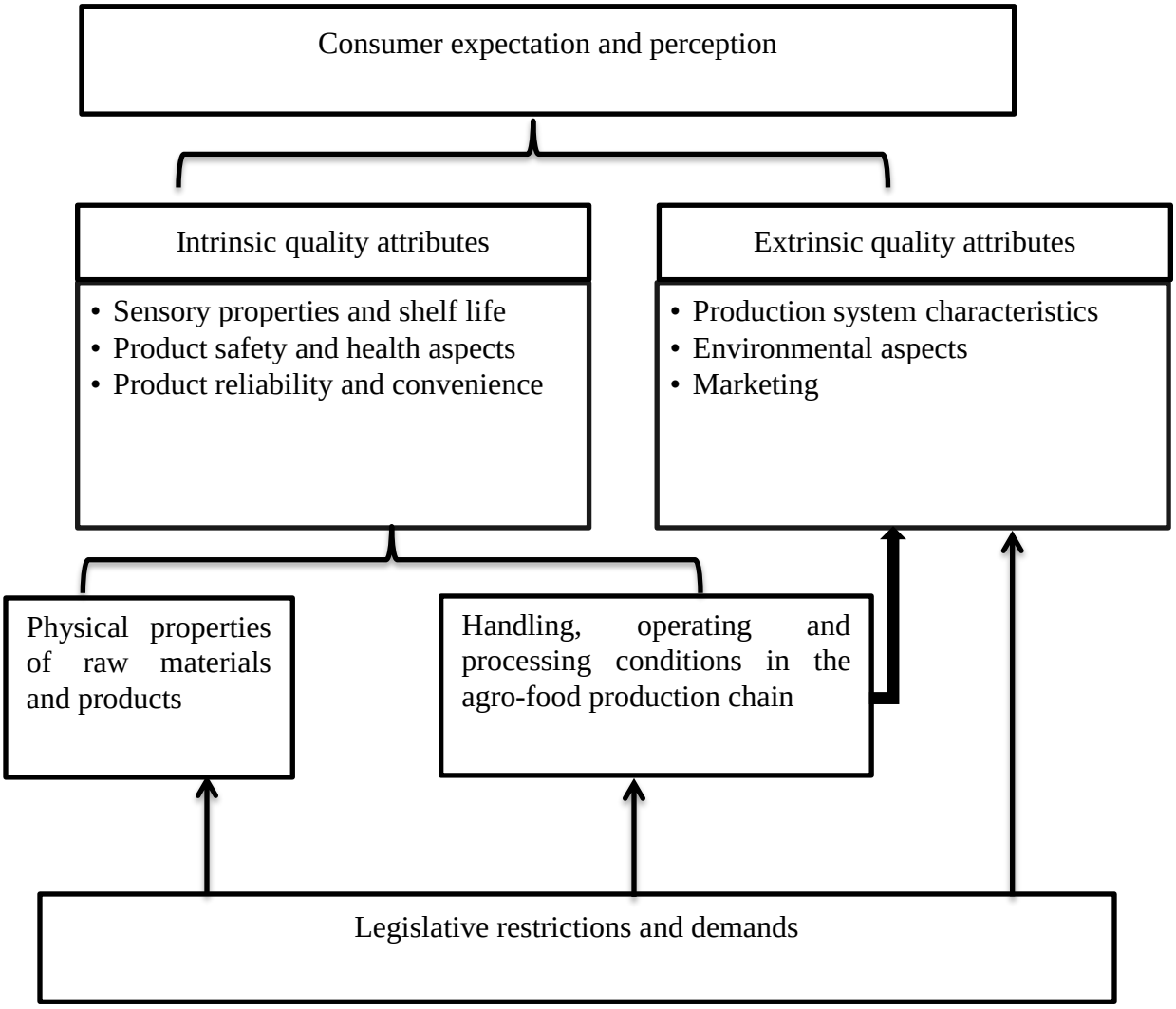
*Includes correction value for French overseas department



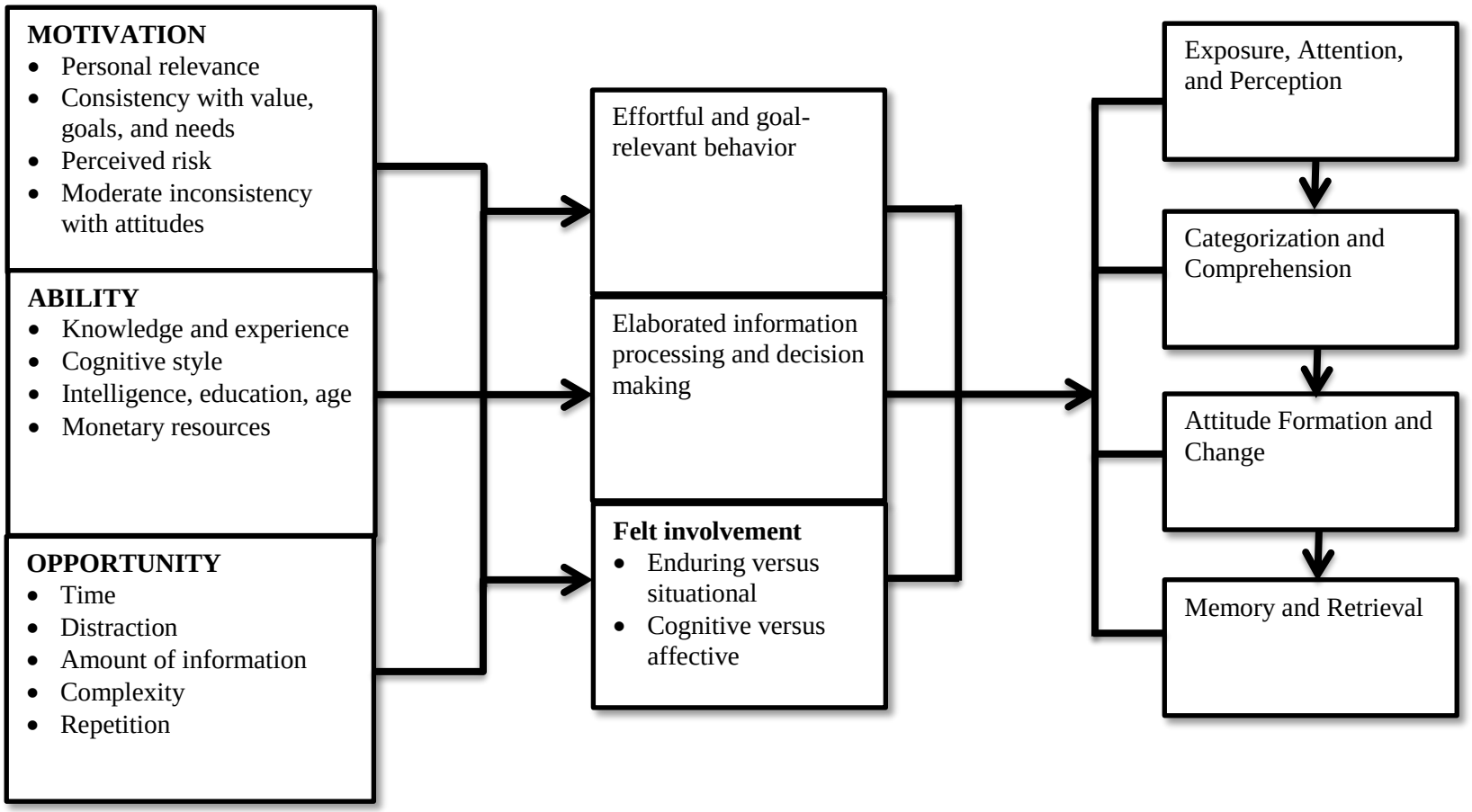
APPENDIX C – Food Safety Management System (FSMS) Process Model



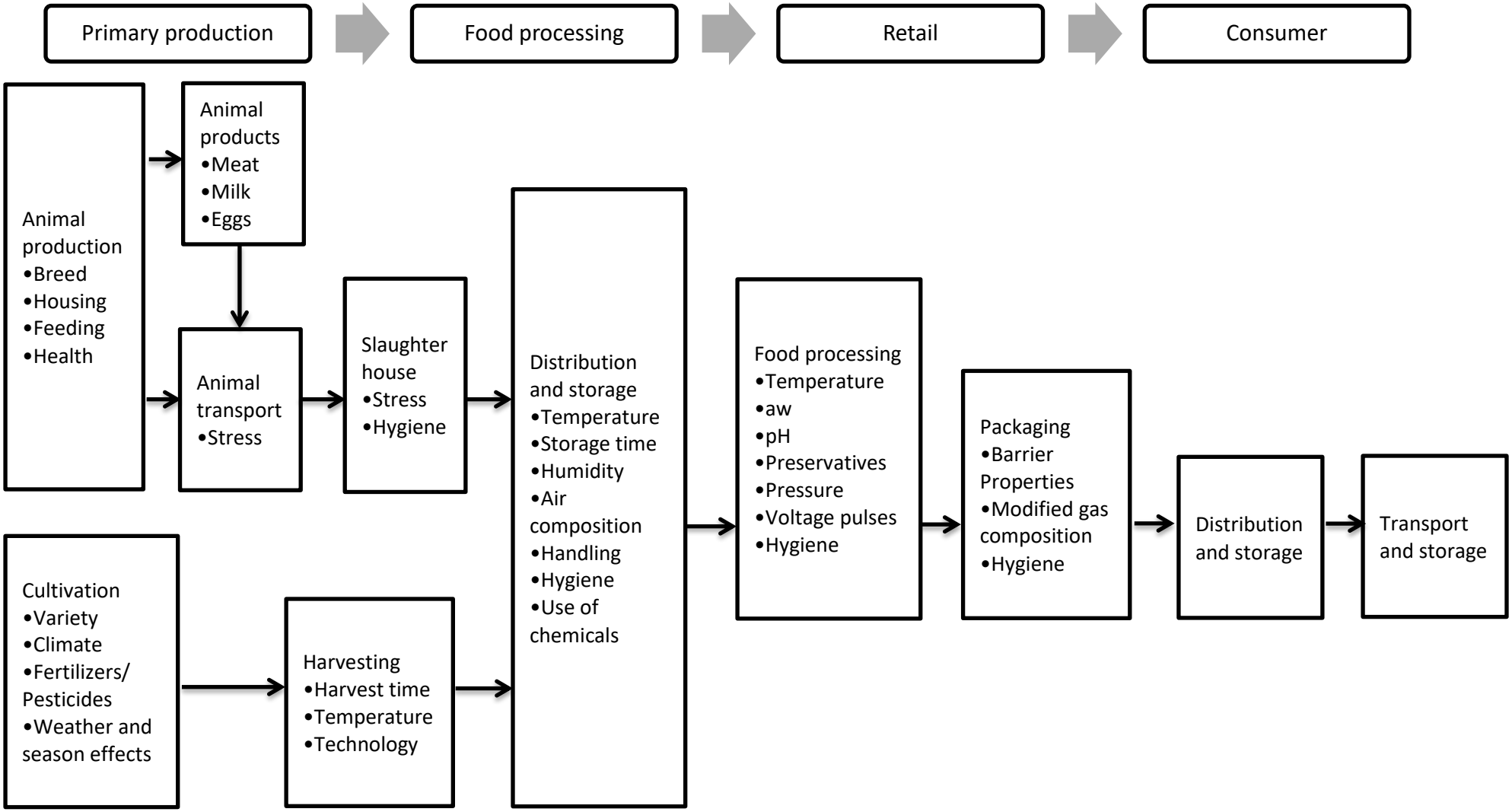
APPENDIX D - General intrinsic and extrinsic attributes affecting consumer expectation and perception



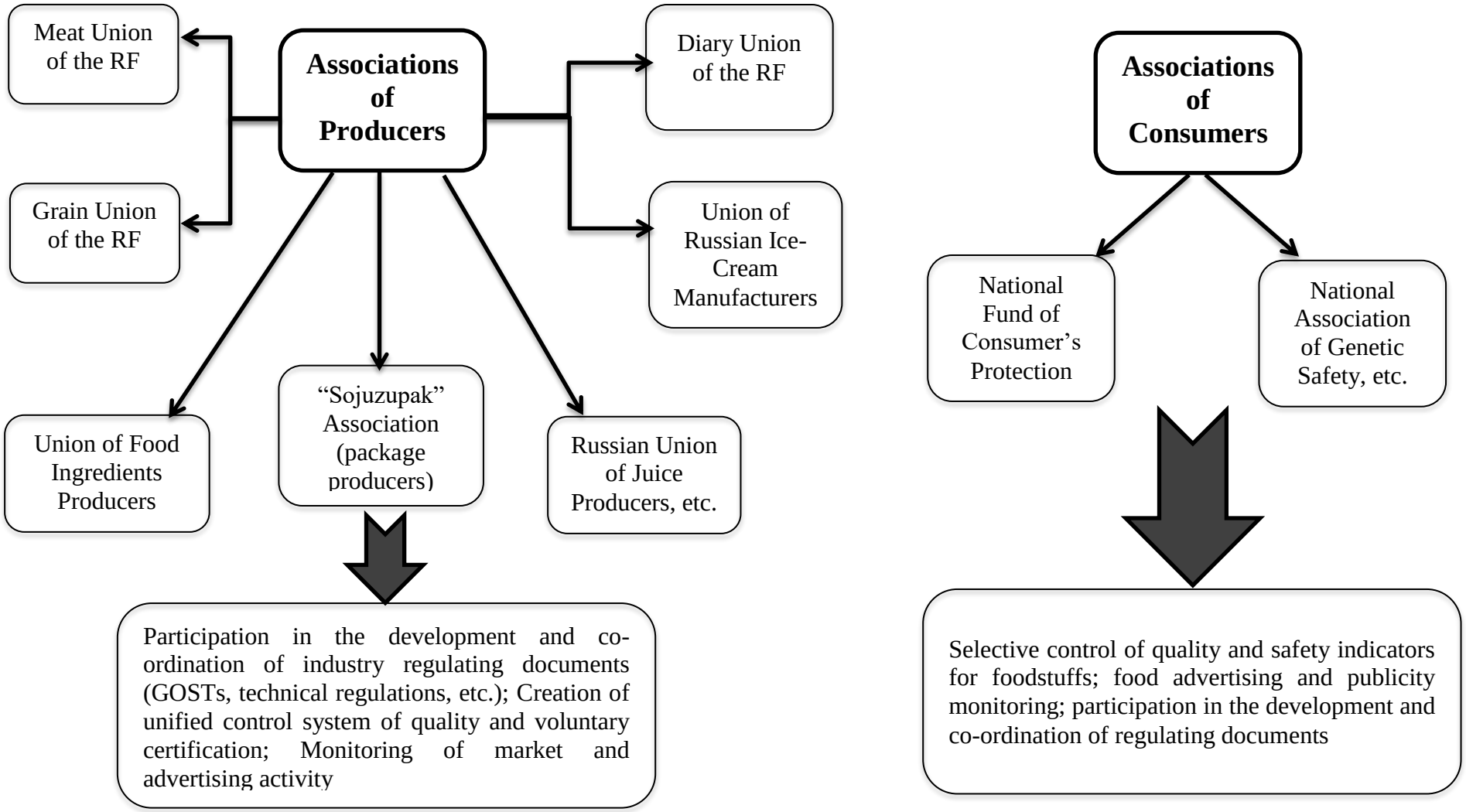
APPENDIX E – The Psychological Core: The Effects of Motivation, Ability, and Opportunity



APPENDIX F - Quality affecting factors in agro- food chain



APPENDIX G - Non-governmental Organizations and Associations in Russian Food-Related Area



Source: Vladimir Popov, Bakh Institute of Biochemistry Russian Acad. Sci. Moscow, Russia, "Food Safety in Russia", International Seminar "Emerging Food Safety Risk: How can we know?" , 27 November 2007, Bangkok, Thailand

APPENDIX G - Quantities of selected agricultural product exported of Laos (t)

Items	2000	2001	2002	2003
Maize	150	8,057	5,877	13,504
Job's tear	-	435	438	2,590
Sesame	-	50	49	83
Coffee (raw)	16,905	17,025	19,206	22,000
Potatoes	-	9	914	1,504
Peanut	26,631	2,152	479	1,006
Milling Rice	-	969	2,520	504,455
Paddy rice	-	-	-	230
Black Rice	-	-	-	49
Cotton	34	5	-	123
Cabbage	775	180	644	-
Banana	292	54	119	121
Ginger	6	-	63	25
Garlic	14	50	-	25
Soy bean	-	198	20	786

Source: Department of Agriculture, Department of Custom, Department of Food and Drug

APPENDIX H - The key elements of a Food Safety Plan of Laos

Sector	Agency	Food Safety Responsibility	Notes
Legislation	Ministry of Agriculture	Responsible for Primary production: formulate guidance related to SPS measures and develop decree, regulation on agriculture practice, pesticide and livestock management.	Existing law and regulation from MAF -Agriculture law (1998) -Decree on livestock management (1993) -Reg on seed and plant for cultivation(97) -Reg on fertilization management (2000) -Reg on management and use of pesticide (2000) -Reg on livestock management (1997)
	Ministry of Industry, Commerce, Science and Technology Agency and Ministry of Health (Food and Drug Department- Hygiene and Prevention Department)	Responsible for the processing, importation, exportation and distribution: develop necessary regulation such as: food Importation- Exportation, processing of food safety, regulation of bottle drinking water and others regulation related to food additive, inspection, hygiene and some code of practice.	Existing law and regulation : -Food law (2004) -Hygiene law (2002) -Processing Industry law
Laboratories	National Food and Drug Quality Center	Responsible for physical, chemical and microbiological analysis of food samples.	This is the main laboratory to issue certificates of analysis for food processors and conduct quality assessment for the FDD
	Animal Health Center- Lab of Livestock and Fishery Depart. (MAF)	Carry out animal parasite and diseases analysis and certify a sanitary of meat products.	
Monitoring and surveillance	National Epidemiology Institute – Hygiene and Prevention Department	Conduct the clinical analysis and surveillance for food borne illness	Weekly report of food borne illness has been collected at Hygiene and prevention Department
	FDD-FDQC (MOH)	Study on food contaminants Monitor on high risk food of imported food and locally manufactured food product	

	Animal Health Center- Lab of Livestock and Fishery Depart. (MAF)	monitoring and surveillance food borne disease and animal disease	
Implementation of Food safety systems	MOH by coordinating with MAF and other related agencies	Promote the implementation of GHP, GMP, GAP, and HACCP application at farmers, food premises/food factories/processing plants and Improve of using botanical pesticide.	National HACCP Committee and HACCP certification body are not in place
Food inspection and certification	FDD (MOH) DOA-DOLF (MAF)	-strengthening the control capability at borders/International check points -supervise the implementation of inspection in the central and provincial level	
Education and training	FDD (MOH)	Train food inspectors and food handlers on food safety	
	DOA-DOLF (MAF)	Establish group of agriculture producer and farms	
Information sharing	FDD (MOH), DOADOLF (MAF), MOC	-Publish and inform regulations related to crop production such as: seed/planting materials, fertilizers, pesticide and rearing pathogen and natural enemy for controlling pest -Disseminate Codex, ASEAN, WTO document related to food safety	
Research and Development	FDD-FDQC	- Undertake a study of food contaminants to provide information for risk manager	
	University of Agriculture- DOA (MAF)	- Study specific crop to develop a formulation of botanical pesticide	
International participation	MOH by coordinating with MAF and other related agencies	- Effective participation on Codex - strong network in ASEAN - participate in ASEAN Codex Task Force as ASEAN Expert group - Training in database imported inspection	

Consumer participation in food safety	No consumer association		Lao Women Union, Youth Union has been considered as consumer
Food Safety Control System	Integrated of Multisectoral system Primary production – MAF Processed product – MOIH, MOC, MOH, STEA Finished product – MOH (FDD, H&PD)		

Source: The Ministry of Agriculture and Forestry of Laos (MAF)

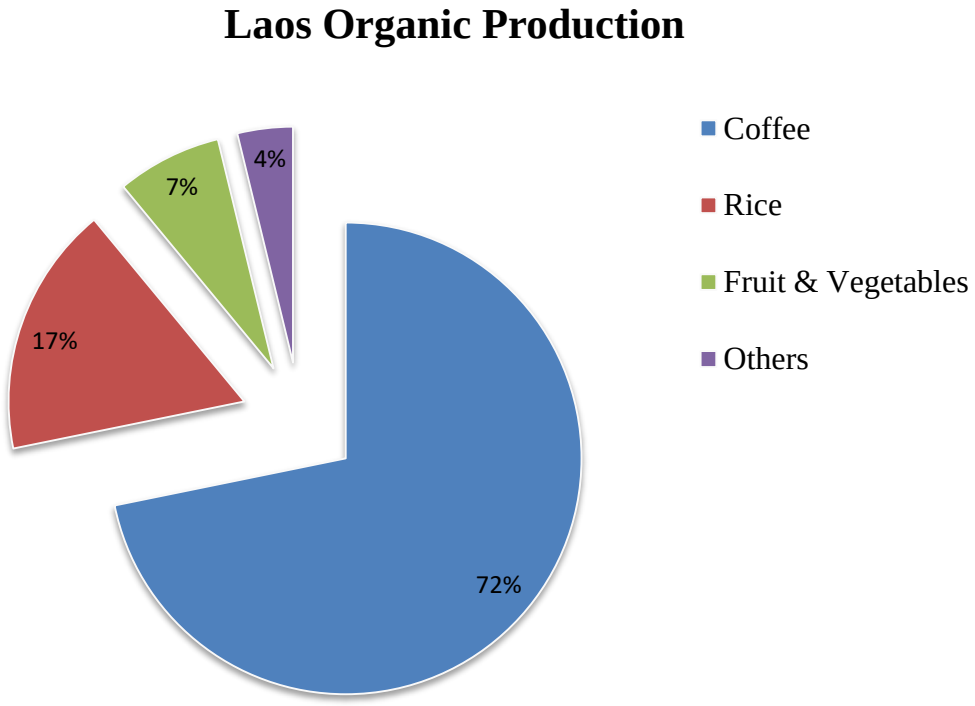
APPENDIX I - Strength and potentials for organic farming in Laos

Market	Good reputation of Lao products
	Growing international market for organic products
	Big demand for organic products in domestic and border markets
	Reportedly unsafe imported agricultural commodities (with pesticide residues)
Production	Favorable conditions for organic products in the Lao PDR (not much mineral fertilizer is imported / applied)
	Existing farmers' groups organization, but geographically limited (e.g. Boloven Plateau)
	There are motivated farmers
	Impact on farms of conversion to organic farming is known in the region (Vietnam, Thailand, China)
Experience	Existing experience in the country (e.g. Lao Farmers' Products)
	Strong "domino" effect among farmers
	Experience with organic farming in the region and worldwide
	Experience with organic fertilizers (EM, BE)
Interest and support	High interest for organic farming at all levels
	Existing network for sustainable farming in the Lao PDR (SA Forum)
	Public awareness of problems linked to the use of mineral fertilizers and pesticides
	Agro-chemical industries (lobby) are not strong in Lao PDR
	Existing bio-fertilizers factories in the country
	Support from the government policy
Commodities with potential	Fruit and vegetables for the domestic and regional markets
	Mulberry tea for the international market
	Purple rice for the international market
	Organic coffee for the international market
	Cotton for processing in the country (handicrafts)

Source: Helvetas 2003 (Based on stack holder interviews)

APPENDIX J - The statistical information of certified organic farmland, number of certified farmers and wild-harvest areas since the year 2008.

Year	Organic Land (Land)	No. of Farmer	Wild Harvest (ha)
2008	1,803.53	795	N.A.
2009	5,243.85	1,832	N.A.
2010	6,005.78	1,333	16,786
2011	5,989.59	1,342	16,786



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