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Exploring collaborative in-store shopping with remote shopping partners: A case study with meat consumers

by

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The research associated with this thesis abides by the international and Australian codes on human and animal experimentation, the guidelines by the Australian Government's Office of the Gene Technology Regulator and the rulings of the Safety, Ethics and Institutional Biosafety Committees of the University. Ethics Approval No : H0017697.

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Abstract

Collaborative shopping is an activity where two or more people shop together to fulfill their purchase needs. Collaborative shopping improves consumers' purchase decisions and social bonds. It occurs in-store, online, and where one person is present in the store, and others are in a different location, communicating via technology. Food purchasing is one of the main contexts where consumers are involved in collaborative shopping. When consumers shop alone, they often use mobile technology while in the shop to communicate with their friends and family for various purposes. They depend on basic mobile interaction, such as voice calls, text messages, or multimedia messages. In recent years human-computer interaction (HCI) researchers have given a lot of attention to the food industry and it has become a significant research area in that community. HCI Researchers are focusing on helping food consumers by introducing technology that supports a range of food-related activities from shopping to eating. However, most of the previous research has focused on individual consumers whereas collaborative shopping involves two or more shoppers.

This research explores consumers' remote collaborative shopping in the context of meat shopping to understand consumers' in-store collaborative shopping behavior such as for what purpose they collaborate with their remote shopping partner and how mobile technology is being used to support their collaboration.

Meat is one of the main protein sources for many people. During their meat purchase, consumers search for meat-related information to make a purchase decision, because consumers value good meat for better health and taste.

During shopping, not every consumer understands the product-related information that is available at the point of purchase. In that situation, consumers may communicate with their friends and family to seek preferences and meat-related information. To understand meat consumers' in-store collaborative shopping with remote shopping partners, this research investigated premium beef, beef, chicken, lamb, and pork meat consumers' in-store collaborative shopping with a remote collaborator.

A mixed-methods research methodology was adopted to collect and analyse qualitative and quantitative data. In the first phase of the research, a qualitative study was conducted. Semi-structured interviews were conducted with premium beef consumers to identify their

instore collaborative shopping behavior with remote collaborators and uses of mobile technology. Data were analyzed using a grounded approach. The qualitative study led to the quantitative study. In the second phase of the study, an online survey was conducted with beef, lamb, pork, and chicken meat consumers to explore their in-store collaborative shopping. In this phase data were collected using an online survey and data were analyzed using descriptive statistics.

The findings of the qualitative and quantitative studies show that remote collaborative shopping is part of the meat shopping context. Meat consumers value their friends and family's opinions to make purchase decisions. In the context of remote collaborative shopping, current mobile technology plays an important role as mobile technology is usually accessible anytime anywhere. However, they are only using the existing communication features of mobile technology, there are no dedicated tools to support meat consumers' remote collaborative needs where meat consumers could access product information, communicate with their partners in real-time, and compare different products. The study also identifies the types of information consumers share with their remote collaborators during this type of collaborative shopping. The most important information consumers share are price, cut, type, shopping location, and brand. They discuss this information to confirm the purchase with their remote shopping partner. Finally, findings identify consumer's future preferences for using technology to support their remote collaborative shopping. Consumers prefer real-time interaction where they can communicate with their remote shopping partner, share real-time information, and make a joint decision. They also want accurate local product information to decide on their purchase.

The major contribution of this thesis includes the exploration of remote collaborative shopping in the meat shopping context in-terms of why meat consumers collaborate, how they collaborate, and the importance of mobile technology in a remote collaborative shopping context. These findings contribute to the body of knowledge to better understand remote collaborative shopping in the meat shopping context. Also, this research established an understanding of the technological, social, and knowledge requirements for remote collaborative shopping.

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CHAPTER 1 — INTRODUCTION

1.1 Introduction

Food is not only a source of nutrition but is also part of community life, personal life, and is central to social interaction. Food purchasing, meal-times, cooking and other food-related activities provide opportunities for sharing, relaxation, connectedness, and expressions of identity (Comber, Ganglbauer, Choi, Hoonhout, Rogers, O'Hara and Maitland, 2012). The experience of buying, growing, storing, cooking, eating, and sharing food is changing in most cultures.

Nowadays, consumers prefer to buy high quality food (Joo, Kim, Hwang and Ryu, 2013). To achieve this goal, consumers use multiple channels to purchase food. Technology also plays a big role in purchasing food in-terms of searching for food-related information or looking for a recipe (Helm, 2015; The-Hartman-Group, 2015).

Since the early 2000s (Park, Kim and Leifer, 2017) the Human-Computer Interaction (HCI) community has been exploring consumer interactions with food such as purchasing, eating, cooking and sharing behavior (Comber *et al.*, 2012) with the use of digital technology (Khot, Lupton, Dolejšová and Mueller, 2017) under the term Human-Food Interaction (Khot and Mueller, 2019). Interacting with food using technology presents interesting challenges to the HCI community (Comber, Choi, Hoonhout and O'hara, 2014). Various factors have to be considered when designing digital technology for what we buy or eat such as, physical, social, cognitive and physiological factors (Connor, Armitage and Conner, 2002). These factors are influenced by consumers' values, culture, social norms, and demographic background. HCI researchers, also raised concerns about what and when to deliver food-related information to consumers and the best way to introduce the technology to consumers (Chinthammit, Duh and Rekimoto, 2014). Therefore, to design positive and meaningful interactions for consumers, it is important to identify their daily food practices and the opportunities for the design of technology to support such practices (Comber *et al.*, 2012).

Food technology has been focused upon individuals' problems with food, like lack of nutrition knowledge, inefficiency in understanding food-related information or inexperience with a particular food. More particularly, previous research has focused on the gaps, limitations, and struggles that individuals have (Grimes and Harper, 2008; Comber *et al.*,

2014). To solve the problem, researchers have designed technologies to be corrective in nature. Corrective technology attempts to make better interactions between humans and food, however, this type of research creates challenges (Grimes and Harper, 2008; Henze, Olsson, Schneegass, Shirazi and Väänänen-Vainio-Mattila, 2015). Grimes and Harper (2008) argue that corrective technology is used on the premise that an existing situation should be changed or that users might want it changed; if changes are not desired then there would be no need to introduce technology or applications that fix human-food interaction.

Instead of making corrective technology artifacts, researchers could focus on designing celebratory technology: technologies that celebrate the way that people interact with food for example, how consumers successfully purchase their food using technology (Grimes and Harper, 2008). To design meaningful and celebratory technologies for consumers, it is essential to identify consumers' daily food practices and behaviors and relevant technology (Grimes and Harper, 2008; Comber *et al.*, 2012; Ng, Shipp, Mortier, Benford, Flintham and Rodden, 2015).

One of the fundamental activities surrounding food is its purchase. A consumer's food purchase is a complex process and various factors influence their purchasing decisions such as personal factors, environmental factors, and the properties of the food. The whole decision process is divided into several steps: need recognition, search for information, evaluation and choice (Steenkamp, 1997). Evaluation and choice are the most critical steps in the food purchase decision-making process, as consumers evaluate the product based on their previous experience and the available information on the product. Consumers consider several criteria before making purchase decisions regarding health, taste, nutritional value, reliability, quality, price, origin, and the convenience of food. These criteria are important for when they buy food (Knight, Jackson, Bain and Eldemire-Shearer, 2003; Wilcock, Pun, Khanona and Aung, 2004; Tudoran, Fischer, van Trijp, Grunert, Krystallis and Esbjerg, 2012). However, consumers face difficulties when making purchase decisions based on the available information and matching it with their personal preferences due to information asymmetry (Jin, Zhang and Xu, 2017; Sysoeva, Zusik and Symonenko, 2017). Food producers provide limited information to consumers regarding the food (Jin *et al.*, 2017)— such as nutritional value, origin, and other food-related information. Food product labels contain limited information that complies with various regulatory requirements. Information about food is important for consumers as they want to ensure product quality before they purchase the product (Sackey and Ullmann, 2012).

Information about provenance (when, how and where), food is produced and distributed is mainly available to food producers, suppliers, distributors and retailers of food products; consumers are mostly unaware of such supply chain information (Yoo, Parameswaran and Kishore, 2015). Consumers get confused about products with complex characteristics too: because of limited information on food products, consumers face difficulties making purchase decisions that support their individual, social or cultural preference (Sackey and Ullmann, 2012). Also, the internet allows consumers to obtain information from various sources and this can cause information overload (Van Rijswijk and Frewer, 2012) and confusion (AMPC, 2016). When consumers are unable to evaluate the information, they often seek advice from their friends and family, as consumer trust the opinions of friend and family (Lee, Niode, Simonne and Bruhn, 2012; Watson and Wyness, 2013; Lioutas, 2014).

Shopping with friends and family is referred to as *collaborative shopping* or social shopping. Collaborative shopping occurs in online platforms, physical stores, or remotely. In online platforms, people from different locations make a purchase decision online together. In physical collaborative shopping two or more people shop together in a physical store where they discuss the purchase and make a joint decision. People also collaborate with friends and family when they shop alone at a physical store with the help of technology. This is called remote collaboration. Food shopping is mainly a situated action, that is it mainly occurs inside physical stores. That means collaboration with regard to food shopping mainly needs to involve at least one person being physically present in-store. Although previous research has identified that people remotely collaborate with their friends and family during food purchase (Morris, Inkpen and Venolia, 2014; Doub, Levin, Heath and LeVangie, 2015; Ocepek, 2018), there is a knowledge gap about food consumers' remote collaborative shopping and how technology is being used. This research aims to explore remote collaborative shopping of meat consumers and how technology is being used to support their remote collaborative shopping.

Research shows that HCI can play a role in informing the purchase decision of food products (Bedi, Diaz Ruvalcaba, Foley-Fisher, Kamal and Tsao, 2010; Sackey and Ullmann, 2012; Hwang and Mamykina, 2017). However, HCI often fails to provide support to the different types of consumers as digital technology often does not combine relevant information with an incentive to act (Sackey and Ullmann, 2012). To support consumers through the

purchasing process, researchers need to have a deeper understanding of consumers and their needs and preferences (Remy, 2013).

1.2 Research Motivation

When two or more people shop together it is called collaborative shopping. The purpose of collaborative shopping is dependent upon various needs, including decision-making requirements, task-based reasoning, and the relationship or social bonds between participants (Morris *et al.*, 2014).

Researchers have studied collaborative online retail shopping (Leitner and Grechenig, 2008; Zhu, Benbasat and Jiang, 2010; Gao, Reddy and Jansen, 2016) and in-store retail collaborative shopping (Chan, 2001; O'Hara, Black and Lipson, 2006; Morris *et al.*, 2014). In online collaborative shopping, physically separated consumers can search, navigate and make purchase decisions from their separated locations using a collaborative web page and mobile app. However, collaborative bricks-and-mortar shopping is different than online collaborative shopping. In collaborative bricks-and-mortar shopping, collaborators are co-located in a physical shop, where they directly communicate with their shopping companions. Shopping with collaborators is an enjoyable experience and it also influences the purchase (Lindsey-Mullikin and Munger, 2011).

Purchasing food is one of the main contexts where people prefer to contact their friends and family to make decisions (Tohidi and Warr, 2013; Morris *et al.*, 2014) but there have been few further studies in this area, and this highlights a problem that needs to be investigated by this research: there are several already-identified benefits that come from collaborative shopping, but modern lifestyle factors can make it impossible for people to shop while co-located. To encourage the benefits that arise from collaborative shopping, tools need to be made available which facilitate these benefits. It is unclear if existing tools are already sufficient or if existing tools may be used in new ways or if new tools need to be developed. This research will investigate these things.

Mobile devices and their applications have become an important channel for shoppers as they purchase and research their purchases (Shukla and Sharma, 2018). And due to 'anytime, anywhere' access, mobile devices create opportunities for shoppers to shop collaboratively. In modern days, mobile applications are designed to provide relevant

information and service to the users (de Reuver and Bouwman, 2010) and context-aware applications are capable of understanding users' current situations, for example, a context-aware application can filter information based on the user's preferences, the purpose of use, current location, and time. Many mobile applications include social context features such as catering to the preferences of the user's friends and family members, linking strangers with common interests or sharing content, tracking the status of social contacts, allowing users to exchange ideas and share information with others in every aspect of life (Farmer, Holt, Cook and Hearing, 2009). Using such applications, users can communicate with their friends and family when the need arises. However mobile applications may not always be able to support structured task-oriented activities (Consoli, 2012). Research has shown that users have a variety of social needs and have to complete different tasks involving different people (Ickin, Wac, Fiedler, Janowski, Hong and Dey, 2012). Thus, applications are required to support different scenarios involving various tasks, environments, and users. Users are increasingly using mobile devices to seek information on the go, at anytime and anywhere as mobile devices have such capabilities (Okoye, Mahmud, Lau and Cerruti, 2011). Since users tend to seek information and achieve their goals as a group, social context-sensitive mobile applications have the potential to make collaboration possible when users are not together allowing them to initiate information-seeking with the help of others at any place at any time and also to perform problem analysis and decision-making as a group. For this reason, mobile applications need to support broader requirements which will allow people to collaboratively define the problem and different ways of resolving it, and come to a mutual decision (Tan and Goh, 2015).

Information seeking can be a collaborative activity wherein certain contextual situations individuals seek assistance from others when they need information or are uncomfortable in the situation. However, most search tools and techniques are designed for single users in an uncollaborative mode and focused on general information retrieval rather than domain-specific information. There has been little work in investigating domain-specific collaborative search and task-focused systems, as opposed to general web search engines such as Google that contain collaborative features. The development of domain-specific collaborative tools could improve the effectiveness and efficiency of collaborative shopping (Gao, Reddy and Jansen, 2017; Gao *et al.*, 2016).

This research focuses on in-store collaborative shopping with a remote collaborator in the food shopping domain: particularly the meat shopping context and how consumers use

mobile technology to connect with their remote shopping partners. This research initially focused on premium beef consumers due to the project sponsor¹. However due to the small number of participants because of the limited subject area, after the qualitative study was completed, the research was expanded to investigate other types of meat (chicken, lamb, and pork) consumers' collaborative in-store shopping with remote collaborators.

Meat consumers purchase meat for better taste and health benefits (Sepúlveda, Maza and Mantecón, 2008; Morales, Griffith, Wright, Fleming, Umberger and Hoang, 2013; Escriba-Perez, Baviera-Puig, Buitrago-Vera and Montero-Vicente, 2017). During purchase, they appreciate product information and search for information on relevant intrinsic and extrinsic quality cues (Ardeshiri and Rose, 2018). During product evaluation, they often seek opinions from others to help them decide on their purchase.

Previous research has suggested that consumers are involved in collaborative in-store food shopping however, to our best knowledge there is no research which explores collaborative in-store shopping with a remote shopping partner in the meat shopping context. Therefore, the purpose of this research is to explore meat consumers' in-store collaborative shopping with remote shopping partners and identify how they are doing it currently. Designing tools to support collaboration between remote collaborators is a challenging task because systems integrating these tools are complex. They must allow for different types of activities and technological advances are still needed to overcome their existing limitations (Kaeri, Moulin, Sugawara and Manabe, 2018). Understanding consumers' in-store collaborative process will provide insights that HCI researchers and interaction designers can use to design and develop collaborative technological solutions for supporting consumers' collaborative shopping needs. .

1.2.1 Research Objectives

- 1. To explore meat consumers' collaborative shopping practices in the context of in-store shopping.*

¹ This study was supported by *The Australian Research Council: Industrial Transformation Research Hub — "Pathways to Market: Transforming Food Industry Futures through Improved Sensing, Provenance and Choice"* in collaboration with premium beef suppliers and industry partner HW Greenham & Sons Pty Ltd.

For more information about the Research Hub visit: <https://www.utas.edu.au/pathways-to-market>

This research seeks to understand the collaborative meat shopping behavior of consumers focusing upon what influences consumers to collaborate with their collaborators.

2. *To investigate how mobile technology is being used to support collaborative meat purchasing in bricks-and-mortar settings.*

This research seeks to understand how consumers are using mobile technology to support their collaborative needs and what issues they face.

3. *To identify the factors that need to be considered for designing technological artifacts to support meat consumers' collaborative shopping tasks.*

This research will identify factors that need to be considered for designing technological solutions for meat consumers to improve their in-store collaborative shopping experience in terms of technology, and information seeking and sharing.

1.2.2 Research Focus

This research will focus on food consumers' collaborative shopping practices, particularly in the in-store meat shopping context. How consumers collaborate with remote shopping partners from the shop, what the purpose of doing that is, and what the most important information that they share is, will all be investigated.

1.2.3 Research Questions

1. What influences in-store meat shoppers to collaborate with remote shopping partners?
2. How does mobile technology play a role in supporting meat consumers' collaborative shopping in-store?
3. What factors need to be considered for improving the experience (technological, sensory, information seeking and sharing) of collaborative remote shopping for meat consumers?

Research Questions 1 and 2 aim to determine in what situation meat consumers collaborate with their friends and family, what is the most important information about the products that they share, what is the purpose of collaboration, how mobile technology supports their needs, and what — if any — issues are they facing with the technology. Research Objectives 1 and 2 will answer questions 1 and 2 by qualitative and quantitative study with meat consumers. Research Question 3 is intended to provide suggestions for the design of technology for meat consumers' collaborative shopping. Based on both qualitative and quantitative analysis Objective 3 will answer Research Question 3.

1.3 Research Approach

An appropriate methodology needs to be chosen for conducting systematic research and achieving the research objectives and answering the research questions (Creswell, 2009). This research adopts a mixed-methods methodological approach to answer the research questions and achieve the research objectives. The mixed-methods approach has been applied in this research in two phases. The first step consists of a qualitative study (semi-structured interviews) to explore and understand consumers' collaborative in-store shopping with remote shopping partners and the use of technology in the context of premium beef purchases. The second phase of the study involves a quantitative study. In the quantitative phase, an online survey was conducted to understand meat consumers' in-store collaboration, information needs, the use of technology to communicate with their remote shopping partners, and their purpose for collaboration.

1.4 Research Contribution

This study is one of the first studies exploring meat consumers' in-store collaborative shopping with remote collaborators. This study presents an understanding of meat consumers' remote collaborative shopping behavior and how mobile technology is supporting their remote collaboration. It also identifies the factors that need to be considered before designing collaborative shopping tools for meat consumers in the future.

Hence, this study significantly contributes to theoretical, methodological, and substantive level.

Theoretical contribution: This research has brought together remote collaborative shopping theory with, meat shopping theory to improve the experience of collaborative meat shopping. This has resulted in the development of a conceptual framework for remote collaborative meat shopping.

Methodological contribution: This research has developed an instrument for data collection on remote collaborative premium beef shopping and applied it to the context of general meat shopping.

Substantive contribution: This research has established an understanding of the technological, social and knowledge requirements for remote collaborative meat shopping.

1.5 Thesis Structure

The remainder of this thesis is structured as follows:

- **Chapter 2 — Literature review**

Chapter 2 presents the literature review describing the relevant research in the context of this research and explains knowledge gap this research covers.

- **Chapter 3 — Methodology**

Chapter 3 describes the research methodology adopted to conduct this research. The chapter describes the research philosophy, research strategy, the research design and data collection tools and techniques used in this research. It also describes the data analysis and interpretation methods of the research.

- **Chapter 4 — Qualitative Study**

Chapter 4 describes the qualitative data analysis and findings. A semi-structured interview with premium beef consumers were conducted to collect qualitative data. The purpose of the study was to understand premium beef consumers' collaborative shopping with remote shopping partners and the uses of mobile technology during remote collaboration. Data were analyzed using thematic analysis methods.

- **Chapter 5 — Quantitative Study**

This chapter discusses quantitative data analysis and findings. The qualitative study was used to develop a tool for the quantitative study. An online survey was conducted to understand meat (chicken, beef, lamb and pork) consumers' remote collaboration shopping behaviors and uses of mobile technology.

- **Chapter 6 — Conclusion**

Chapter 6 concludes the thesis by answering the research questions and summarising the research and its impact. Also, it discusses the future directions for this research.

CHAPTER 2 — LITERATURE REVIEW

2.1 Introduction

This chapter discusses the existing literature on collaborative shopping, types of collaborative shopping and its context, and technology that is being used in the collaborative shopping. This chapter also discusses Human-Computer Interaction and its application in the food area. As this research focusses on meat consumers' in-store collaborative shopping with remote shopping partners, it reviews existing literature on how meat consumers make a purchase decision from consumers' purchase behavior perspective and how information influences their purchase. Finally, discussion is presented identifying the need for study.

2.2 Collaboration

People work together to conduct searches for many reasons in many situations. When two or more people work together to achieve a mutual goal it is called a collaborative task. Researchers in information retrieval and information science have focused on the study of collaboration in which people work together to conduct searches, collect information, and share information. There are many dimensions that affect collaborative information search, including whether or not the collaborators are co-located or in a remote location, working synchronously or asynchronously, and the depth of collaborative task and relationship between collaborators (Capra, Chen, Hawthorne, Arguello, Shaw and Marchionini, 2012).

Shopping is one possible area of collaboration; people often shop together with their friends and family. The purpose of collaborative shopping is dependent upon various needs, including decision-making requirements, task-based reasoning, and the relationship or social bonds between participants (Morris *et al.*, 2014). The following sections discuss collaborative shopping in detail.

2.2.1 Collaboration in shopping

Shopping is often recognized as a social process in which the shopper is accompanied by an acquaintance (Evans, Christiansen and Gill, 1996; Zhu *et al.*, 2010). Consumers spend more time in shopping when they are with friends and family (Zhu, Benbasat and Jiang, 2006; Lindsey-Mullikin and Munger, 2011; Kim, Suh and Lee, 2013). Shopping experiences can be influenced by social, relational, and individual perspectives. For example, consumers can share

their opinions about products, solicit various opinions from their friends and family and other consumers and have fun through interacting with other consumers with similar interests (Tauber, 1972; Pfeiffer and Benbasat, 2012; Kim *et al.*, 2013). However, sometimes it is difficult to shop together due to physical distance, for instance, two friends may live in different cities in which case they cannot physically shop together. This limitation can be alleviated by online shopping because online shopping has no requirement for friends and family to be physically present (Zhu *et al.*, 2010).

2.2.2 Collaborative online shopping

Collaborative online shopping refers to the activity in which a consumer shops at an online store with one or more friends or family who is at a remote location (Zhu *et al.*, 2010; Kim *et al.*, 2013). The goal of collaborative shopping is not only to help shoppers to choose a product but also to interact with others.

To bridge the physical distance between friends or family during shopping, Zhu *et al.* (2010) investigated the design of a collaborative online shopping support tool with two primary features — navigation support and communication support. Both features are fundamental processes of collaborative online shopping and help shopping partners navigate products and allow an exchange of ideas or opinions about the product. They conducted a lab experiment with 128 university students to evaluate the effectiveness of different techniques for collaborative online shopping. Navigation support was chosen as the between-subject factor (separate navigation versus shared navigation), and communication support as a within-group factor (text chat versus voice chat). Two types of products were used in the experiment — school bags and watches. The study found that shared navigation was superior to separated navigation because visible browsing behavior of the other party and an awareness of shared context enhanced shoppers' perceptions that their shopping partners were socially close to them. In communication, a supportive voice had a much stronger impact than text messages, as voice chat builds a direct connection between shoppers and friends. A combination of shared navigation and voice can best support collaborative online shopping and allows collaborative shoppers to spend more time online (Zhu *et al.*, 2010).

Similar to Zhu *et al.* (2010) study, Kim *et al.* (2013) proposed two possible design components for collaborative online shopping such as embodiment and media richness and investigated their impacts on the online collaborative shopping experiences through co-

presence and relational perspective. The purpose of the study was to understand whether embodiment and media richness affected consumers' intentions to use a collaborative online shopping website. Two design components were included: an avatar and voice chatting which would increase shoppers' perception of embodiment and media richness in an online collaborative shopping context. They hypothesized that co-presence would affect the intention to use a collaborative shopping website. To validate the design, they conducted a lab experiment. Their result found that embodiment with the support of an avatar increased co-presence significantly. This enhanced interaction and the shopping experiences between shoppers, and media richness could be increased by including voice chatting which influenced co-presence (Kim *et al.*, 2013).

Gao *et al.* (2016) developed and evaluated a collaborative web searching system for online retail shopping. The motivation behind their work was that there was limited work in understanding the collaborative nature of the underlying domain-specific task and collaborative search systems for a specific domain. The collaborative searching system features were based on an analysis of online retail shopping task attributes as their previous study found that collaborative searching system could assist shoppers in a certain situation where they desired the opinions of others (Jansen, Sobel and Cook, 2011). Their system allowed multiple users to work together synchronously or asynchronously to accomplish an online collaborative retail shopping task.

They conducted a user study. The aim of the study was to understand the use of the collaborative searching system during a collaborative shopping activity. The study was divided into three sections: pre-scenario questionnaire, a brief overview of the system and post-scenario interview. A qualitative methodology was used to analyze the data. For the study, a searching scenario was designed that was complex and nuanced enough to encourage and facilitate collaboration. The user study ran for two hours 30 minutes including introduction, pre, and post-study questions, scenario discussion, tutorial, searching session and interview. The online shopping engagement ran for 40 minutes. The study found that experience products (where consumers can determine product characteristic upon purchase) within specific context influenced the collaborative searching process and collaborative communication was great between friends. Their initial finding also confirmed that collaborative search tools were more effective if they were domain targeted (Gao *et al.*, 2016).

With an understanding of collaborative online shopping, it enables this research to consider in-store collaborative shopping. Collaborative in-store shopping is different to collaborative online shopping. The following section discusses in-store collaborative shopping and in-store shopping with remote collaborator(s).

2.2.3 In-store collaborative shopping and in-store shopping with remote collaborators

In-store or bricks-and-mortar shopping is an everyday activity for many people. Sometimes it is done solo and sometimes with friends and family (Morris *et al.*, 2014) where they communicate with each other and seek feedback about the particular product (Lindsey-Mullikin and Munger, 2011). However, people are not always accompanied by friends or family in the store due to living in different places or conflicting commitments. Previous research shows that people use mobile phones or smartphones during shopping to contact their friends and family in a remote location (Smith, 2013; Tohidi and Warr, 2013; Morris *et al.*, 2014; Willems, Smolders, Brengman, Luyten and Schöning, 2017). The consumer also uses a mobile phone to support their eating behavior during dinner preparation, while grocery shopping, to obtain the recipe and to share food photos on social media. Grocery shoppers interact with various non-textual information during shopping at the store via their senses. This information source helps them to make purchase decisions, discover new items and impact their experiences in the grocery store. Shoppers in the grocery store obtain much of their product information just by looking at product displays, packaging, and appearance of fresh produce as their sources of information. Visual information can also be shared with grocery shoppers to assist them in the shopping. Information sharing is an information behavior that refers to transmitting information from one person to another. For example, a remote partner sends a picture of the specific product to the shoppers or shoppers send product pictures from the shop to a remote partner for their opinion. Visual information is more useful than a textual description of the grocery item (Ocepek, 2018).

Doub *et al.* (2015) identify four unique consumer segments based on their attitudes towards technology these are, attitudes towards food and nutrition, using a mobile device and internet to explore and socially share food, use of mobile devices and internet to seek information about food/restaurants, and use of mobile apps to support everyday food-related activity (Doub *et al.*, 2015).

Morris *et al.* (2014) investigated smartphone uses to get remote shopping advice in the clothes shopping context. They conducted a survey with 200 shoppers to find their current and desired remote shopping habits. Their survey result found that 107 people out of 200 contacted their friends and family in a remote location for shopping advice while they were in-store. The most common items involved in the situation were food (37%), clothing (24%) and electronic goods (10%). The person contacted was a partner, friend, parent, sibling, or child. Typically, the contacted person was not physically available at the store because they were busy with other tasks or were too far away to join the trip, and the purpose of contact was to seek their opinion about a particular item (55%), to inform the other person about the sale, the item or a store they might enjoy (32%) and to ask the other person if they needed anything from the shop (19%). Phone calls were the most common means of contact, followed by MMS (Multimedia messaging service)/SMS (Short message service). Some people used more than one method to reach a remote partner, for example, sending a photo via MMS and then calling the person to discuss it. 38% of respondents shared a photo as part of the shopping experience. Video was less popular; only 14% of respondents used video however 12% said they did not use video but would have liked to (Morris *et al.*, 2014). Tohidi and Warr (2013) found that people took photos of products while shopping to share with their friends and family. The primary reason for the photo was to get feedback from family or friends who were at a remote location. People also shared photos with others to inspire someone else to buy something and maintain or enhance the personal relationship. Other photo sharing purposes included expressing bad shopping experiences, providing proof of purchase or for product recommendations.

Food purchase activity is a situated action, and a situated action is the everyday activity of persons acting in settings (Comber, Hoonhout, Halteren, Moynihan and Olivier, 2013). Consumers engage in social shopping in the store and when their shopping partner is at a remote location, they use a mobile device to connect with them. Previous research suggested that consumer's collaborative behavior is different based on the domain (Gao *et al.*, 2016; Reddy and Jansen, 2008). Currently, in-store consumers depend on mobile devices and simple voice or text-based interaction (Morris *et al.*, 2014) and photo sharing (Tohidi and Warr, 2013). However, there is less study on food consumer collaborative behavior and the impact of mobile technology on consumers during purchase. Technology for food practice is needed to recognize the needs for flexibility and target specific contexts (Comber *et al.*, 2013). In-store technological innovations can bring value to the consumer (Willems *et al.*, 2017) however, before designing any technological solution we must understand how current technology is

already being used in the current food system (Norton, Raturi, Nardi, Prost, McDonald, Pargman, Bates, Normark, Tomlinson, Herbig and Dombrowski, 2017).

2.3 Human-Computer Interaction

Human-Computer Interaction (HCI) involves human and computer technology, where computer technology influences human work and activities. Computer technology refers to a personal computer with a keyboard and mouse, a smartphone, household appliance, embedded system or in-car navigation system (Dix, 2009). Hewett, Baecker, Card, Carey, Gasen, Mantei, Perlman, Strong and Verplank (1992, p. 5) define HCI as “a discipline concerned with the design, evaluation, and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them”. According to Myers, Hollan, Cruz, Bryson, Bulterman, Catarci, Citrin, Glinert, Grudin and Ioannidis (1996, p. 794), “HCI is the study of how people design, implement and use interactive computer systems and how computers affects individuals organization and society”. This not only includes ease of use but also any new interaction technique that allows a user to perform a task and provide better access to information, creating better communication. This involves input-output devices and interaction techniques for using them, how information is provided and requested, how to control and monitor the computer’s actions, all types of help and training, the tools used to design, build, test and evaluate user interfaces and the processes that developers follow when creating an interface (Myers *et al.*, 1996).

The term Human-Computer Interaction (HCI) has widely been used in ICT since the early 1980s, however, it has its roots in more established disciplines. A systematic study of human performance began in the early nineteenth century in factories, with an emphasis on manual tasks. The Second World War gave the motivation to study human interaction with machines because at that time people were designing effective weapons systems to be operable by humans (Hewett *et al.*, 1992; Dix, Finlay, Abowd and Beale, 2003). Researchers formed the Ergonomics Research Society in 1949 to study human performance. Traditionally, ergonomic study was concerned with the physical characteristics of machines and systems and how these affects human performance. Human factors incorporate these issues as well as cognitive issues (Dix *et al.*, 2003). The “HCI” and “human factor” terms are often used interchangeably; the United Kingdom preferred to use ergonomics while English-speaking North America called it human factors. Both disciplines are concerned with user performance in the context of any system, whether computer, mechanical or manual. When the computer started to become more

widespread, an increasing number of researchers specialized in studying the interaction between people and computers. This research was originally called *man-machine interaction*, however, over time it changed to *human-computer interaction* in recognition of the particular interest in computers and the composition of the user population (Dix *et al.*, 2003).

HCI is a part of many disciplines but in computer science and system design, it is a central concern. For other disciplines, it can be a special area which will provide crucial input; for system design, it is an essential part of the design process. From a computer science and system design perspective, HCI focuses on the interaction between one or more humans and one or more computers. HCI also involves the design, implementation, and evaluation of interactive systems in the context of the user's task and work (Hewett *et al.*, 1992; Dix *et al.*, 2003).

2.3.1 HCI with Food

HCI researchers and designers have given attention to food and interaction design by exploring various food-related areas to facilitate consumer needs such as shopping, cooking, nutritional information, and recipes. HCI researchers have also studied consumers' behavior and attitudes toward food. In this section previous research into the application of HCI in food will be reviewed.

Researchers have addressed consumers' uncertainty regarding food choices (Normann, 2012), for example, some people may be unsure of what to prepare for dinner. This situation may occur from not knowing what is in the refrigerator or being overwhelmed by recipes. Svensson, Höök and Cöster (2005) addressed this consumer uncertainty by developing *Kalas* to assist users in choosing recipes for a meal. *Kalas* allowed users to navigate meal recipes socially. It supported decision making by allowing users to navigate others' recipe choices and their comments and ratings on any recipes. This helped users to make effective decisions about food and what to prepare instead of searching the internet for recipes and becoming overwhelmed by an unlimited number of recipes (Svensson *et al.*, 2005).

Other than uncertainty, individuals can also be distracted when interacting with food, for example, while preparing food, users might need to leave the kitchen several times to answer the door, answer the telephone or for other interruptions. Multitasking or interruptions can cause memory slips. The user might forget which ingredients had already been added and what to add next. To tackle this problem, Tran, Calcaterra and Mynatt (2005) designed *Cook's*

Collage to help users to follow recipes properly even with all the distraction they face while cooking. *Cook's Collage* acted as a memory aid while cooking. It constructed a visual summary of ongoing activity in the kitchen, so if cooking were interrupted, users could view the cooking record and remember which step they were in.

In related work, Hamada, Okabe, Ide, Satoh, Sakai and Tanaka (2005) designed a cooking navigation system to help inexperienced users to cook without failure and to improve advanced users' cooking skills. Nakauchi, Fukuda, Noguchi and Matsubara (2005) proposed a human activity support system using an LCD touch panel on the kitchen counter and a mobile robot on the floor to assist users during cooking. An LCD displayed the recipes with pictures while the robot suggested the next action users should take using voice and gesture. *CounterActive* (Ju, Hurwitz, Judd and Lee, 2001) was another system to help users to prepare food. *CounterActive* was a digital cooking book embedded in the kitchen counter. It provides rich multimedia experiences to the user as it included pictures and videos for users to learn how to cook new dishes.

Siio, Hamada and Mima (2007) developed a computer-augmented kitchen environment called the *Kitchen of the future*. Their kitchen environment was equipped with an embedded video camera, display, microphones, switches, sensors, and network. The aim of their system was to allow people to use an application for facilitating communication by placing cooking guides on the internet, learn cooking using these guides, communicate with others and learn cooking through video conferencing and assisting interactive cooking by using multimedia. They installed three applications in their kitchen environment: a system for recording and replaying a cooking process, a remote cooking support system, and a cooking navigation system. They used all three applications in their kitchen environment and found that it was easy to record the cooking process and publish on the internet directly from the kitchen. Also, their recorded video was useful for novice cooks. Cooking by video conferencing was helpful for the users as well.

Sano, Kanemoto, Noda, Miyawaki and Fukutome (2014) developed a cooking assistant agent (robot) to promote cooking among children and young adults, and also support people with cognitive disabilities during cooking. Their system built a relationship between user and agents by adopting a multimodal scheme including onomatopoeic terms and expressions to represent different cooking states, speech, music, and gestures. The agent-based system automatically recognized the cooking state of the food and then alerted the users of the timing

of the cooking through sensory interaction. They conducted a series of trials with ten university students to evaluate the systems. Their results showed that the system helped the user to cook pancakes perfectly by providing the timing of the cooking to the users.

Other than helping a user with cooking, HCI researchers have also been exploring healthy eating and how HCI can be used to help people eat healthily. Mankoff, Hsieh, Hung, Lee and Nitao (2002) designed an application to help people to keep track of the nutritional content of the food they have eaten. Their system used grocery shopping receipts to analyze what users bought from the store and suggested healthier food selections that would supplement missing nutrition. Chi, Chen, Chu and Chen (2007) proposed a smart kitchen to help users make healthier decisions by providing nutritional information about the ingredients they were using in their meals. Their smart kitchen system detected the ingredients that users were using to cook the meal using sensors and provided visual information about the nutrition of the ingredients on an LCD display. (Brown, Chetty, Grimes and Harmon, 2006) developed a system for college students to maintain a healthy diet and exercise habits. Their system kept a photographic journal of diet and exercise using a camera phone. The goal was to help college students to see the relationship between their diet and exercise. More recently Chaudhry, Schaefbauer, Jelen, Siek and Connelly (2016) developed an interactive food portion size estimator for low literacy people to manage dietary intake for a chronic condition. People with chronic diseases need to maintain their nutritional intake to avoid severe health consequences. Since the portion size of food influences nutrient consumption, it is important to track food portion size to estimate nutritional intake. Therefore, it is important for people with chronic illnesses to have a system to estimate the nutritional value of food portions. Normally, people can calculate food portion size by nutritional labels or by making quantity comparisons with various objects known as estimation aids or reference objects. However, these methods can be problematic because people misunderstand labels on the food, cannot always have estimation aids with them and can forget comparison amounts (Huizinga, Carlisle, Cavanaugh, Davis, Gregory, Schlundt and Rothman, 2009).

Some researchers have also studied consumers' behavior related to food consumption. Ng *et al.* (2015) studied consumers' motivation and behaviors around food consumption using a wearable camera. Their study focused food-related behavior and motivation in Malaysia and the UK. Based on their study they proposed the food consumption lifecycle framework. The first-person perspective camera was clipped on users' clothes, which took still images every 10

– 30 sec. Their study identified the potential of using a wearable camera to enhance the wearer's knowledge of food consumption and show how and where digital interventions might be appropriate.

Kadomura, Li, Tsukada, Chu and Siio (2014) presented a system called *Sensing Fork* to educate children about balanced diets and to motivate proper eating behavior. Furthermore, they developed a smartphone-based persuasive game named *Hungry Panda* and a storybook. This gave the advantage to *Sensing Fork* of interacting during mealtime. Their study showed positive effects on changing children's eating behavior.

Augmented reality (AR) is the technology of allowing visualization of information using a camera and display which overlays the real world. A few researchers have applied AR technology on food research. For example, Narumi, Nishizaka, Kajinami, Tanikawa and Hirose (2011) developed a system named *MetaCookie+* for flavor augmentation using visual and olfactory AR technology. For their AR system, they developed an Edible Marker, which could detect the state of each piece of bitten food in real time. The main purpose of this project was to change the perceived taste of a cookie by overlaying olfactory and visual information on top of the cookie with a special AR pattern.

Narumi, Ban, Kajinami, Tanikawa and Hirose (2012) developed a method to modify the apparent size of the food with AR to control the nutritional intake. The main purpose of the study was to decrease the obesity rate. They used food volume augmentation using shape deformation processing in real-time. Their study showed that it could change the consumption volume of the food by changing the apparent size of the food with AR. This system only useful for finger foods and drinks, and it uses head mounted display (HMD) which is not practical for dining. To overcome this problem Sakurai, Narumi, Ban, Tanikawa and Hirose (2015) developed a tabletop system named *CalibraTable* to control food intake and change perceived food volume without any effort from the diner. Studies showed that the ratio of the size of the dish to the size of the food it contains plays an important role in food quantity estimation and the amount of food eaten. Based on this concept they developed their tabletop system to measure food volume. Their system projected virtual dishes around real food in order to show how much food should be on the plate to change the perceived food quantity interactively. In their system, the user placed food on a transparent plastic plate which had an infrared LED attached. The infrared LED had various blink patterns for detecting the position of the plate and the food on it. The web camera was set up under the table to capture the light from the

LED and the system calculated the plate and food position. In this way, the tabletop system became aware of the plate and food position on it and projected a virtual dish around the plate. The result of their study showed that this method could influence the amount of food consumed by changing the size of virtual dishes without changing the perceived fullness. They also studied the nutritional values of the food by changing the dishes' size. Their study showed that the volume of food consumed could be altered by changing the size of the projected dish according to the energy and nutrients that the food contained. For example, to reduce the intake of food that contained excess energy and nutrients, a dish that made the food appear smaller could be projected. By changing the scale factor interactively according to the type of food, their system could influence human eating behavior and control nutritional intake (Sakurai *et al.*, 2015)

Researchers also explored food as augmented display. Henze *et al.* (2015) explored how food itself could be augmented to act as an information medium. Information was printed on the food such as bread, fruits, vegetables, and cereals using a laser cutter. They conducted a study using focus groups and an online survey to investigate food augmentation and assess the type of food and information users wanted on their food. The study showed that users found it beneficial as they were able to see critical information on food even without the package. It could also give users a personalized food experience. However, it raised some concerns as consumers perceived that printing on food could affect the original appearance of food and it could contain something toxic such as ink or color.

Narumi (2016) developed a multi-sensory Virtual Reality/Augmented Reality (VR/AR) human food interaction system to change users' perceptions related to their eating experience. The eating experience involves the integration of various sensations such as vision, hearing, olfaction and trigeminal nerve sensations (Auvray and Spence, 2008). Different people experience different tastes and flavors when consuming the same food and even the same person experiences different tastes when consuming the same food at different times. Food flavor and palatability perception not only depend on the food's ingredients but are also affected by various factors such as eating environment, physiological state, understanding of the food and their previous experiences with the food. Narumi's (2016) system's aim was to provide people different flavor and palatability experience without altering the food itself. Their system included various sensations including vision, hearing, haptics, olfaction, gustation and other sensations. The author believed augmented human food interaction could control a

person's food consumption without them losing the pleasure of eating, and, that it could also have significant effects in promoting nutritional health (Narumi, 2016).

The pseudo-gustatory interface is another interesting research area in human food interaction. Humans can distinguish between five major taste qualities: sweet, sour, bitter, salty and savory. Taste gives a rich spectrum of experience to the human. Moser and Tscheligi (2013) developed the *LOLLio* gustatory interface for children. It provided a long-lasting sweet taste through a lollipop, a taste-based output with the pump and reservoir in the lollipop handle using citric acid and allowed some degree of tangible input through its handle equipped with accelerometers. They investigated a children's game experience and the children perceived taste while playing the gustatory game. Results showed that the gustatory interface provided positive game experience and developed curiosity (Moser and Tscheligi, 2013).

More recently Rahman, Azhar, Karunanayaka, Cheok, Johar, Gross and Aduriz (2016) proposed a human-food interaction interface named the *Magnetic Dining Table*. Their interface looked similar to a traditional dining table but it allowed user interaction for food and utensils such as modifying weight, levitation, movement, and dynamic texture. Their new interaction worked by manipulating a strong magnetic field generated by an array of electromagnets placed under the table. This electromagnetic array generated the required magnetic field to manipulate magnetic foods and utensils. The electromagnets were operated by a controller circuit which was placed under the table and a microcontroller-based firmware and computer program controlled the magnetic object according to the user's needs. According to Rahman *et al.* (2016), magnetic utensils and food would be placed on the magnetic table and these special foods and utensils would be able to be magnetized which would allow users to levitate, move, modify weight and change the food shape in order to enhance people dining experience.

Technology does not only promote healthy eating and cooking, but it also supports consumers during the activity of shopping so that they are able to make healthier choices. Many consumers find traditional food nutritional labels hard to read and understand and they struggle to calculate nutritional value according to serving size. Based on this problem Bedi *et al.* (2010) designed the *Healthy Shelf Interactive System*. It displays on kiosks next to supermarket shelves. A wide range of users can use this system (such as family shoppers, students, new immigrants, and people with dietary restrictions) to calculate serving size and the nutritional values of food products they want to buy. They can compare the nutritional value of two

different food products for the same serving size. This system also alerts users if any food products contain ‘negative nutrients’ such as salt or trans-fat.

Sackey and Ullmann (2012) developed an application named *Baked Potato* to help users to make a better decision about their food purchase. To build the prototype they used Human Centered Design which focused on user needs and abilities. The application allowed users to create food profile, set goals and rewards to encouraging users for positive purchasing habits, provide product suggestions based on user’s food profile, manage shopping trips and connect with friends to support their purchasing. The purpose of this application was to provide a better shopping experience by providing product information and decision-making resources to the users. Feedback from users shows that they valued product information pairing with social gaming.

Hwang and Mamykina (2017) designed a persuasive game called *Monster Appetite* to encourage individuals to choose healthy nutrition. The game asked the user to choose snacks of various caloric content for a monster, who is presented as an avatar, and to view the impact of their choices on the monster’s appearance. Their game gave persuasive messages to the users in two different forms: firstly, the visual impact of the snack choices on the monster and, secondly, goals and text messages that highlighted the health impact of the chosen snacks. If the chosen snacks had high-calories, then the monster becomes big, depressed and sickly in the game. Conversely, if users chose low-calorie snacks, the monster stayed in its original state until a calorie threshold was reached — only then would the monster grow in size. They combined the consistently negative visuals with persuasive framing for the game’s goals and feedback messages. The first type of framing, two-sided inoculation, encouraged players to consume low-calorie snacks and had positively-framed pop-up messages that highlighted the benefits of healthy snacking. The second type of framing, subversive, encouraged users to choose high-calorie snacks and had negatively-framed pop-up messages highlighting the negative impact of unhealthy snacking, which were also illustrated by negative changes in the monster’s appearance. To investigate the effect on users after playing the game the researchers developed an online snack market application *Snackzon* to purchase snacks for delivery. This site, *Snackzon*, was used as a pre- and post-manipulation measure to evaluate participants’ nutritional choices. The site tracked participants’ information-seeking behaviors (captured by clicks on nutrition buttons), food choices (purchases of snacks) and whether the food purchases were mediated by the items’ nutrition information. The results showed that both treatments had

an effect on user's snack purchase processes and the game help participant to make healthy snack choice .

Most of the previous research in HCI and food has focused on facilitating consumers to manage healthy diets, cooking or introducing new technology. However, to design meaningful and positive interactions, it is essential to identify the consumer's daily food practices and decision-making process behaviors and relevant technology regarding food (Grimes and Harper, 2008; Comber *et al.*, 2012; Ng *et al.*, 2015).

Everyday life is full of purchase-related decisions: choosing between sustainable products and unsustainable products: which brands to buy, what is the manufacturing process, how to use the product or how to dispose of it, where to get information about the product, how the product information might conflict with the consumer's requirements, needs, and desires. At times these decisions can be hard because of the difficulty of comparing the product and the information about the product (Remy, 2013).

Sustainable HCI research has examined a different aspect of how people make purchase decisions or acquisitions of goods, how information and conflicting needs come into play in these decisions, and sustainable HCI research highlights the potential role in supporting consumers' purchase decision-making (Huang and Truong, 2008; Huh, Nam and Sharma, 2010). To support the consumer purchase decision-making process, HCI research needs to understand consumers' motivations and their purchasing processes. Seeking to understand people in HCI research is not new (Remy, 2013), however, researchers are yet to seize the opportunity to draw insights about purchasing behavior and decision processes from a field that has been investigating these process for several decades: marketing research (Remy, 2013).

2.4 Technology in Retail

The retail industry and many related organizations are using technology internally and externally to improve its operations, efficiencies and provide functional benefits to customers. These days the retail industry uses technologies such as the internet, mobile applications, and social media to allow customers to access services or to provide them with dynamic and up-to-date information on product attributes electronically (Meuter, Ostrom, Bitner and Roundtree, 2003; Priporas, Stylos and Fotiadis, 2017).

These new technologies may be beneficial to both consumers and retailers since technology can enhance the consumers' decision-making and purchase behavior. For example, technology in retail can assist frontline employees to provide more efficient service to the consumer as the availability of technological innovation makes accessible a greater amount of knowledge on a product or service (Pantano and Migliarese, 2014). Vrontis, Thrassou and Amirkhanpour (2016) points out that technology in retail is changing consumer behavior throughout the decision process stage (search, purchase, consumption and after sales process). It also improves consumer information exchange and search behavior. These provide opportunities for the development of new products and services as well as new contact through interactive tools between consumer and retailers (Pantano and Timmermans, 2014; Pantano and Migliarese, 2014; Priporas *et al.*, 2017).

According to the Nielsen Company's global survey (The-Future-Of-Grocery, 2015), the increasing usage of mobile and internet technology has boosted online grocery sales. Nielsen's survey was conducted in 60 countries with 30000 people to understand how digital technology was shaping the retail industry. The Asia-Pacific region exceeded the global average for the adoption of online retailing options (37% of people) with particularly high usage in China (46% of people). Automatic online subscriptions also rate highly in this region compared to the rest of the world (22% Asia-Pacific and 14% globally; China is leading the way with 30% of people). Food sales is the primary growth area in China for using technology. Because of rapid urbanization and population density, technology makes life easier. Additionally, booming smartphone ownership and user counts have created a huge opportunity for mobile commerce. Finally, food safety concerns have driven consumers to the search for high-quality foods online (The-Future-Of-Grocery, 2015).

Digital interventions will not replace traditional grocery shopping (The-Future-Of-Grocery, 2015). Technology makes the consumer shopping experience simpler (Agratchev, 2014) but physical stores have a strong advantage over technology: physical shopping gives a strong sensory experience to the consumer, for example smelling fresh food, seeing and feeling the color and texture of fresh vegetables and fruits. A majority of consumers from the study believe that going to the supermarket for grocery shopping is a fun and enjoyable experience. While consumers will continue to go grocery shop in person, store owners need to make sure that in-store retail is a pleasurable experience. Infusing technology will be an important enabler of this process (The-Future-Of-Grocery, 2015; Ingrey, 2017).

Complete digital strategies for consumption include interaction with the consumer at every point of purchase — including finding stores, making lists, checking prices, researching the product, sharing content and the actual act of purchasing. These touchpoints occur both in-store and out of the store. Consumers are increasingly using technology to simplify and improve the process. Digital enablement can bring ease, convenience, and personalization into a ‘brick and mortar’ store. These also will increase engagement levels and shoppers’ satisfaction. Currently, shoppers do all the work ‘putting the pieces together’ to arrive at their final purchase decision. Retailers and manufacturers might add value by providing a digital tool to help consumers take control (Schmitt, 2019; Liu, Lobschat, Verhoef and Zhao, 2019; McLean, Osei-Frimpong, Al-Nabhani and Marriott, 2020).

Digital technologies are adding value to the consumer’s purchase processes (Schmitt, 2019), however, when consumers go to the store to do shopping, they will choose the technology that best suits their needs and convenience. To enhance consumer purchases through the use of technology, retailers and manufacturers should understand what drives the consumer and need to show the consumers they are delivering the content that the consumers need, they need to understand the consumers in order to add value to the consumer’s life using technology (The-Future-Of-Grocery, 2015). Also, when designing technology such as a mobile app for the consumer, ease of use and functionality should be the top priority. Consumers’ preferences vary greatly based on their personal and physiological needs; one size doesn't fit all. This should also be considered when developing the technology for the consumer (The-Future-Of-Grocery, 2015).

2.4.1 Retail and mobile technology

Mobile marketing has become a major marketing channel worldwide. It refers to multi-way communication between businesses and consumers (Shankar and Balasubramanian, 2009). Mobile marketing can be seen as an evolution of internet-based marketing. Mobile marketing strategies are based on how consumers access information through their own mobile devices; for example, by receiving customized messages, services or offers (Pantano and Priporas, 2016; Tong, Luo and Xu, 2020). Advancement of mobile marketing created an opportunity for making applications for smartphones (which let consumers search for product information, compare with other brands, access news on products and services, create a shopping list, locate stores, etc.). Also using NFC (Near Field Communication) and QR codes (Quick Response Code) consumers can get information about the product by scanning the code through the

smartphone's camera (Sankaridevi, Vennila and Jayakumar, 2015; Zhao, Smith and Sample, 2015; Pantano and Priporas, 2016).

Smartphone usage is at an all-time high; currently over 3 billion people use a smartphone (Grewal and Stephen, 2019; O'Dea, 2020). With the number of smartphone users growing, opportunities are created for developing a store's mobile phone app (Tong *et al.*, 2020), but many fear that an app may negatively affect in-store purchases by encouraging online shopping. Savvy retailers are seeing it as an opportunity and making smartphone apps to support consumers in the store shopping process. Stores without an app may find their customers logging into their competitor's sites and making their way in another store (Girish, 2014; Abed, 2015).

The growth of smartphone usage and its application have changed how consumers are making purchase decisions (Liu *et al.*, 2019; McLean *et al.*, 2020). A large numbers of consumers use retailer's apps during in-store purchase (Spanke, 2020). Their paths to purchase often comprise an online and mobile touchpoint; they not only use mobile devices to make purchases but also to research the products, (such as comparing pricing or checking other consumers' reviews), or obtain additional product-related information in-store (Girish, 2014). Providing consumers with more information via the retailers' app can push the sale also it can stop consumers from browsing the retailer's competitors sites for the same product (Abed, 2015). Mobile devices may boost consumers' in-store shopping satisfaction, according to a consumers' survey in the US, where 77% of consumers have used their smartphone in-store to help them shopping (Howland, 2017). One-third of shoppers use their mobile devices in-store while shopping in the store; about 90% of consumers mentioned using retail apps improved their in-store shopping experience (Howland, 2017).

Even though retailers are increasingly adopting mobile apps for their consumers to have better experiences in-store, they still face difficulties in satisfying all the consumers because of their changing behavior (Gustafson, 2015).

Mobile technology and its applications are beneficial to consumers and retailers since technology can enhance consumers' decision-making and purchase behavior, it also improves consumer information exchange and search behavior. These provide opportunities for the development of new products and services as well as new contacts through interactive tools between consumer and retailers (Pantano and Timmermans, 2014; Pantano and Migliarese,

2014; Priporas *et al.*, 2017). Which will improve consumers in-store shopping experience and increase sales. Also, apps can be used to provide personalized service or exclusive in-store promotion (Spanke, 2020).

2.5 Meat Consumers

Meat consumption is an important part of many human diets. It is associated with human health, economy, and culture worldwide (Paredi, Sentandreu, Mozzarelli, Fadda, Hollung and de Almeida, 2013; Pighin, Pazos, Chamorro, Paschetta, Cunzolo, Godoy, Messina, Pordomingo and Grigioni, 2016). Meats contribute to humans' nutritional needs by providing minerals, vitamins, and essential amino acids (Zhang, Xiao, Samaraweera, Lee and Ahn, 2010; Wolk, 2017). In recent years consumers' demands for healthier meat and meat products has increased (Zhang *et al.*, 2010) due to their health concerns as there are evidence that several chronic diseases are link to high meat consumption (Wolk, 2017). Thus, consumers' demand for more product related information during purchase (The-Power-of-Meat, 2016).

When purchasing meat, consumers receive different types of information which affects their purchase decisions. Some of these cues are intrinsic cues and extrinsic cues. Information consumers consider important depends on their personal, situation and product characteristics (Font-i-Furnols, Realini, Montossi, Sañudo, Campo, Oliver, Nute and Guerrero, 2011). Intrinsic quality involves the physical properties of meat (cut, muscle color, marbling, fat content) and extrinsic quality cues comprise price, country of origin, animal welfare, quality labels, brand name, place of purchase, packaging, and expiry date (Issanchou, 1996; Grunert, Bredahl and Brunsø, 2004; Morales *et al.*, 2013).

This section discusses how meat consumers (beef, chicken, lamb and pork) choose meat and what types of information they look for during purchase.

2.5.1 Beef consumers

While beef provides one of the important components in human diets, (Wyness, 2015; Pighin *et al.*, 2016) beef consumers find it difficult to assess the quality of beef products while shopping because of the limited information available at the point of purchase (Banović, Fontes, Barreira and Grunert, 2012). Product uncertainty increases shoppers' perception of risk, including risk to health (Fontes, Giraud-Héraud and Pinto, 2015; Pighin *et al.*, 2016). This perception of risk is associated with a product category or product supplier. This may cause a

consumer to look for an alternative product or more information to decrease product uncertainty (Hornibrook and Fearne, 2003).

Currently, there is increasing demand for information about beef products such as nutritional information, recipes, meal suggestions, and transparency (The-Power-of-Meat, 2016). Beef consumers have their own individual beliefs and attitudes towards beef products related to their personal, cultural and other psychological considerations, as well as previous experience (Grunert *et al.*, 2004; Morales *et al.*, 2013). Consumers evaluate the beef product before purchase based on the quality cues available during purchase (Grunert, Larsen, Madsen and Baadsgaard, 1996). During the product evaluation, the consumer uses intrinsic and extrinsic quality cues. Not all consumers understand the visual appearance of beef or intrinsic cues (marbling, fat content, color), therefore they depend on the extrinsic cues of the product such as information about nutritional value, production methods, and how to consume after purchase (Umberger, Boxall and Lacy, 2009; Mesías, Escribano, De Ledesma and Pulido, 2005).

Taste and health are the main reasons to buy premium beef. According to Morales *et al.* (2013) consumers who purchase premium beef have high household incomes, are experienced in beef products, appreciate brands, seek information about the product and assistance at the purchase point, shop for beef at specialist butchers, have more interest in quality and cut more than size, are interested in the healthiness and intrinsic quality cues of the product, and have smaller households. Segments of beef consumers differ in characteristics and look for different attributes of the product even though they might shop in the same store (Morales *et al.*, 2013).

In addition to the intrinsic cues, consumers of premium beef look for various attributes when purchasing premium beef products such as origin, breed, and absence of genetically modified organisms (GMO), animal welfare and organic production, quality label, cuts and other credence attributes such as healthiness of the product (Morales *et al.*, 2013; Scozzafava, Corsi, Casini, Contini and Loose, 2016; Sepúlveda *et al.*, 2008; Schroeder, Tonsor and Mintert, 2013). Adding additional information to the product may increase the likelihood of purchase and of consumers' willingness to pay extra for premium beef and will reduce product uncertainty (Grunert *et al.*, 2004; Umberger *et al.*, 2009). Providing clear information also facilitates a consumer's product evaluation and decision making process (Van Wezemael, Verbeke, de Barcellos, Scholderer and Perez-Cueto, 2010).

As some consumers rely upon a product's extrinsic information in order to evaluate the product when they do not understand intrinsic quality cues, researchers have explored the role of information technology as a tool to provide such information at the point of purchase via: traceability of provenance, information sheets, barcodes, QR codes, and RFID tags (Bamgboje-Ayodele, Ellis and Turner, 2015). Consumers may obtain traceability information by scanning a QR code or using NFC through their smartphone (Sankaridevi *et al.*, 2015; Zhao *et al.*, 2015; Pantano and Priporas, 2016). However, a number of gaps remain including the consumers' preference for using these technologies (Chrysochou, Chryssochoidis and Kehagia, 2009; Bamgboje-Ayodele *et al.*, 2015). Consumers are also concerned about using RFID tags because of perceived health issue related to the tags, information credibility, privacy and time (Chrysochou *et al.*, 2009). A large number of consumers are not aware of QR codes or do not know how to use them as no instruction is provided (Ochman, 2011) as well as solely using QR code is not affective on the product level (Li and Messer, 2019). Also, QR codes' positioning requirements on packages may result in unappealing packaging making it ineffective for the consumer (Adam, 2012; Yaoyuneyong, Foster, Johnson and Johnson, 2016).

Traceability provides pre-programmed information about nutrition value, origin, and producer (Bamgboje-Ayodele *et al.*, 2015). However, the key challenge is how best to target information to the needs of specific consumers, at specific places and times when decisions about purchasing occur. Clearly not all consumers require the same information; different consumers have different preferences based on their individual needs and circumstances. It is therefore important to understand how consumers desire to receive food information, when and where to receive this information and what information should be provided (Van Rijswijk and Frewer, 2012; Buskirk, Clarke, Grooms and Kirk, 2014).

The beef industry faces challenges to provide better and clearer information to consumers to shape their perception about the product and provide more convenient and healthy options. Consumers receive product information through advertisements, via information campaigns, labels, and brand promotions (Font-i-Furnols and Guerrero, 2014). However, the inability to understand consumers' changing preferences due to information overload, health concerns, lifestyle changes and lack of communication has resulted in a decrease of beef consumption (AMPC, 2016). Studies suggest that it is important to understand consumer preference in order to provide better information to the consumer using technology (Mesías *et al.*, 2005; Umberger *et al.*, 2009; Morales *et al.*, 2013) as information about the

product does influence consumer behavior (Hocquette, Van Wezemael, Chriki, Legrand, Verbeke, Farmer, Scollan, Polkinghorne, Rødbotten and Allen, 2014). A deeper understanding of consumers' preference and information flow will create an opportunity to design tools for the consumer to support their needs (Schroeder *et al.*, 2013).

2.5.2 Chicken consumers

Due to health concerns, red meat consumption has fallen in the last decade and people have started to consume more poultry meat such as, chicken. Also, the type of chicken meat purchased has changed. Where whole roast chicken was part of the family meal on special occasions, now chicken has become a regular meal (Mitchell, 1999). Consumers expect good quality products raised in a healthy environment, which are natural, fresh and nutritious (Morrissey, Sheehy, Galvin, Kerry and Buckley, 1998). Chicken meat plays an important role in the human diet because of high protein, nutritional value, low cholesterol, essential amino-acids, flavor and lower price (Pirvutoiu and Popescu, 2013; Vukasović, 2010). Vukasović (2010) identified three advantages for chicken meat: it is suitable for every occasion and preparation is quick and easy, it provides diverse tasty and enjoyable meals, and low-fat content makes it easily digestible.

Chicken consumers value quality cues during purchase because of taste and health reasons. During purchase, they look for intrinsic quality cues (appearance, cuts, fat content, sensory attributes) and extrinsic quality cues (origin, brand, nutritional content, animal welfare). The purchaser also values family members opinion to choose chicken meat. The consumers' meat purchase decisions are mainly oriented towards quality characteristic, healthy products, and food safety. Their experience and credence quality attributes influence these processes as well. Moreover, their attitudes are influenced by values and social rules (Merlino, Borra, Tibor and Massaglia, 2017).

During the chicken product purchase, consumers collect information about the product's properties, environment, and other product-related information and it depends on consumers objective and subjective properties. Choices of chicken meat is slightly different from other types of meat (Akinwumi, Odunsi, Omojola, Aworemi and Aderinola, 2011). A number of factors affect consumers' chicken purchase decision such as chicken meat quality (Almeida, Junqueira and Zamudio, 2009), sensory characters (Sow and Grongnet, 2010), cholesterol content (Resurreccion, 2004), meat cuts (Tolušić, Škrtić, Gajčević and Kralik,

2005), taste of the product, nutritional quality, health conditions, fat content, and product price, preparation time as well as consumers income level, socio-demographic and socioeconomic factors (Balogbog, 2018) and product origin (Vukasovič, 2010) .

Kennedy, Stewart-Knox, Mitchell and Thurnham (2004) studied the consumers' perceived factors which underpinned their choice of chicken. They provided a theoretical framework to explain how different factors influenced consumers food product quality judgments. The main purpose of their study was to understand which cues are the most important in the selections of chicken meat and how these factors influence decisions. Their study found that appearance is the most important indicator of chicken quality as it indicates freshness and healthy properties. The choice of the cut is linked with tradition and value for money. Consumers also prefer to purchase raw chicken compared to the cooked product as they think it enables them to better assess the chicken quality (Kennedy *et al.*, 2004).

Pirvutoiu and Popescu (2013) examined consumers' chicken meat purchase behavior commercialized on the Bucharest market to establish consumer profiles. Their survey found that increased consumption of chicken meat had a close relationship with income and level of education. The majority of consumers in their study purchased fresh chicken meat every 2-3 days to cover the weekly meals for their family. They used it to alternate with other meats or with vegetables in the diet. Consumers preferred local chicken meat raised naturally compared to imported meat due to taste and flavor. Most consumers preferred to purchase from the supermarket to save time. Chicken legs and breasts were the most preferred meat cuts as well as meat with bones and boneless meat in order to diversify meals. The majority of consumers were aware of quality brands which were the guarantee for high-quality meat, good taste and convenient price — each of which had a deep influence on consumers (Pirvutoiu and Popescu, 2013).

In their study, McEachern and Warnaby (2008) found that during the purchase of chicken meat, consumers preferred communication with family members and with the industry to evaluate chicken meat quality and animal welfare. Attitudes towards meat quality had a direct influence on purchase behavior of quality-centered, welfare-friendly and organic brands and an indirect influence via behavioral intentions. Nevertheless, their study found that family members opinions is not strong influential factor during chicken meat purchase decision compared to the food industry.

2.5.3 Lamb consumers

Lamb meat consumers search for various quality cues and safety information to make their purchase decisions. Consumers search for information that satisfies their need for purchasing good quality and safe meat. Consumers' information search can be divided into two pre-purchase search processes: internal and external. During internal searches, consumers search for information within their own memory for past experience with the product. Previous experience with certain products and brands trigger consumers' memories and assist with making purchase decisions in the future (Van Ittersum, 2001). However, if the internal search information is insufficient for making purchase decisions, consumers do external searches such as product advertisement. Information obtained from external searches leads to an internal search for evaluation (du Plessis and du Rand, 2012). Evaluation of lamb meat during purchase is a difficult process, and depends on several variables (Holm and Møhl, 2000; de Andrade, de Aguiar Sobral, Ares and Deliza, 2016).

During product evaluation, extrinsic quality cues such as country of origin, price, animal welfare, the animals' diet have a great influence on consumers' lamb meat purchase decision. Font-i-Furnols *et al.* (2011) conducted a study to understand the effect of three extrinsic cues (country of origin, price and feeding system) on the purchasing decisions of British, Spanish and French consumers of lamb. Their study found that the majority of consumers' decisions were driven by the meat's country of origin. Consumers appreciated their own country's meat due to feelings of belongingness and sense of identity. Another extrinsic cue, price, was less important compared to the country of origin and the feeding system. However lowest price was most preferred in all cases. Feeding systems (grain-fed, grass-fed, and mixture of grain and grass) were also an important factor for the consumers to make a purchase decision. Feeding systems, environmentally friendly production and animal welfare were linked to safety, health, and nutrition.

Bernués, Olaizola and Corcoran (2003) identified four groups of lamb consumers who valued different quality cues to make purchase decisions. Their study was conducted in five European countries — England, France, Italy, Scotland, and Spain — with total of 1056 lamb consumers. The largest consumer group, 'group one', considered origin and region of lamb production to be the most important cues and other attributes as secondary. Important quality cues for 'group two' consumers were production systems such as feeding methods, environmental friendliness and animal welfare, however, packaging and storage were

irrelevant to them. Similarly 'group three' also paid special attention to animal welfare and environmental concerns but in combination with processing and packaging. The animal's origin and feeding methods were less important to this group. Lastly, 'group four' consumers showed the highest interest in packaging/processing and storage of lamb in combination with animal feeding. The number of purchase motives were different between groups: family concerns, safety, ease of purchase, cooking, eating satisfaction of lamb and the occasion for the meal. To group one, satisfaction of eating was most important compared to all other factors. Group three also gave less importance to satisfaction of consumption, meal occasion, and safety, where groups two and four showed the highest interest for all purchase motives. Among consumer groups there was also a difference in relation to the direct assessments and label/brand as a source of information about quality. Their study also found that a lamb consumer's 'own assessment' of intrinsic quality cues at the point of purchase was an important source of information for those with a range of concerns, including safety. Product brands and labels were also important sources of information for lamb consumers for evaluating production processes. Bernués, Ripoll and Panea (2012) found that most of the Spanish lamb consumers preferred to purchase lamb from traditional butchers and consumers who cared less about the product attributes purchased package lamb from the supermarket. In term of extrinsic cues, the most important attribute for all consumers was local origin and quality labelling in combination with easy cooking attributes. The feeding system was also an important attribute to the consumers: they preferred pasture-fed compared to grain-fed attributes. In terms of intrinsic quality cues, consumers considered the appearance of freshness of lamb meat. Another important intrinsic cue was the fat content of the lamb meat; however, color was least important attributes in general (Bernués *et al.*, 2012).

2.5.4 Pork consumers

The pork consumers' purchase decision-making process is denoted by the use of available information, evaluation of the alternatives, preferences development and finally making a choice to purchase preferred types (Verbeke, De Smet, Vackier, Van Oeckel, Warnants and Van Kenhove, 2005). Evaluation of any meat and meat product is a complex process and, like the other meats discussed in this thesis, it is based on product attributes intrinsic and extrinsic quality cues. Pork consumers evaluate pork quality based on health-related and hedonic dimensions (eating pleasure), in terms of freshness, nutritional value, taste, juiciness, leanness, and tenderness (Bredahl, Grunert and Fertin, 1998). Pork consumers purchase decision depend

on various factors including: color, drip (fluids), marbling, fat content, brand, origin, and product quality and safety certificate (Verbeke *et al.*, 2005; Grunert, Loose, Zhou and Tinggaard, 2015; D'Souza, Cleary and Hewitt, 2017). Consumers also consider meat sensory characteristics (appearance, taste), health impact, nutritional value, and other relevant aspects (Brewer, 2010).

Once pork consumers choose the place of purchase, they consider some extrinsic characteristics of the product such as expiry date, product information, food safety, purchase convenience, size, and palatability. Once the decision to purchase a pork meat product is made, subsequent choices among a variety of products with various intrinsic and extrinsic cues must be made using weighted decisions whether to choose steaks or chops. Which is determined by personal preferences such as quality, price range, range of product available (Brewer, 2010).

Wang, Gao and Shen (2018) conducted a study on Chinese pork consumers to analyze how their attitudes towards behavior, subjective norms and perceived behavioral control affected their purchase intentions of safety-certified pork. Due to serious quality and safety incidents related to pork between 2006-2015 in China, government issues safety certification for pork (Xu, Yang, Wu, Chen, Chen and Tsai, 2019). Their study found that consumers' attitudes, subjective norms, and perceived behavior positively influenced purchase decisions. Consumers' attitudes of purchasing safety certified pork and consumers with enough knowledge and experience of purchasing safety certified pork are the two main internal factors that affect their purchase intentions. In terms of an external factor, media and government influence were most significant. They also found that consumers' experience and cognitive ability affect perceived behavior. Finally, origin of the pork played an important role in making final purchase decisions.

Grunert *et al.* (2015) studied how Chinese consumers chose fresh pork meat (pork ribs) in the supermarket. Previously, consumers used to purchase meat from the open market, where consumers used to have personal communication with sellers. Over time, however, food retailing has moved from open market to supermarket, where personal communication is replaced with package labels, advertising, and in-store displays (Grunert *et al.*, 2015; Wang *et al.*, 2018). This has changed the way consumers make purchase decisions for fresh meat. In open markets, the major quality cues for the fresh meat was familiarity with the seller, personal communication and the ability to inspect by touching and visually inspecting the physical product. However, in supermarkets, this is not possible. Meat products are still visible but

prepacked, therefore it is less available for visual inspection and handling. Due to this reason, the main objective of their study was to analyze the impact of intrinsic and extrinsic quality cues on consumers' choice. The finding of their study showed that the majority of consumers chose fresh pork meat based on the intrinsic quality cues such as fat content and color of the meat. And a small number of consumers made their decision based on extrinsic quality cues like quality certification. They also found that the importance of branding and quality certification was increasing in Chinese supermarkets (Grunert *et al.*, 2015).

Price was another major factor in making meat purchase decisions. Consumers increasingly demand specific attributes in meat products and they often pay a premium for those attributes. Sanders, Moon and Kueth (2007) conducted a study to analyze pork consumers' attribute preferences and willingness to pay for fresh pork product attributes in terms of four taste-related attributes such as tenderness, juiciness, leanness, and marbling. The result showed that consumers were willing to pay a premium for certified superior product with multiple attributes compared to only purchasing for marbling, and one-half of the responders were willing to pay a premium for juiciness, leanness, and tenderness. Consumers' willingness to pay a high price was driven by their past experiences, and perceived importance of the taste and level of price. Health-conscious consumers were willing to pay a higher premium for lean pork meat. However, the majority of consumers were not willing to pay a premium for marbling.

Meat consumers are concerned about health and safety (Verbeke, Pérez-Cueto, de Barcellos, Krystallis and Grunert, 2010). Media coverage and government regulation have highlighted health scares in the meat industry including pork. Consumers have become more aware of hazards, however, many consumers do not understand what they are (McCarthy, O'Reilly, Cotter and de Boer, 2004). Typically, consumers search for available attributes at the point of purchase and experience attributes depend on previous consumptions. That said, consumers are concerned about the attributes and when no intrinsic cues were directly accessible in the buying process, consumers can use other information like extrinsic quality cues to evaluate the meat as an indicator of quality (Verbeke *et al.*, 2005). Nevertheless a lack of interest and confidence made consumers unable to use such information (Wang *et al.*, 2018). To help consumers make informed purchase decisions, social influences need to be considered. The opinions of friends and family members can often influence their purchase decisions (McCarthy *et al.*, 2004).

2.6 Consumer Behavior Models

Consumer behavior models have been developed since 1940 to describe consumer buying behaviors and to understand consumers (Marreiros and Ness, 2009). Multivariable consumer behavior models are the most appropriate according to Schiffman and Kanuk (1994) who state that multivariable models are comprehensive and capture consumers' buying behavior and decision-making processes and provide a better understanding of the consumer. The multivariable models highlight many consumer buying decisions including those purely based on economic considerations. Consumers' needs and motivations are complex and consumers like to get satisfaction at an economic level and at a personal level for example emotions, cultural values, and norms, etc. (Chisnall, 1995).

There are several multi-variable consumer models. These are Engel-Blackwell-Miniard (EBM) (Engel, Blackwell and Miniard, 1995), Howard-Sheth model (Farley and Ring, 1970), the Nicosia model (Nicosia, 1966), and the Andreasen model (Andreasen, 1965). Among all the models, the EBM (Engel *et al.*, 1995) model is considered more comprehensive and can be applied to different products and decision-making processes (Marreiros and Ness, 2009; Hsu, Lin and Ho, 2012; Muhammad and Ghulam, 2019).

The EMB model was developed based on three factors: individual difference, environmental influences and physiological process (Engel *et al.*, 1995). The EBM model is divided into four sections: decision process; information input; information processing and variable influencing the decision (Figure 2.1). According to the EMB model, every purchase decision goes through the following stages: need recognition, search for information, pre-purchase alternative evaluation, purchase, consumption, post-purchase alternative evaluation and divestment. The search for information feeds into the information processing stage and passes through the buyer's memory which serves as a filter. The consumer requires external information if their prior experience with the product is dissatisfactory. The information processing section of the model consists of the consumer's exposure, attention, comprehension, acceptance, and retention of incoming information. The last section of the model consists of individual and environmental influences that affect all stages of the decision process.

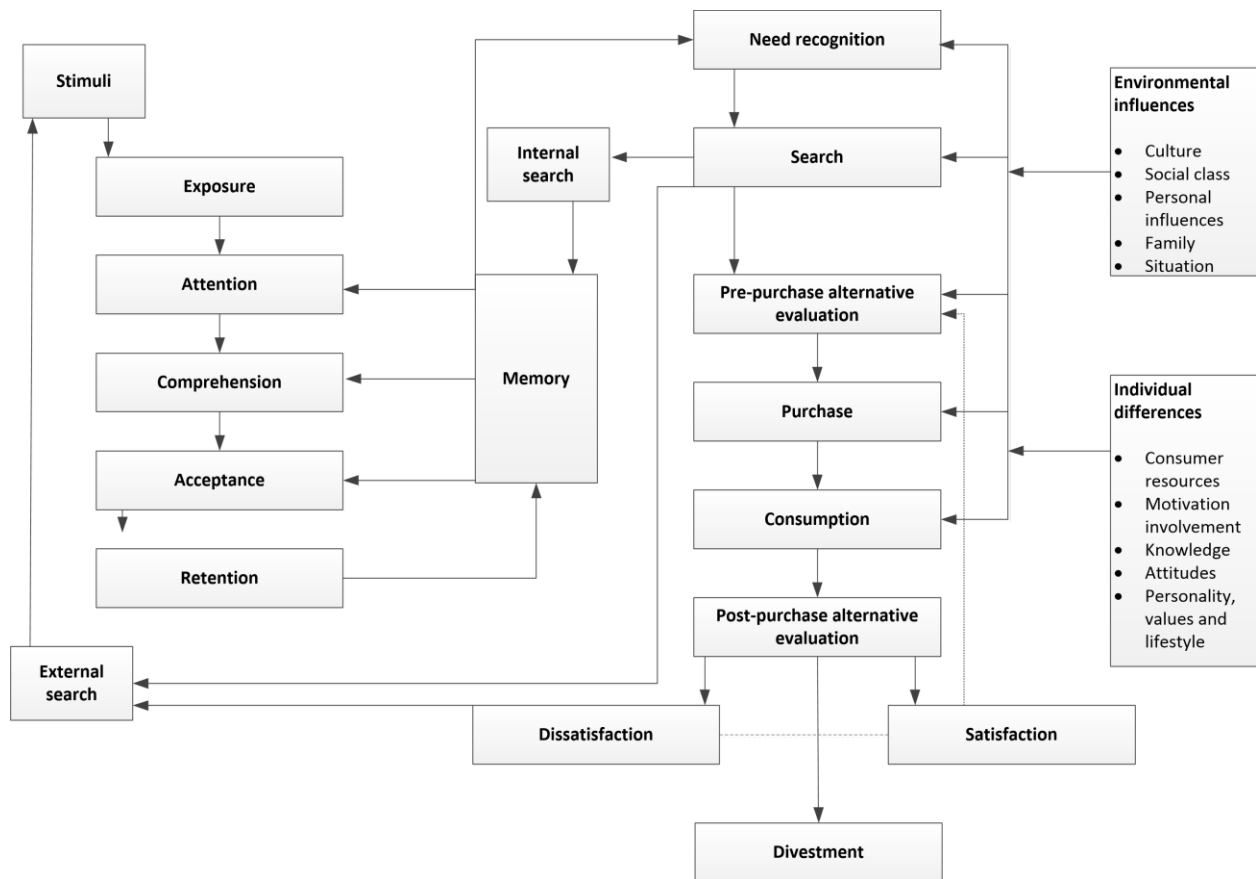


Figure 2.1: The Engel-Blackwell-Miniard Model.

Source: Engel *et al.* (1995)

2.6.1 Consumer Behavior Models for Food

To make a purchase, consumers look for several criteria such as healthy food, taste, nutritional value, reliability, quality, price, origin, and convenience of food (Asioli, Aschemann-Witzel, Caputo, Vecchio, Annunziata, Næs and Varela, 2017). Consumers prefer to shop at supermarkets due to the reliability of the food sold, the atmosphere and convenient personal inspection of the products (Knight *et al.*, 2003; Wilcock *et al.*, 2004; Tudoran *et al.*, 2012). When faced with too many choices and qualities of products, consumers may be confused about which of the products to choose, how to choose healthy food and where best to put their money. The taste, nutritional value, reliability, and price are quite important when buying food (Tudoran *et al.*, 2012; Bryla, 2012).

To understand food consumers' purchasing processes, several food-specific consumer behavior models have been developed over the years, for example Steenkamp's model

(Steenkamp, 1997) and the Total food quality model (Grunert *et al.*, 1996). These are discussed below.

Food consumer behavior models take a cognitive approach, where the decision-making process and the information processing of marketing stimuli are the main influences to explain consumer behavior (Verbeke, 2000). Most food consumer behavior models focus on the interaction between the consumer and the food product, while there is recognition of external influences such as economic factors and product availability. The decision process is facilitated by information processing mechanisms and shaped by social, psychological, cultural influences (Marshall, 1995).

The Steenkamp (1997) behavior model with regards to food distinguishes between the consumers' decision-making process with respect to foods, and the factors influencing this decision process (Figure 2.2). There are four stages in the decision process. These are: need recognition, search for information, evaluation and choice. These stages are adopted from EMB (Engel *et al.*, 1995) consumer model (Marreiros and Ness, 2009).

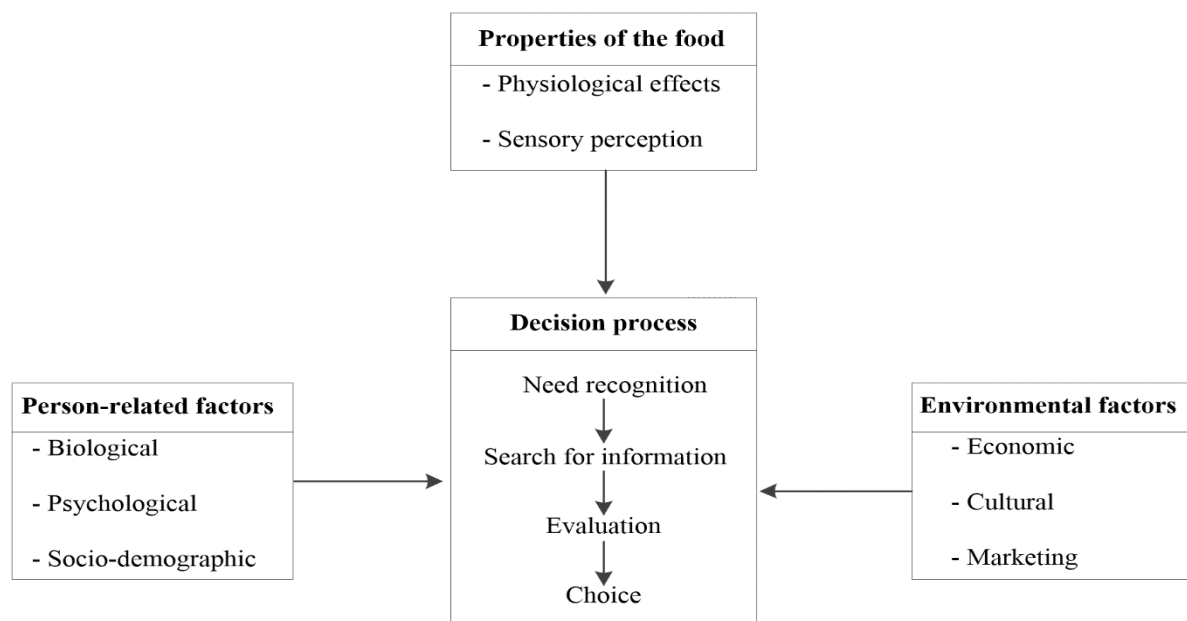


Figure 2.2: Conceptual consumer behavior model with respect to food.

Source : (Steenkamp, 1997)

The decision process is influenced by three groups of influential factors: properties of the food, person-related factors, and environmental factors. This group of three factors is based on one of the most influential and earliest models of factors affecting consumer behavior

regarding food — the Pilgrim model (Pilgrim, 1957). According to Steenkamp (1997) any comprehensive analysis of consumer behavior regarding food must consider these three influencing factors.

The Steenkamp model is especially focused on the product as one of the main influences on food choice. Buying decisions are affected by the product through physiological effects and sensory perception, because food products are commodities, sold unlabeled or unbranded and have poor or no communication around them. Consequently, the models dealing with consumer choice and behavior relating to food are mostly concerned with the influence of physical and sensory properties of the product and of price (Marreiros and Ness, 2009).

2.6.1.1 Consumer food evaluation and choice

Consumers' evaluation of food is one of the most critical areas in consumer behavior studies (Grunert, 1997). There are a variety of foods, and food selection is a major component of all purchase decisions made by consumers. Food products come with lots of characteristics, but the degree of satisfaction obtained from consuming the product is often only related to the cues available at purchase. This is because, for many food products, consumers would process the product further by cooking and mixing it with other products to create meals, which affects the usual food quality evaluation methods including the taste of the product. And with meat products largely sold unbranded, there is no major cue of quality on which consumers may otherwise have relied (Grunert, 1997).

Within consumer behavior analysis of food, choice several approaches can be distinguished, these are the economics of information approach, the multi-attribute approach, hierarchical approaches, and integrative approaches (Grunert, 1997).

In the economics of information approach (Nelson, 1970; Nelson, 1974) a contrast is made between search goods (search products) and experience good (experience products). This classification provides important insights into consumer behavior (Huang, Lurie and Mitra, 2009; Siering, Muntermann and Rajagopalan, 2018). Search goods is when consumers can evaluate the products with available information prior to purchase. On the other hand, experience goods is when consumers can evaluate the product only after purchase. Later, consumers try to draw product quality conclusions from the brand name with a good record of credibility or the market share of the product.

Nelson's approach was extended in two ways. Firstly, most products have search and experience goods. It makes more sense to apply the multidimensional notion of quality which includes search and experience characteristics. For example, taste is the typical experience characteristic of food, on the other hand, the fat content of the piece of meat is a search characteristic (Grunert, 1997). Secondly, there may be a third group of characteristics where the consumer does not have the possibility of detecting whether the product actually possesses the characteristics. Examples are whether a vegetable has been ecologically produced and whether an animal was farmed following animal welfare guidelines. These are the characteristics which do not reflect in the objective character of the final product. Such characteristics are either impossible to verify due to lack of traceability or require a high cost for the consumer to verify (Andersen, 1994; Grunert, 1997). The economics of information approach does not provide a model of the quality perception process as such, since the question of how consumers infer beliefs about experience and credence characteristics, and how they integrate such beliefs into an overall quality evaluation, are not treated explicitly.

Multi-attribute approaches assume that product quality is a multidimensional phenomenon — the overall quality is described by a set of characteristics or attributes. But these are not objective characteristics, they are specific to the consumers. The consumer then evaluates the product by creating one-dimensional quality evaluation with the various attributes of the product.

Many variations of the multi-attribute model have been used in consumer behavior theory. The Fishbein attitude model (Fishbein, 1975) is one of the popular ones. To some extent, the multi-attribute model made distinctions between search, experience and credence characteristics by the distinction of intrinsic and extrinsic product attributes. The multi-attribute model is a widely used approach to analyze the quality in consumer behavior, however, it is also widely criticized. One of the reasons is that the interrelationship of attributes is not taken into consideration.

Hierarchical models deal with the shortcomings of the multi-attribute approach. One of the hierarchical models is the means-end chain theory (Zeithaml, 1988; Grunert, 1997). A means-end chain is a model of the consumers' cognitive structures depicting how concrete product characteristics are linked to self-relevant consequences. More specifically it shows how product characteristics are linked with functional or psychosocial consequences of consumption. For example, a piece of meat's fat content (concrete characteristics) is linked

with its calories (abstract characteristics) and hence linked to the functional and social acceptance, which leads to the individual such self-confidence and self-esteem. The main shortfall of these approaches is that, while the process of the attribute is satisfactorily modeled, the final product quality evaluation remains unclear (Grunert, 1997).

Some researchers made attempts to integrate these various approaches together for analyzing the quality perception steps for food products. The most notable attempts are the work of Steenkamp (1989) and Andersen (1994). Both models assume that consumers only seek experience and credence qualities in food products. Consumers used search characteristics only as an indicator for the quality they actually sought on the products and this indicator covers the attributes of the product itself and other attributes. Based on this observation, consumers form expectations about experience and credence qualities, which turn into one-dimensional quality. One-dimensional quality attributes is: attributes presence gives satisfaction and absence causes dissatisfaction (Schvaneveldt, Enkawa and Miyakawa, 1991). Later expected quality may compare with experienced quality.

Grunert *et al.* (1996) have elaborated these approaches and developed the Total Food Quality Model (TFQM), as shown in Figure 2.3, (Grunert *et al.*, 1996; Grunert, 1997; Grunert *et al.*, 2004) by integrating these approaches to analyze consumer quality perceptions and decision-making behaviors. TFQM is divided into before and after purchase evaluation.

In the before purchase part, the model shows how consumers' quality perceptions are formed based on the quality cues. Physical characteristics of the products are covered by intrinsic quality cues and are related to the products' technical specifications. These also include the products' physiological characteristics which can be measured objectively. All other product characteristics such as brand name, price, packaging, sales outlet, etc. are represented by extrinsic quality cues. Out of all the cues, consumers are exposed to perceived cues and these will have an influence on the consumers' expectation quality. Perceived cues are affected by the shopping situation. For example, the amount of information available in the shop, whether shopping was pre-planned or sudden, or time pressure during shopping and other consumer's circumstances. According to the TFQM, quality helps to satisfy purchase motives or values (Grunert *et al.*, 1996; Grunert *et al.*, 2004).

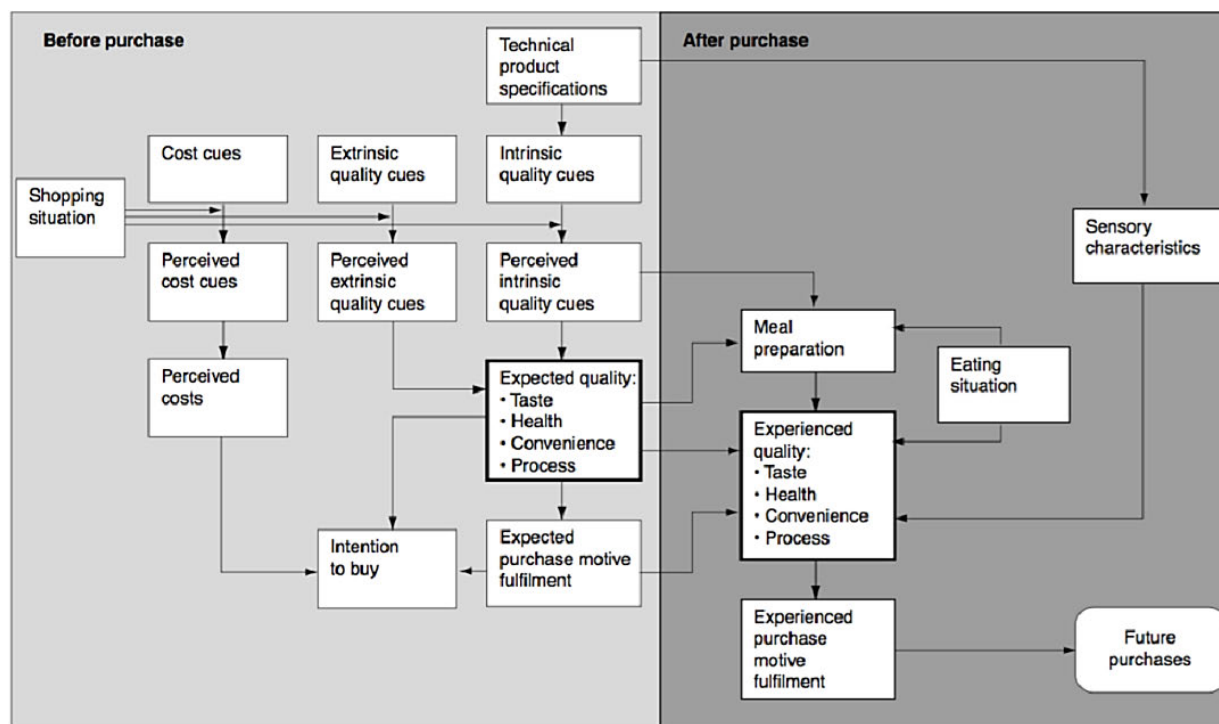


Figure 2.3: Total Food Quality Model (TFQM).

Source: (Grunert et al., 1996, p. 82)

Consumers will have an experience with a product after they have purchased it, and this experience will inform their perception of the product's quality. Often there is a divergence between the quality expectations that the consumer had before purchase and the quality perceptions that result from their post-purchase experience. The experienced quality is influenced by many factors such as the product itself, sensory characteristics, product preparation, time and type of the meal, consumer's mood, and previous experience. Expectation also plays an important role in determining the experienced quality of the product (Grunert et al., 1996; Grunert, 1997; Grunert et al., 2004). They conduct a study on beef consumers in order to identify how the consumers form expectations from intrinsic and extrinsic quality cues. Details will be discussed in the following section.

More recently, Marreiros and Ness (2009) proposed a two-component conceptual framework for analyzing consumer decision-making behavior (see Figure 2.4). They adopted the main features of consumer decision-making from the EBM model (Engel et al., 1995). The main contrast from the TFQ model (Grunert et al., 1996) was the consumers' quality evaluation. The main idea was to integrate EBM and TFQ models, taking into account the theoretical principles proposed by their authors. The EBM model is a general consumer

behavior model while the TFQ model was mainly proposed for food products however it is expected to apply to other products which are composed mainly of experience attributes (Marreiros and Ness, 2009).

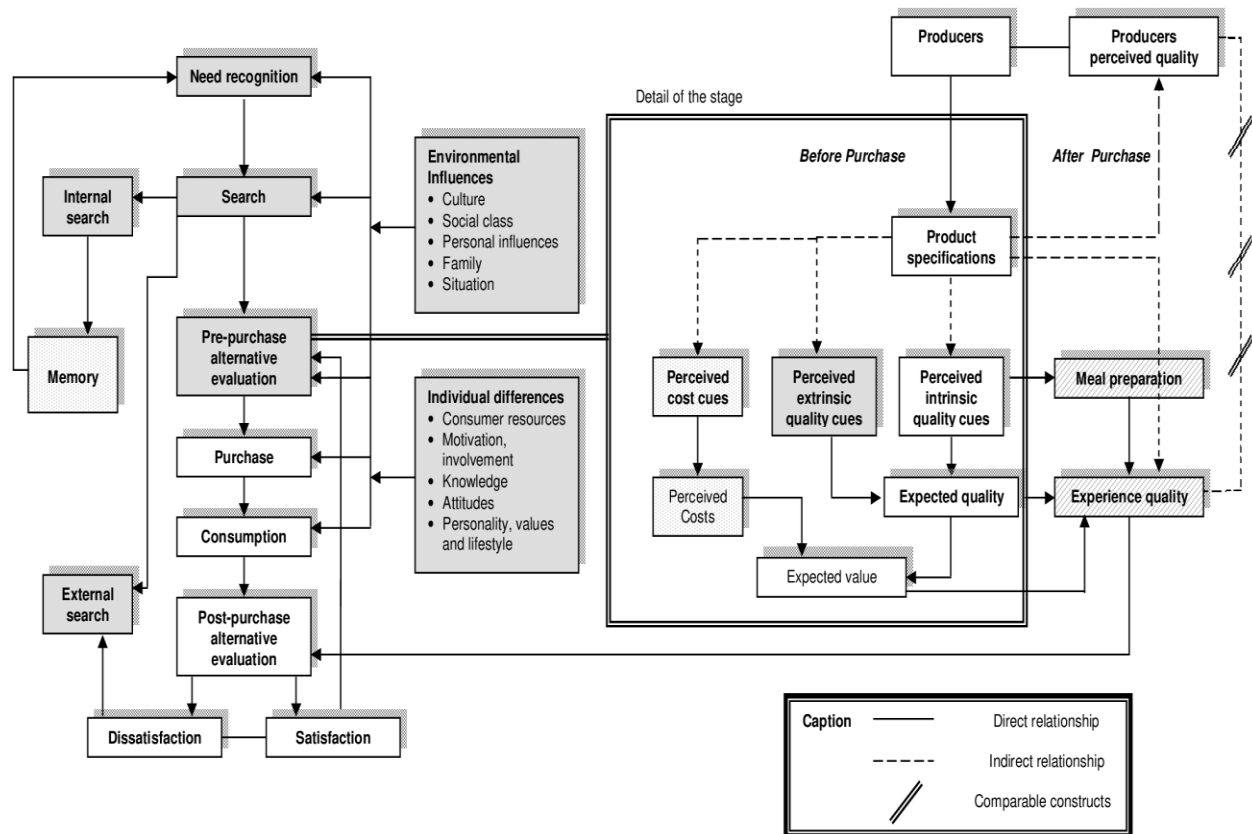


Figure 2.4: A Conceptual framework for food choice.

Source: (Marreiros and Ness, 2009, p. 21).

The relationship between EBM (the Engel-Blackwell-Miniard Model) and TFQ (the Total Food Quality) models was explored in this conceptual framework and applied to consumers' decision-making processes relating to purchasing beef. Marreiros and Ness (2009) study tried to understand how a beef consumer chose beef and what are the main influences on the beef buying process were by investigating consumers' attitudes, perceived quality cues, choice cues and beef consumption.

This research also studied the difference between consumer groups using several criteria to define those groups. The result of their study showed that different consumer group always associated between their attitudes and beliefs and important attributes for experienced quality and cues used for making the buying decision. On the basis of group attitudes to eating beef, every group of customers was shown to have different consumption behavior and they

used different product cues to make their beef buying decision and also used different attributes to evaluate the experienced quality of consuming the beef.

2.6.2 Consumer meat buying behavior

Verbeke (2000) presented a four-component conceptual framework to analyze consumer decision-making behavior for buying fresh meat (see Figure 2.5). Verbeke combined four different consumer behavior models and developed a conceptual framework for meat consumer behavior analysis. The decision-making process was adopted from the EBM model (Engel *et al.*, 1995) and was linked and integrated with a Hierarchy of Effects model proposed by (Lavidge and Steiner, 1961). The second part of the model is Information Processing as proposed by (McGuire, 1978) and discussed by (Scholten, 1996). Finally, decision-making influence factors or variables are adopted from (Pilgrim, 1957; Steenkamp, 1997).

According to Verbeke (2000) studying consumer behavior models based on stage models is also referred to as a decision-making perspective in consumer research. The purchase is considered as one point in a particular course of action undertaken by a consumer from a decision-making perspective. In order to understand that point, identifying problem recognition, information search and processing, and product evaluation is needed. The hierarchy of effects model indicates the different cognitive stages of the consumer while they make a buying decision and responds to marketing or non-commercial messages.

When considering meat purchasing, it is important to pay attention to the influencing factors on consumer decision-making that results from communication and marketing (Verbeke, 2000; Verbeke, Rutsaert, Bonne and Vermeir, 2013). The information processing stage in the framework identifies the communication effects in terms of the ordered stages' exposure and attention to communication, comprehension, persuasion, which refers to attitude change, and finally, the retention of a new attitude. Based on the model by Pilgrim (1957), throughout the decision-making process, consumers' judgments and choices about food products are affected by various stimuli from the environment and consumer characteristics. It has been identified that the borders between groups of stimuli are fuzzy and factors can be interchangeable between groups.

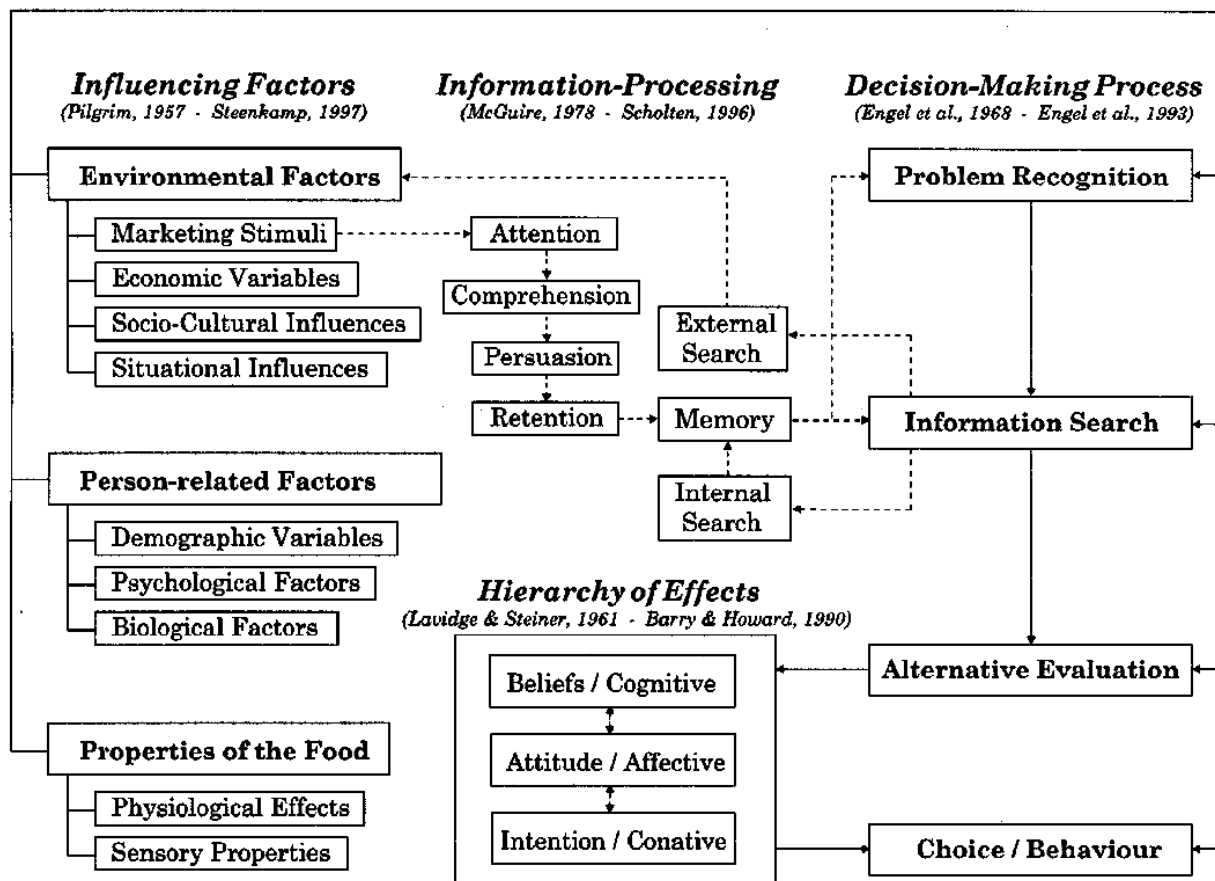


Figure 2.5: Conceptual framework for analyzing consumer decision-making towards meat.

Source: (Verbeke, 2000, p. 525)

According to Font-i-Furnols and Guerrero (2014), consumers are the final step in the production chain, and meeting their expectation is an important part of their satisfaction and buying behavior, therefore it is important to understand the factors that affect consumer behavior (Escriba-Perez *et al.*, 2017). Font-i-Furnols and Guerrero (2014) divided the influencing factors of consumer behavior into three types: psychological (individual factor), sensory (product-specific factor) and marketing (environmental factor). They illustrated these three influencing factors — shown in Figure 2.6 — as a multidisciplinary model of the main factors affecting consumer behavior in the food domain.

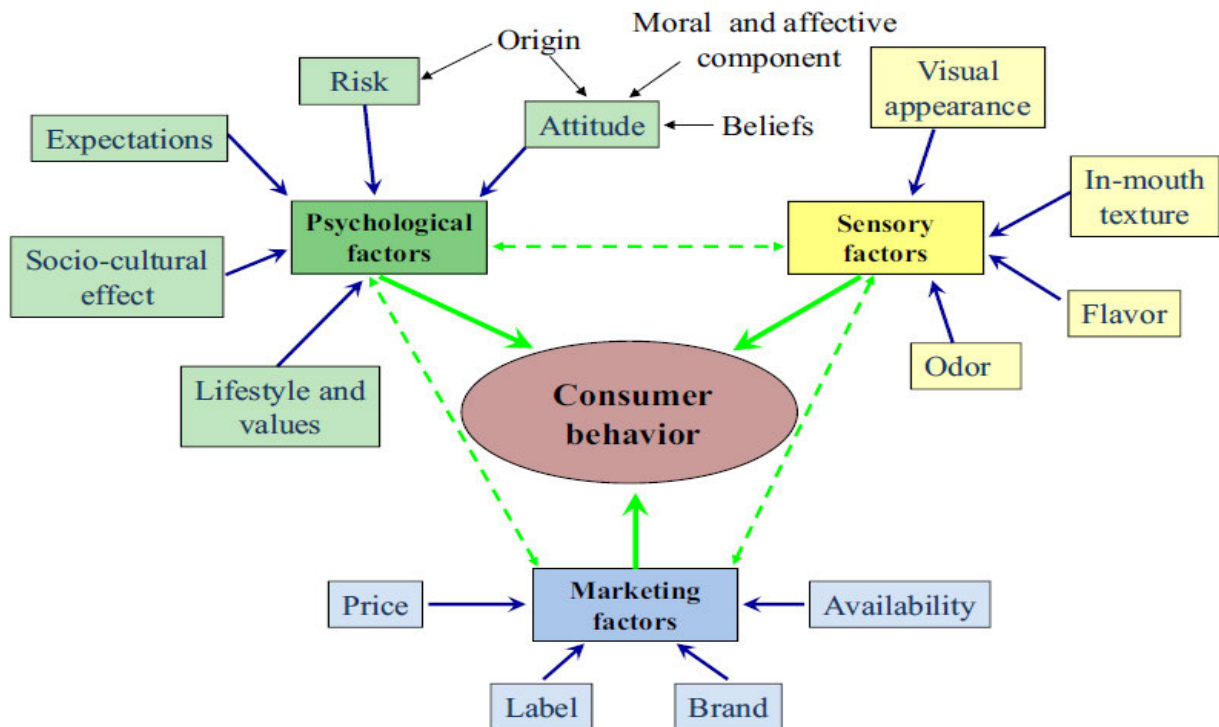


Figure 2.6: A multidisciplinary model of the main factors affecting consumer behavior in the food domain.

Source: (Font-i-Furnols and Guerrero, 2014, p. 362)

These decision-making factors are interrelated and also depend upon additional factors that affect consumers' decision-making. The importance of the model's components depends on the consumer context, culture and available information that might influence individual behavior.

As human beings, consumers are affected by many psychological factors, which can control or modulate their emotional, cognitive, volitional or automatic actions. Psychological factors such as beliefs, motivation, perception, attitudes, and expectations drive human life and make their conduct predictable from a social, economic, cultural or psychological perspective. Such psychological factors affect consumer decision-making towards meat purchases. According to Fishbein (1975) beliefs represent individual's perceptions about products and particular attributes associated with it. Beliefs develop throughout life and this is a dynamic process, it can be developed by direct observation, by information obtained from friends, mass media, social media, relatives . and from previously acquired experience and knowledge. Beliefs and attitudes about the characteristics of a particular product and the way it is produced or distributed can influence consumer perceptions (Claret, Guerrero, Ginés, Grau, Hernández, Aguirre, Peleteiro, Fernández-Pato and Rodríguez-Rodríguez, 2014). In general, humans tend

to show positive beliefs and attitudes towards behavior similar to their own, and negative beliefs and attitudes towards different behavior. Consumer's beliefs and attitudes about meat products depend upon the individual characteristics and the product itself. Regardless of meats characteristics and social status, meat has a negative image due to its handling practices, slaughter conditions, environmental issues, and religious, ethical and moral concerns. However, negative attitudes towards meat production seem to have less effect on shopping behavior, probably because consumers do not have enough knowledge and information is obtained from an indirect source (Grunert, 2006). Knowledge and attitudes about diet and meat products also influence consumer's choices about types of meat (Guenther, Jensen, Batres-Marquez and Chen, 2005). Consumers show positive attitudes about the specific nutritional value of meat and meat products, such as low fat or salt (Guàrdia, Guerrero, Gelabert, Gou and Arnau, 2006). However, consumers do not compromise the sensory features of their food products for potential benefits to their health (Verbeke, 2006). A big percentage of consumers prefer to consume less of certain products rather than consume a healthy and tasteless version of the product.

Food safety issues and livestock diseases have changed consumer and political perspectives of meat supply chain and animal science. Meat-related diseases such as BSE or hormones (Van Wezemael *et al.*, 2010) have raised public concern and questions about the risks and benefits of meat consumption. However, nutritional value and healthiness are more important than meat safety to consumers (Verbeke *et al.*, 2010). Effective communication such as informative meat labeling can help to improve consumers' confidence about products and change their attitudes especially for consumers who are more concerned about safety and nutritional value. These types of consumers tend to seek more information and read product labels often. According to Grunert (2006), meat quality has increasingly come to mean information about meat instead of its innate properties and less often refers to conventional extrinsic quality cues such as origin or place of purchase.

The sensory properties of meat are another influential factor that affect consumer decision-making behavior. Sensory enjoyment of the meat is related to several quality traits such as visual appearance, texture and flavor of the meat. These quality traits depend on several intrinsic and extrinsic cues: species, genotype, nutrition, age, antemortem and postmortem treatment, slaughter procedure and aging time. However, not all of the factors affect all of the cues (Duckett and Kuber, 2001; Channon, Kerr and Walker, 2004; Pethick, Davidson, Hopkins,

Jacob, D'Souza, Thompson and Walker, 2005). Thus, it is sometimes difficult to improve meat characteristics because these depend on various stakeholders in the meat production process. Furthermore, modification of the product during production, to meet a desired characteristic, can negatively affect another characteristic of the product (Font-i-Furnols and Guerrero, 2014).

The third influencing factor of consumer behavior is marketing factors. Consumers receive most of the information about meat and its quality from advertisements, information campaigns, product labels or brand names. Consumers use this information with previous experience to create their quality expectations which influence them to choose the product, make a purchase decision and make them willing to pay more. The price of the meat is an important extrinsic quality cue for the consumer to make a purchase decision. It has a positive effect on expected quality, and it is affected by demographic characteristics (Reicks, Brooks, Garmyn, Thompson, Lyford and Miller, 2011). Quality certification is another important attribute which can affect consumer buying preferences depending on the country. In some countries, consumers prefer to buy meat from known butchers without veterinary stamps over certified meat by government veterinarians, probably because of distrust of government food safety enforcement (Imami, Chan-Halbrendt, Zhang and Zhllima, 2011). In some countries, consumers trust governmental institutes and the certificates provided by them (Schleenbecker and Hamm, 2013).

The product quality label, the brand of beef, and product origin are important cues that positively influence the consumer to buy beef. Another important quality label for Muslim consumers is a halal label in a non-Muslim country. Halal labels assure the halal authenticity of the meat and meat products (Bonne and Verbeke, 2008). Muslims are also willing to pay more for meat with a halal label (Verbeke *et al.*, 2013).

Multiple influencing factors affect consumers' decision-making behavior towards meat and meat products. Therefore, consumer's preferences, behaviors and their perceptions of meat not only depend on sensory properties but also psychological and marketing factors. Better understating of consumers' behavior may help improving the meat industry by providing effective information, healthy and environmentally friendly choices (Font-i-Furnols and Guerrero, 2014).

The consumer behavior model mostly focused on consumer decision-making processes and factors that influence the decision-making process, but also how consumers evaluate

products based on quality cues and formed product experience. However, it is still not clear how experience influences future product purchases and how one consumer's experience influences another consumer to purchase any food product.

2.7 Information Behavior of Food Consumers

According to Wilson (2000, p. 49) information behavior is a general term defined as “the totality of human behavior in relation to sources and channels of information, including both active and passive information seeking, and information use”. Information behavior consists of information seeking behavior, information searching behavior, and information use behavior. Wilson (2000, p. 49) defined information seeking as “the purposive seeking for information as a consequence of a need to satisfy some goal”, it may consist of information search behaviors which are the “micro-level” of behavior employed by the searcher in interacting with information systems of all kinds”. And lastly information use behavior “consists of the physical and mental acts involved in incorporating the information found into the person's existing knowledge base”.

Human information behavior is a complex (Bates, 2010) and multidimensional process. It activates when a person recognizes the needs which can be met through information intake and includes all the activating mechanisms that lead to information seeking and then information processing and use (Lioutas, 2014). The way human information behavior is expressed depends not only on the nature of the information requested but also on personal, psychological and situational factors (Lioutas, 2014).

Understanding consumers' information behavior is important in order to understand consumers' perceptions, beliefs, attitudes, and choices. As discussed in the previous section, product choice is affected by a set of psychological, cultural, personal, (Steenkamp, 1997) or even hormonal factors (Durante, Griskevicius, Hill, Perilloux and Li, 2010), and also the characteristics of the product itself. For a food product, Steptoe, Pollard and Wardle (1995) discovered that the choice of a product is affected by nine different factors: consumer health, mood, convenience, sensory appeal, natural content, price, weight control, familiarity, and ethical concern. Consumers make decisions about which food product to choose based on their needs and the information they have on the characteristics of the product and those of its possible alternatives (Lioutas, 2014).

The process of information seeking starts when consumers recognize the need for the information which activates information search (Lioutas, 2014). However, consumers may also be interested in seeking information that is not directly associated with their goals. For example, the consumer might be interested in any food product they accidentally encounter while they were browsing another product in the grocery store. This is known as passive information behaviors (Ocepek, 2017).

The nature of their needs shapes their information behavior. In the case of physiological needs there is a physical discomfort that leads to need recognition, but the way the individual acts depends strictly on the need. For instance, in the case of the need for food, people usually act habitually, skipping the stage of information seeking, or following limited information seeking. A very hungry person walking in the street may choose a product that is near at hand (a hot dog or a sandwich), without seeking information on its nutritional value or its vitamin content. On the contrary, when the primary need refers to health, consumers adopt a different strategy in order to meet the need (Barnett et al., 2011).

Barnett, Leftwich, Muncer, Grimshaw, Shepherd, Raats, Gowland and Lucas (2011) indicate that allergic consumers adopt a more extended information-seeking behavior, while other surveys reveal that population segments which are driven by health-related needs, such as parents of children with food allergies (Hu, Grbich and Kemp, 2007), or pregnant women (Szwajcer, Hiddink, Koelen and Van Woerkum, 2005), have continuous and more intense information needs about food. In this case, the more acute the need, the more extended the seeking behavior will be.

Consumers start to seek information after recognizing the primary need for information. The primary need could be information regarding health, ingredients of the food, how to prepare it, nutritional value, and so on. Different primary needs generate different goals and are interpreted into different information needs, and, consequently, different information behaviors. Hence, a consideration of the primary needs is crucial for a deeper understanding of consumer information behavior (Lioutas, 2014).

Even when the primary need is the same, the information needs which arise may be quite different between consumers. According to (Garden-Robinson, Eighmy and Lyonga, 2010), each person has an individual way of understanding and interpreting needs. Hence, each consumer focuses on a (or a set of) different topics and/or different areas of inquiry.

The selection of information source(s) is the first decision the seeker has to make. In a real-life setting, the consumer has to choose from among several alternatives which include, published sources, media sources, experts, and social sources. Indeed, recent studies indicate that friends, family, social networking sites, television, radio, Web sources, booklets, newspapers, magazines, and experts (Fan and Li, 2010; Freisling, Haas and Elmadfa, 2010; Goodman, Hammond, Pillo-Blocka, Glanville and Jenkins, 2011; Watson and Wyness, 2013) are some of the most commonly used food information sources. Food consumers also seek information from store personnel (Marshall, 1995) and food labels (Bonsmann, Celemín and Grunert, 2010).

The selection of source(s) is a function of several parameters — including source availability and accessibility, the convenience each source provides, consumers' familiarity with different kinds of sources, and their estimation about the ability of each source to satisfy the information need, as well as about its credibility and trustworthiness. The selection of information source also depends on the intensity of the consumers' needs, their previous experience with the source and psychological and available time. They also seek information from multiple sources when their need is not satisfied by one source (Lioutas, 2014).

2.7.1 Using Food Information

Perhaps the most critical question regarding food consumers' information behavior is, "How do consumers use information?" According to marketing literature, consumers use the information they have in order to make informed decision, or, in other words, to decide to buy or not to buy the product after a process of evaluation. Several studies confirm that information affects food choice such as, consumers' behavior toward fair-trade products (De Pelsmacker and Janssens, 2007), organic food (Schleenbecker and Hamm, 2013), animal welfare-friendly food products (Umberger *et al.*, 2009) and functional food (Cranfield, Henson and Masakure, 2011). Consumers' attitudes toward restaurants (Choi, Miao, Almanza and Nelson, 2013), are also affected by their level of information.

Consumers use the information on food labels to make direct choices, although, according to (Huizinga *et al.*, 2009; McLean and Hoek, 2014; Bedi *et al.*, 2010) they are not always able to accurately interpret the information they acquire from food labels. When information is difficult for consumers to comprehend its use is limited (Maubach, Hoek and McCreanor, 2009). Nevertheless, food labels are used only for packaged food products and in-

store information seeking. Hence, the use of information from labels can be extremely different from the use of information obtained from other out-of-store sources.

In any case, consumers evaluate the information they have gathered and, when frustrated, they continue to seek information from other sources. This subphase continues until the consumer feels that the need has been satisfied. Finally, the consumer processes the sum of information he/she has and adopts a specific behavior to the food product(s).

It is argued that an intense need leads to extensive information seeking (Visschers, Hess and Siegrist, 2010), to deeper processing of information, but the way consumers use the information, in that case, is rather “reflexive”. For example, a consumer who is allergic to a food ingredient may spend a considerable amount of time to seek information from several sources for the ingredients of different food products. However, when informed that a food product contains the specific allergen, there is little doubt that the consumer will reject the product. On the other side of the coin, when a need is less acute, the use of information is less “standardized.” For example, when consumers seek information on the sensory characteristics of a food product, it is expected that they will also evaluate the product’s other attributes (such as price, availability, or nutrient content) before deciding whether or not to buy the product (Lioutas, 2014).

2.8 Conclusion

The literature review presented in this chapter has focused on collaborative shopping, usage of technology, meat consumers, and their information needs when making purchase decisions, and consumer purchase behavior from a marketing perspective.

The main purpose was to gain insight into how meat consumers make their purchase decisions, how collaborative shopping works and how consumers use technology to do collaborative shopping. Meat plays an important role in the human diet by providing high-quality protein (Wyness, 2015; Pighin *et al.*, 2016), meat quality is important to consumers (Joo *et al.*, 2013). Consumers’ demand for tasty, healthy, and safe meat is increasing, as consumers are concerned about livestock production (Muchenje, Dzama, Chimonyo, Strydom, Hugo and Raats, 2009). Therefore, meat consumers increasingly search for product information during purchase including provenance, content, recipes, and suggestions (The-Power-of-Meat, 2016). Product quality information can assist consumers to make informed purchase decisions

(Risius and Hamm, 2017; Zhang, Baker and Griffith, 2020). Based on the available information, their personal, cultural, and other psychological experiences, consumers evaluate the product during and after purchase. During the evaluation, consumers depend on intrinsic and extrinsic quality cues (Issanchou, 1996; Grunert *et al.*, 2004; Morales *et al.*, 2013; Zhang *et al.*, 2020).

According to consumers' purchase behavior models and human information behavior, people first recognize their information needs, and then they start looking for that information from different sources. Information needs, and their intensity shape consumers' information behavior. The selection of information sources is the first decision people have to make when they recognize the need for more information. In terms of food, consumers make a direct decision based on the information available on the product label, however, they are not always able to interpret the product label information according to their needs. When consumers are unable to understand a label's information, they seek information from other sources. Information obtained from a label can be different than information obtained from other sources. The selection of information sources depends on several parameters such as availability, accessibility, familiarity with the source, the convenience each source provided, as well as credibility and trustworthiness. Friends and family are one of the trusted sources of information (De Bruyn and Lilien, 2008; Chu and Kim, 2011). Going shopping with friends and family is recognized as social shopping. When consumers are accompanied by their friends and family they spend more time shopping and it enhances their shopping experience also they can share information and have fun through interacting with others (Zhu *et al.*, 2010). However, sometimes it is difficult to shop together due to distance. In that situation, shoppers contact their remote partner from the shop via mobile device (Smith, 2013; Tohidi and Warr, 2013; Morris *et al.*, 2014; Willems *et al.*, 2017). While using mobile devices in-store has become more intuitive, meeting consumers' expectations is still a way off. When consumers are unable to satisfy their needs using mobile devices in-store they feel frustrated (Ingrey, 2017). Research has suggested that to support consumers' expectations and preferences we need to understand their needs, preferences, and the way they do things. The use of mobile devices in markets or shopping is popular, however, it is yet to fulfill consumer's needs; users get frustrated due to lack of information, features, and system that could support their needs (Nugent, Lueg, Buttfield-Addison and Dermoudy, 2015; Nugent, 2016).

The existing research shows that people do engage in collaborative shopping – either physically or remotely, often supported by technology. Missing from the existing research is insight into collaborative shopping for meat, and how technology is used to support collaborative shopping needs. To fill the gap in the existing research, this research seeks to explore collaborative in-store shopping practices among meat shoppers and how technology is facilitating their shopping.

The next chapter discusses the methodological approaches was taken to fill the gaps in the literature.

CHAPTER 3 — METHODOLOGY

3.1 Introduction

The aim of this Chapter is to discuss and justify the research methodology that was implemented to achieve the overall objectives of the research. As discussed in the previous chapter (Chapter 2), this research focuses on understanding collaborative in-store shopping with remote shopping partners in the meat shopping context and how people use technology to achieve their goals. Previous research has explored collaborative shopping in different contexts: technology usage to support shopping, meat shopping and how consumers purchase meat. However, there is no work in collaborative shopping of meat consumers and how they use technology to support their remote collaboration. Therefore, the main objectives of this research are:

1. To explore meat consumers' collaborative shopping practices in the context of in-store shopping.
2. To investigate how mobile technology is being used to support collaborative meat purchasing in bricks-and-mortar settings.
3. To identify the factors that need to be considered for designing technological artifacts to support meat consumers' collaborative shopping tasks

The above objectives will answer the following research questions:

1. What influences in-store meat shoppers to collaborate with remote shopping partners?
2. How does mobile technology play a role in supporting meat consumers' collaborative shopping in-store?
3. What factors need to be considered for improving the experience (technological, sensory, information seeking and sharing) of collaborative remote shopping for meat consumers?

To achieve the research objectives and answer the research questions several methodological approaches were taken. This chapter will discuss the research philosophies and approaches implemented in the study. By discussing the research strategy and design, it will follow with a detailed explanation and justification of the adopted research methodology.

3.2 Research Philosophy

It is necessary to discuss research philosophy before conducting research, as it provides the perspective for the study and determines how knowledge is created (Johnson and Onwuegbuzie, 2004). Understanding research philosophy before conducting research helps the researcher to identify potential research methods and provides a clear picture of which method is most appropriate to answer the research questions (Easterby-Smith, Thorpe and Jackson, 2012).

To employ a suitable research design to achieve the research aims, a background of the underpinning research philosophy should be evident, which supports how the study is viewed and influences the research design that was implemented in the study. There are three main research philosophy principles: ontology, epistemology and, methodology (Guba and Lincoln, 1994).

3.2.1 Ontology

Ontology refers to reality and what can be known about reality (Ponterotto, 2005). There are two main ontological positions: materialism or objective and metaphysical, and subjectivism. Objectivists believe that everything is real and material, while subjectivists believe reality is spiritual and mental rather than material (Willis, 2007).

3.2.2 Epistemology

Epistemology is about how we can know about reality and what we can know (Ryan, 2018). More specifically epistemology deals with questions of knowledge, like what is knowledge? How do I acquire the knowledge and what are the limits of the knowledge (Willis, 2007)? Positivism and interpretivism are two common paradigms of epistemology. Positivist belief is that all knowledge can only acquire from observation and experimentation, while interpretivist belief is that knowledge can be acquired only through the direct experiences of humans (Mack, 2010). Another philosophical paradigm is pragmatism which offers an epistemological view and logic (Johnson, Onwuegbuzie and Turner, 2007; Morgan, 2014). Pragmatism supports answering research questions the best way possible by using a combination of methods and approach (Saunders, Lewis and Thornhill, 2009). The pragmatism paradigm does not focus on one particular method but interrogates research questions to find the most suitable method to reflect reality. According to Morgan (2007) pragmatism values knowledge of qualitative and quantitative study to understand the meaning of social settings.

3.2.3 Methodology

Methodology is the process and procedures of the research (Ponterotto, 2005). Choosing an appropriate research design method is vital as it determines how the research data will be collected and analyzed (Creswell, 2009). This research takes an epistemological pragmatic view and the methodology used to conduct the research needs to reflect this philosophical view. Thus, this research is using a mixed methods research methodology to conduct the research after considering the goals and scope of the research. A combination of qualitative and quantitative research methods in information systems research aims to overcome the weaknesses in both methods (Creswell, 2009). According to Venkatesh, Brown and Bala (2013), the mixed method approach provides opportunities to address exploratory research questions, it allows for a stronger conclusion than a single method research approach and it helps researchers to have a broader understanding of the topic. Pragmatic views acknowledge the knowledge produced by mixed methods to expand our understanding of society and social life.

Details of mixed methods used in this research are discussed in the following sections.

3.3 Mixed Methods Research

Mixed methods research is a combination of qualitative and quantitative research methodologies (Creswell, 2009). In mixed methods research both qualitative and quantitative studies are integrated within a single study (Doyle, Brady and Byrne, 2009; Wisdom, Cavaleri, Onwuegbuzie and Green, 2012) and it helps produce a fuller account of the research problem (Glogowska, 2010; Zhang and Creswell, 2013). The integration of methods can occur at any stage of the research (Halcomb and Hickman, 2015). According to Saunders *et al.* (2009), a combination of data collection methods within a study increases the correct interpretation and validity of results. Bryman (2006) pointed out several advantages of combining quantitative and qualitative methods such as improving the validity of the research findings, answering different research questions, instrument development, explaining findings, diverse views of the findings, and enhanced credibility of the findings.

When adopting a mixed methods research methodology, researchers need to select and specify the design, purpose of using mixed methods and design approach that guides data collection, analysis and interpretation of the data (Creswell, 2009). Mixed Methods design can

be fixed or emergent; fixed mixed methods design is preplanned from the beginning of the research process. And emergent mixed methods design arises during the process of conducting research. For instance, when a second research approach is added to the research design because one method is insufficient (Creswell and Clark, 2017; Schoonenboom and Johnson, 2017) . In addition to the design, it is also important to identify the reason for mixing the qualitative and quantitative methods in the study. As it is challenging to combine methods thus it should only take place when there are specific reasons to do so (Creswell and Clark, 2017). Five broad reasons for mixing methods were identified by (Greene, Caracelli and Graham, 1989). These are : triangulation, complementarity, development, initiation, and expansion. Although these reasons are general, they are still frequently used in research (Creswell and Clark, 2017; Schoonenboom and Johnson, 2017).

Furthermore, after choosing the right design and reasons for mixing methods, it is important to choose an design approach that reflects, interaction, priority, timing and mixing (Creswell and Clark, 2017). There are several types of mixed method designs approach available such as convergent, embedded, explanatory and exploratory design (Creswell, 2007; Punch, 2009).

In convergent mixed method design, researchers collect and analyze qualitative and quantitative data simultaneously and combine the results in the interpretation stage (Creswell, 2007). This design is used when researchers want to understand the problem better and complement the weakness of one method with others, compare both study results or explain quantitative findings with qualitative results (Creswell, 2007). In embedded mixed-methods design, researchers combine the collected data and analysis of qualitative and quantitative data within a traditional qualitative or quantitative research design (Creswell, 2007). The embedded design allows comparison between the data sources, assesses research questions, gains broader understanding of the research problem, explores concepts or findings (Creswell, 2009). On the other hand in the explanatory mixed-methods design, researchers start with a quantitative study and use qualitative study design in the second phase to explain the results of the original quantitative study in detail (Creswell, 2009).

According to Creswell (2007), researchers use explanatory design when they want to investigate trends and relationships with quantitative data and want to explain the reasons behind the outcome. Lastly, in exploratory design, the study starts with a qualitative study and uses the findings of the study to develop an instrument that will be used in a quantitative study

(Creswell, 2009; Punch, 2009). An exploratory design is useful when the researchers do not know which instruments will need to be constructed and which instruments already exist, limited resources are available or research questions are identified in the first phase which cannot be answered only with qualitative data (Creswell, 2007).

3.3.1 Mixed methods research methodology in this research

This research is undertaken using emergent mixed methods design incorporating exploratory sequential mixed methods research approach, it also aligns with Creswell's (2007) description of when exploratory research is useful. There is limited literature on collaborative in-store shopping and especially none on collaborative in-store meat shopping and how technology is being used during collaborative meat purchases. Creswell (2007) suggested the combined approach when literature on the topic is limited and investigating a new area. The reason behind the emergent mixed methods design in this research was because there were not enough participants at the end of the first phase of the research. This was due to limited number of participants and narrow focus of the study. Also, during data collection findings suggested that in-order to have more in-depth understanding of wide range of consumers' in-store collaborative meat shopping, another study was necessary. Therefore, this research adopted a sequential mixed method approach, where a qualitative study was conducted at the first phase followed by a quantitative study in the second phase of the research. The quantitative study was design based on qualitative findings. More detail on research strategy and research design is discussed in the following section.

3.4 Research strategy

According to Saunders *et al.* (2009) the choice of research strategy is guided by the nature of the research questions and objectives and allows researchers to answer the research questions.

This research employed several research strategies: case studies, grounded theory based methods and surveys. The following subsection discusses the research strategies used in this research.

Pilot investigative phase: In this phase of the research, the traditional literature review was conducted where related literature on collaborative shopping, HCI in food and food consumer purchase behavior models, food consumer information behavior, and meat consumers' behavior and technology use in retail were studied. A traditional literature review

helps to gather the volume of literature in the specific subject area and summarize and synthesize it and refine research questions. It also guided development of a conceptual or theoretical framework (Cronin, Ryan and Coughlan, 2008). The purpose of the pilot investigative phase is to identify the need for the study.

3.4.1 Case studies

Case studies are a research strategy that allows researchers to explore and understand a program, event, process, or one or more individuals in-depth within a specific context (Zainal, 2007; Creswell, 2009). From the pragmatic philosophical point of view, a case study strategy can provide valuable details about society (Mills, Durepos and Wiebe, 2010). Through a case study, researchers are able to go beyond quantitative statistical results to understand the behavioral conditions of the actors through their points of view. Case studies can help to understand the process and outcome of phenomena through the analysis of the case that is under investigation (Tellis, 1997). Yin (2009) defines the case study as *“an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident.”*

In case studies, cases are bound by time and activity and data are collected using a variety of data collection procedures such as documents review, interviews, questionnaires and observation (Eisenhardt, 1989) over time (Creswell, 2009). A case study is usually based on qualitative evidence, however, quantitative data are also acknowledged in case studies (Fridlund, 1997). In most cases, a case study approach selects a small geographical area or a limited number of people as subjects of the study (Fridlund, 1997; Zainal, 2007)

3.4.1.1 When to use a case study?

A case study approach should be considered when ‘how’ and ‘why’ questions are asked, researchers have little control over the events or behavior of those who are involved in the study, the researcher wants to cover contextual conditions because conditions are relevant to the phenomenon under study or boundaries are not clear between the phenomenon and the context (Fridlund, 1997; Baxter and Jack, 2008; Yin, 2003). For example, Baxter and Rideout (2006) conducted a study on nursing student decision-making in clinical settings. Their aim was to determine the types of decisions made by nursing students and the factors that influenced their decisions. A case study was chosen because the case was the decision making of nursing students, however, the case could not be considered without the context, the school of nursing

and specifically the classroom and clinical settings. It would have been impossible for the author to understand the decision-making process of nursing students without considering the context within which it occurred (Baxter and Jack, 2008).

3.4.1.2 Types of case study

Once researchers have a research question that is best answered using case study research strategy and the case and its boundaries are identified, then they must consider what types of a case study they will conduct (Baxter and Jack, 2008). There are several types of case study; Yin (2003) categorizes case studies as explanatory, exploratory or descriptive while Stake (1995) identifies case studies as intrinsic, instrumental or collective.

An explanatory case study would be used if researchers were seeking to answer a question that sought to explain the presumed causal links in real-life interventions that are too complex for a survey or experimental strategy (Yin, 2003). Exploratory case studies are used to explore those situations in which the intervention being evaluated has no *a priori*, clear, single set of outcomes (Yin, 2003). And descriptive case studies are used to describe an intervention or phenomenon and the real-life context in which it occurred (Yin, 2003).

Stake (1995) distinguishes three types of case study: the intrinsic, the instrumental and the collective. In an intrinsic case study, a researcher examines the case for its own sake. In an instrumental case study, the researcher selects a small group of subjects in order to examine a certain pattern of behavior. In a collective case study, the researcher coordinates data from several different sources, such as schools or individuals. Unlike intrinsic case studies which seek to solve the specific problems of an individual case, instrumental and collective case studies may allow for the generalization of findings to a bigger population (Zainal, 2007).

3.4.1.3 Advantage and disadvantage of case study

There are a number of advantages in using a case study approach, such as that the examination of the data is most often conducted within the context of its use in which the activity takes place. Case studies allow for both quantitative and qualitative analysis of data. Also, detailed qualitative data in case studies help to explore the data in a real-life environment and explain the complexities of the situation (Zainal, 2007).

Despite these advantages, case studies have some disadvantages as well. Case studies are often accused of lacking rigor (Krusenvik, 2016). Case studies can provide little basis for generalization because of the small number of subjects. Sometimes case studies are labeled as being too long and difficult to conduct and it produces a huge amount of documentation (Zainal, 2007). One of the common criticisms of the case study is that a single exploration makes it difficult to reach the general conclusion (Tellis, 1997). Yin (2003) considered a case study as a ‘microscopic methodology’ because of the limited sample size. However, parameter establishment and objective settings of the research is more important in the case study than a big sample size (Zainal, 2007).

3.4.1.4 A case study in this research

This research uses a descriptive case study to understand premium beef consumers’ collaborative shopping habits, such as what, how and why information they would like to share information, how they would like to share, why and any preferences for mobile technology to do with collaborative shopping. A descriptive case study has been chosen because descriptive these case studies are good for describing the natural phenomena which occur within a real-life context (Zainal, 2007). Case study data has been collected through qualitative semi-structured interviews. In a case study, the interview is used to describe an aspect or characteristic of a small sample or the entire population of individuals. Instead of seeking a large sample size, by using a qualitative method this research can gain insight from the small sample size of premium beef consumers. Qualitative methods can focus on accurately describing the everyday experience of individuals. It can capture the details and complexities of people’s interactions and actions, especially in collaborative work. They are also useful when the goal of the study is to construct a detailed picture of a certain situation or flow of events.

3.4.1.5 Interviews

An interview is a qualitative method of collecting information from people. It is a “conversation with a purpose” (Kahn and Cannell, 1957). Any interaction between two or more people — be it face-to-face or via other media — with a specific purpose is called an interview (Kumar, 2011). There are four types of interviews: structured, unstructured, semi-structured and group interviews (Preece, Rogers and Sharp, 2002). Unstructured interviews are like a conversation that focuses on a particular topic and may go into considerable depth. Open questions are asked, and answers are not predetermined. Structured interviews pose predetermined and closed

questions. It is useful when study goals are clear and specific questions can be identified. Semi-structured interviews are a combination of structured and unstructured interviews. These use open and closed questions. Finally, group interviews involve a small group of people guided by an interviewer who facilitates discussion on a specific topic (Preece *et al.*, 2002).

3.4.2 Grounded Theory Methods

The Grounded Theory Method (GTM) emphasizes the generation of theory from data gathered in the process of conducting research (Vukelja, Opwis and Müller, 2010). GTM allows researchers to gain insights from the raw data by summarizing it into small blocks which are easily understood (Nugent, 2016). The methods in GTM are not a series of steps that are carried out with participants; rather the methods relate to ways of thinking about the data (Glaser and Strauss, 1967), particularly making sense of the data (Charmaz, 2006) and iteratively developing a theory to describe the data and the phenomena that are exhibit by the data (Muller and Kogan, 2010).

GTM originated in sociology and has become a key methodology within the area. It is often used in that area as the major organizing principle for a large project (Muller and Kogan, 2010). GTM has also been used as a data analysis method within HCI and CSCW projects (Muller and Kogan, 2010; Muller, 2014; Nugent, 2016). GTM offers a rigorous way to explore a domain, with an emphasis on discovering new insights, testing those insights and building partial understandings into a broader theory of the domain (Muller, 2014).

GTM applications in computing research, generally, follow the standard approach. First, the data types and domains are identified and then relevant data is collected (Muller and Kogan, 2010). After collecting the data, it is transcribed, and the investigator or researcher spends a significant amount of time reviewing the data in order to become familiar with it. Themes, codes, and categories from the data then iteratively analyzed and identified (Nugent, 2016).

A major component of the GTM approach to analyzing the data is coding. Coding is the identification and extraction of key information from the data. Descriptive codes are used to describe the data and the domain of the data (Muller and Kogan, 2010). There are many different ways of coding the data. One of these is open coding and is often the first analytical step in many projects (Nugent, 2016). In GTM, open coding is labeling the data with simple descriptive labels. Open coding begins by creating labels for the participants, object or concepts

in each time of the data. Over time, some codes reoccur, and the researchers can begin to keep a list of recurring codes (Muller and Kogan, 2010). The coding process is repeated until researchers have reduced the initial data to a level from which they are capable of deriving structure (Nugent, 2016).

GTM comprises different tools and techniques, which have their own effective uses outside of Grounded theory. Due to the open nature of the GTM approach, it can be used without aligning with the traditional grounded theory approaches. According to Corbin and Strauss (1990, p. 306) "... If your purpose is just to pull out themes, then you could pretty much stop here."

Thus, this research will use a GTM based approach, adapted from GTM to analyze the qualitative data to have in-depth understanding of the data. After transcribing the interviews, GTM methods were used to discover major themes from the data. This is the most common use of GTM in computer supported collaborative work (CSCW) and HCI work (Muller and Kogan, 2010).

3.4.3 Survey

The survey research strategy provides a quantitative description of trends and viewpoints of the population by studying a sample of that population (Creswell, 2009). Surveys are often used to answer questions of the form "who, what, where, how much and how many" (Saunders *et al.*, 2009, p. 144). Surveys allows a researcher to inexpensively collect large amounts of data from a sample of a population (Saunders *et al.*, 2009). Questionnaires are a data collection technique that is mostly used to collect survey data. According to Sekaran (2006, p. 236) a questionnaire is "a pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives". Collecting data using a questionnaire is one of the most efficient and inexpensive methods (Sekaran, 2006). The questionnaire can be administered personally, by mail or electronically (online) (Zhang, 2000). Online surveys are flexible, time-efficient, convenient for the respondents, have a low administrative cost and can be used with a large sample size (Verma and Jin, 2005). Online surveys can be administered in several formats: an email containing a link to the survey, embedded the full survey within the email, visiting a website (Evans and Mathur, 2005) or distributed through social media to the target population by sharing a link in any specific product page or through an advertisement (Ramo and Prochaska, 2012; Chang and Cheng,

2016). Other techniques include structured observations and structured interviews (Kothari, 2004). Using any of these techniques in a survey, data collected in a cross-sectional or longitudinal study can be generalized to a population. Survey data is considered “standardized”, which makes it easy for comparison as well as comprehension (Saunders *et al.*, 2009). Using sampling, the data collected from representatives of the population is analyzed using descriptive and inferential statistics. Computer software can be used during the analysis to establish and test relationships between variables (Creswell, 2009).

This research uses an online survey questionnaire to collect data and descriptive statistics to analyze the survey data.

3.5 Research design

This section presents the research design, employed in this research. Research design was guided by the research philosophy and research strategy. This research aims to investigate in-store collaborative meat shopping and usage of technology. As discussed in the methodology section, this research is conducted using exploratory mixed methods sequential design approach. Exploratory sequential design is two phase research design where researcher began exploring the topic qualitatively before building the second phase which is quantitative phase. The purpose of the exploratory design in this research was to expand the research in the second phase, also the qualitative result was used to design the quantitative study. Data were merged from both studies at the conclusion to answer the Research Questions. Figure 3.1 illustrates the mixed methods research process for this research.

In this research the qualitative study focused upon premium beef consumers and the quantitative study focused on chicken, beef, lamb and pork meat consumers.

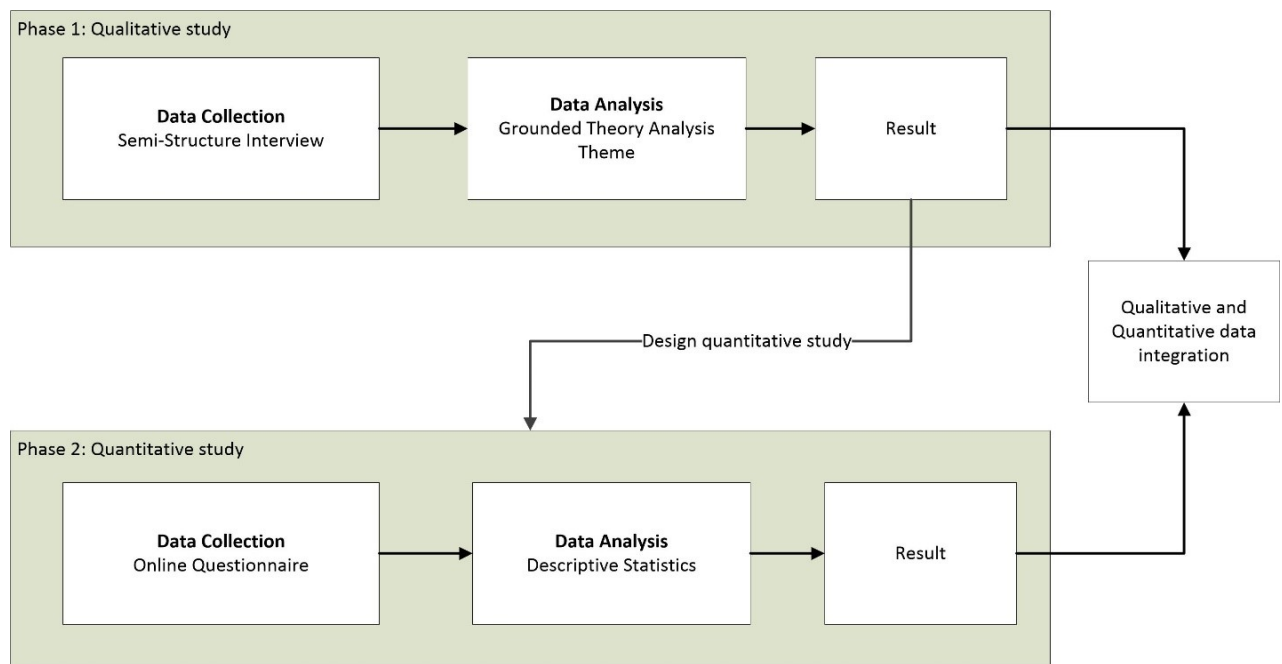


Figure 3.1: Mixed methods research process

Details of each research phase are discussed below.

3.5.1 Qualitative study

The first stage of this research is a qualitative study (see Figure 3.2 for the process followed). In this stage, the collaborative shopping nature of premium beef consumers was explored: what contextual information influenced them to collaborate, how did they collaborate and the use of mobile devices in the context of the collaborative task.

In order to explore premium beef consumers' collaborative shopping behavior, this study used a case study approach and data was collected through a semi-structured interview. Interview questions were developed from the conceptual framework that arose from the literature review.

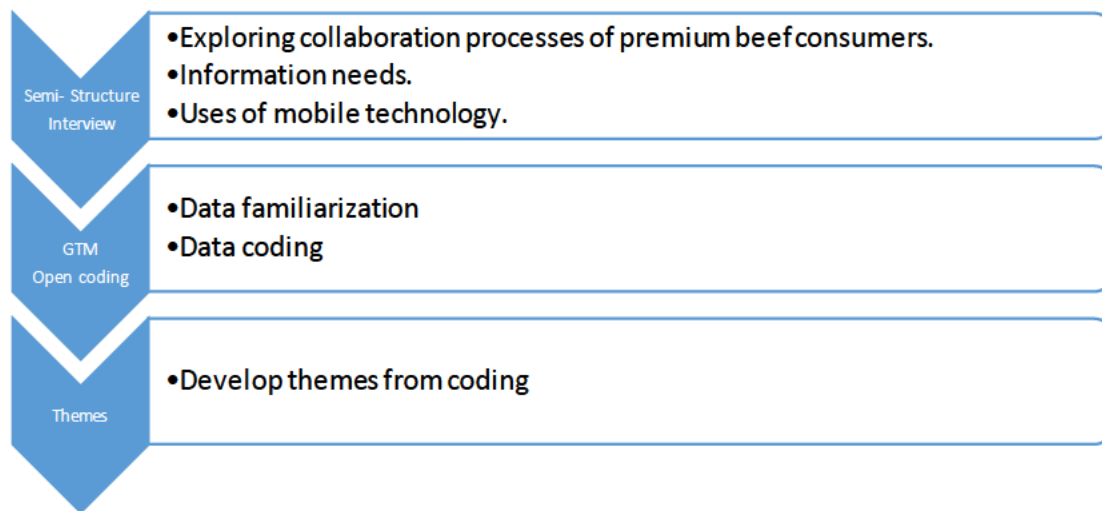


Figure 3.2: Process of qualitative study

This phase of the study partially investigated Research Questions 1 and 2 by exploring premium beef consumers' collaborative shopping in-terms of information needs and uses of technology. This phase of the study identified when consumers make collaborative decisions, if intrinsic and extrinsic quality cues have the same importance, as well as the other reasons for collaboration. This phase of the study also investigated premium beef consumers' use of mobile technologies and interaction preferences for collaborating with their remote shopping partner in terms of interaction methods and whether they faced any problems using the available technology. Finally, the interview focused on whether participants used mobile technology for collaboration tasks, what information they wanted to share and how they preferred to share that information.

3.5.1.1 Development of a conceptual framework

Based on the literature review a conceptual framework was developed to identify premium beef consumers' in-store collaborative shopping. purpose of the conceptual framework is illustrating the link between premium beef consumers shopping purposes, information needs, use of technology. Detail of the framework is provided in Chapter Four. The framework guides the development of the interview questions.

3.5.1.2 Data collection

Qualitative data was collected using semi-structured interviews. Interview questions were designed based on the conceptual framework and modified accordingly (see Appendix A for detail interview questions).

The main focal point of the interviews was:

- Understanding the current situation of collaboration during the premium beef purchase.
- Gaining the consumers' information needs.
- Discovering the uses of mobile technology.

The interview response was audio recorded and each interview ranged from 15 to 30 minutes.

3.5.1.2.1 Interview participants

Interview participants were recruited through online advertisements and email invitations. All respondents answered a few screening questions before qualifying for the actual interview to ensure they met the primary requirements of being over 18 years old, being the primary shopper or having a shared responsibility for grocery shopping, and a premium beef consumer. Permission was requested and granted from all the participants before the interview process (see Appendix J).

3.5.1.2.2 Data Analysis

The consumers' interview responses were analyzed using an approach adapted from GTM (Glaser and Strauss, 1967). The following three steps were taken during data analysis: data familiarization, data coding and grouping data into the themes (Nugent, 2016). Before the actual analysis, interview was transcribed.

To be able to extract any insight from the raw data, the researcher needed to be familiar with that data. The researcher spent significant time reading and listening to the audio recording of the data to have a proper understanding of the data. After that, data coding was performed by labeling the raw data to explore the subjects. Once initial codes were identified, they were grouped together to build themes. Details of the qualitative data analysis and results is presented in Chapter 4.

3.5.2 Quantitative study

The second phase of this research was a quantitative study. Quantitative data was collected using an online survey questionnaire. The following subsection discusses the details of the survey design.

3.5.2.1 Online survey questionnaire design

Careful design of the questions, clear layout, clear instruction of the purposes of the questionnaire is important. The online questionnaire survey was designed based on the qualitative findings from the first phase of the research. In the qualitative study, premium beef consumers' in-store collaborative shopping with remote shopping partners and use of technology was identified. While the qualitative study only focused on the premium beef consumers due to the project sponsor's requirements, the quantitative study focused on beef, chicken, lamb and pork meat consumers' in-store collaborative shopping and usage of technology. The main purpose of the survey was to identify how meat consumers collaborated, what the purpose of collaboration was, what the most important information sought was, with who/whom they collaborate and how technology played a role during their collaboration with a remote partner.

The survey question choice was informed by the interview questions and results. The survey questions are provided in Appendix B. Closed questions and discrete questions are mainly used in the survey because they take less time for participants to complete. If the survey is long, participants lose interest and concentration before finishing the survey questionnaire (Lefever, Dal and Matthiasdottir, 2007). In addition, there were also open-ended options for certain questions to identify any additional factors that were not covered in the answer options.

The questionnaire also comprised multiple measurement scales such as multiple-choice, ranking and five-point Likert scales. Using multiple question formats in the questionnaire maintains participants interest and also helps them think about the response more carefully (Leung, 2001).

3.5.2.2 Content validation

Pre-testing and pilot studies are highly recommended in order to validate the survey questions to make sure the respondents understood the questionnaire item (Kothari, 2004). Pre-testing

was done by using small number of respondents to answer the questions to test appropriateness and comprehension of the questionnaire (Sekaran, 2006). Validity is referred to as whether the data collection methods are accurately able to measure what they were meant to measure (Saunders *et al.*, 2009). While content validity is to check if each question in the questionnaire covers the intended investigative topic (Saunders *et al.*, 2009). And face validity is considered basic content validity of whether question and measurement scales logically reflect their purpose (Saunders *et al.*, 2009).

The face validity of the online survey questionnaire was obtained by the researcher's supervisors to check for possible linguistic and technique errors and structures of the questions. The survey questions went through a few cycles of revision before being validated. A pilot study was conducted with a small number of participants to test the adequacy of the research instrument. Two pilot studies were conducted before the final survey was released to the public. A pilot study led the final refinement of the questionnaire. In this study, the survey questionnaire's reliability and validity were obtained by the pilot study.

3.5.2.3 Survey administration

The online survey was administered through Survey Monkey. Informed consent was obtained electronically (Appendix K). The link to the survey was distributed via email, university intranet and posted on the social media page.

3.5.2.4 Survey participants

Target participants for the online survey were any meat consumers. In order to ensure their eligibility, there were some selection criteria, such as participants needed to be 18 years old or above, the participant needed to have the responsibility for grocery shopping or shared responsibility for grocery shopping and the participant must be a meat consumer.

3.5.2.5 Quantitative data analysis

Quantitative data was analyzed using descriptive statistics. It allowed the researcher to explore the collected data in order to figure out the main results of the study on a specific phenomenon (Kumar, 2011). Descriptive statistics allows measuring central tendency, variation, and correlation of the data (Knupfer and McLellan, 1996). The purpose of descriptive statistics is to summarize and describe quantitative data in a logical, meaningful and, efficient way

numerically in the document in tables or graphically in figures (Good, 1983; Trochim and Donnelly, 2001; Vetter, 2017). Descriptive research includes questionnaires, interviews, observation, and portfolios data collections methods. Descriptive statistics are different from inferential statistics. Descriptive statistics describe the data in terms of what data shows, where inferential statistics try to conclude the data (Trochim and Donnelly, 2001). Descriptive statistics present a large amount of data in a simplified form and sensible way and explain relationships among situations, events, and phenomena. They help us to understand the questions being asked by identifying variables and describing relationships (Thomlison, 2001).

All quantitative data (online survey) was analyzed using descriptive statistics using SPSS statistical software. Details of the quantitative study is provided in Chapter 5.

3.6 Conclusion

This chapter discussed the research philosophy, methodology, research strategy and research design employed in this research. As this research is exploratory in nature, a pragmatic research philosophy was considered to provide the most suitable perspective using mixed-methods research methodology. The methodology divided into two phases: qualitative study and quantitative study.

The qualitative study used a case study research strategy and data was collected using semi-structured interview, GTM based approach was used to analyse the qualitative data. Quantitative study used survey research strategy. Data was collected using an online survey questionnaire and analyzed using descriptive statistics.

The next chapter presents details of the development of the conceptual framework and details the qualitative study and findings.

CHAPTER 4 — QUALITATIVE DATA ANALYSIS AND RESULTS

4.1 Introduction

As discussed in Chapter Three, an exploratory sequential mixed methods research approach was employed to answer the research questions. Sequential design consists of two phases: a qualitative and a quantitative phase. The initial qualitative study explored premium beef consumers' in-store collaborative shopping. As mentioned in Chapter One, this research started initially with premium beef consumers due to project sponsor . Qualitative findings were used to extend the study and develop a quantitative study in the second phase. This chapter focuses upon the qualitative study that was undertaken during the first phase. Qualitative data was collected using semi-structured interviews. Prior to the interviews, a conceptual framework for collaborative shopping in the premium beef purchasing context was developed based on literature findings. The interview was designed based on the conceptual framework. The rest of the chapter presents the conceptual framework, the qualitative study and themes emergent from the interview.

4.2 Conceptual Framework

Mobile technology and its application are beneficial to consumers and retailers as technology can support consumer decision-making and purchase behavior; it also improves consumer information exchange and search behavior. These provide opportunities for the development of new products and services as well as new contact through interactive tools between consumers and retailers (Pantano and Timmermans, 2014; Pantano and Migliarese, 2014; Priporas *et al.*, 2017).

However, it is important to understand how current technology is already being used in the food context before providing them with new technology (Norton *et al.*, 2017) and to recognize the needs for flexibility and target the specific context (Comber *et al.*, 2013) as well as consumers' decision making behavior (Ng *et al.*, 2015) as consumers' collaborative behavior changes based on the domain (Reddy and Jansen, 2008; Gao *et al.*, 2016).

Based on literature, this research proposes a conceptual design framework using an HCI (Human-Computer Interaction) lens for supporting collaborative premium beef shopping. The conceptual framework identifies the components, that need to be considered when designing HCI applications to support collaborative premium beef shopping.

According to da Silva and Barbosa (2012), the use of a system takes place when consumers are engaged in an interactive process with a user interface to achieve some goal in a domain within the context of use. All these elements are interrelated and need to be considered for the HCI design space. In the collaborative shopping situation, consumers collaborate with their shopping partners, and when they want opinions about the product or for other reasons, they use mobile devices to achieve their goals.

The proposed conceptual framework (shown in Figure 4.1) is divided into three parts: consumer attributes, technology and premium beef attributes. All three sections overlap because when consumers require collaboration, they use mobile technology to collaborate and situational and premium beef product attributes affect that collaboration. All these elements are interrelated and need to be considered for the HCI design space.

The Consumers part identifies four components that influence consumers to collaborate. These are social issues, situations, information needs, and information sharing. The social context of premium beef shopping does influence consumers' purchase (Scozzafava *et al.*, 2016).

For example, consumers tend to buy different premium beef products for special occasions compared to everyday eating. Regular buyers are more knowledgeable and concerned about the product attributes than occasional buyers (Sepúlveda *et al.*, 2008), as the latter group only purchases premium beef for special occasions. In such cases, they may require information such as which cut to buy, what brand to buy or where to buy from remote collaborators. Information, such as cut, is an intrinsic product attribute. Using photo sharing, collaborators appear to offer the communication mode required for sharing the intrinsic information related to premium beef. Extrinsic information, like the brand and location, can be shared successfully using text.

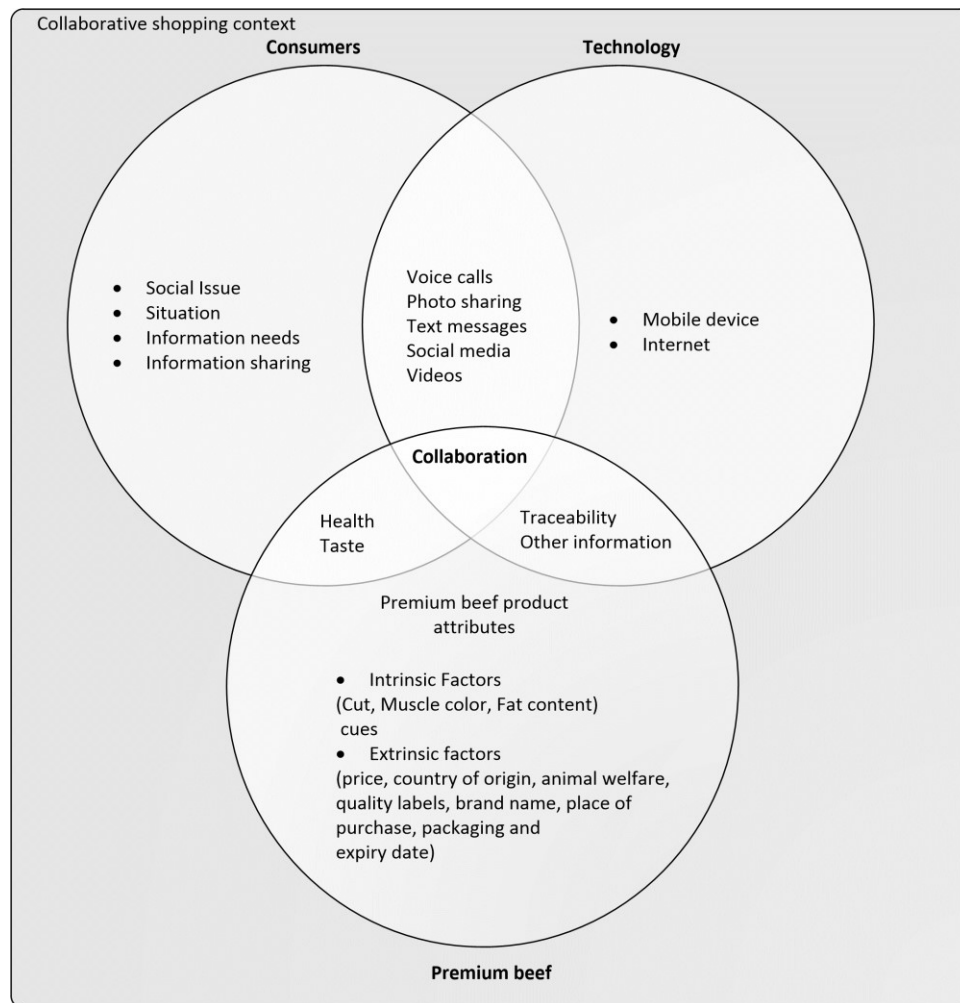


Figure 4.1: Collaborative shopping tool design framework for premium beef consumers.

Shopping situations also encourage shoppers to collaborate with others. For example, a consumer may accidentally encounter the product in the shop and be reminded of someone, encouraging them to contact the person and ask if they want that product from the shop. In that case, consumers could share the photos of the product with their remote collaborator to confirm the purchase.

Photo sharing can also facilitate consumers' information needs. For instance, consumers prefer beef to be colored red, rather than pink (Ardeshiri and Rose, 2018). The color of the meat is an intrinsic quality cue which can be evaluated visually. When someone does not understand which color meat is better they can share a photo with collaborators to make decisions about product quality.

Last, but not least is information sharing, where consumers share their shopping experience or product information with friends and family. People share their food-related

activity using various modes of technology such as social media posts, food blogs or other applications (Tohidi and Warr, 2013). Information sharing helps consumers to express their shopping experiences as well as experiences of the product itself. It also helps other consumers to make purchase decisions and reduce perceived risk (Hussain, Ahmed, Jafar, Rabnawaz and Jianzhou, 2017). In the premium beef shopping context, consumers may want to share the product they have purchased or want to share the experience with others.

The technology section highlighted mobile devices and internet technology. Consumers use both technologies during shopping to make decisions. The Consumers and Technology overlapping section shows how consumers are collaborating with remote shopping partners from the shop using technology. They mostly depend on phone calls, text or multimedia messages, and photo sharing through social media and video sharing. Technology also overlaps with premium beef. Consumers can use mobile technology to trace beef products' production from farm to shop. Also, they can use mobile technology to search for other product-related information at the point of purchase.

The proposed framework shows the link between the consumer, technology, and premium beef product attributes. The Consumers part identifies the possible scenario for collaboration. The Technology part shows what technology is being used at the point of purchase and the overlapping sections show communication modalities. Attributes of the premium beef product play an important role in the collaborative beef purchase as these are the factors that influence consumers' decisions. Intrinsic attributes are the physical properties of the premium beef products and these are visual. Extrinsic information is objective information of the product. The overlapping part between Consumers and premium beef product highlight the reason consumers purchase premium beef.

Although mobile devices provide methods of contacting remote collaborators, it is likely that users' needs may be more effectively met by understanding user preferences (Nugent *et al.*, 2015; Nugent, 2016). HCI research has shown the potential to add value to consumers' food purchases (Bedi *et al.*, 2010; Sackey and Ullmann, 2012; Hwang and Mamykina, 2017). However previous research has largely focused on individual food purchases. The proposed framework provides a foundation to study how consumers collaboratively shop using mobile technology from the shop with a collaborator who is at a different location for social reasons, information needs, information sharing and situational reasons. Also, it shows the possible effects of premium beef products' attributes on collaborative purchase decision making. The

proposed framework can be a guideline to understand the collaborative purchase situation and needs of the premium beef consumers and how different interaction methods can help consumers to interact with each other.

The proposed conceptual framework represents all the relevant components of in-store collaborative shopping experiences. Based on this framework a qualitative study to understand premium beef consumers' collaborative in-store shopping with remote shopping partners has been undertaken. Details are in the following Section.

4.3 Qualitative Study Design

To understand premium beef consumers' collaborative shopping behavior and their technology use, a case study approach was used. Data was collected using semi-structured interviews. Details of the case study have been presented in Section 3.4.1.

4.3.1 Semi-structure interview

In order to explore premium beef consumers' collaborative shopping and their usage of mobile technology to contact remote shopping partners, this study involved semi-structured interviews focused on:

- Understanding the current situation of collaborative premium beef shopping.
- Information needs of the consumers.
- Usage of mobile technology by the consumers to communicate with their remote shopping partner.

The interviews included a total of six participants. Participants were recruited over 8 weeks through online social media posts, flyers at butcher shops and supermarkets, University intranet news posts and face-to-face interactions with the researcher. Participation was voluntary.

All participants were screened before qualifying for the actual interview to ensure they met the requirements of being at least 18 years old, the primary grocery shopper or having shared responsibility for grocery shopping, and being a regular or occasional premium beef consumer. Participation in the study was voluntary. All interviews were audio recorded for analysis.

At the beginning of the interview, the researcher explained the process of the interview to the participants, and the participants were also provided with information sheets; hence participants provided informed consent to participate. The interviews each lasted between 15 and 30 minutes at a location chosen by the interviewee. Detailed interview material including the pre-planned questions can be found in Appendix A.

The interviews were approved as minimal risk studies by the Tasmanian Research Ethics Committee, under Ethics reference: H0017697. See Appendix C for the Ethics approval letter.

4.3.2 Participant Demographics

The six participants in the study were all premium beef consumers and responsible for grocery shopping. They all lived in Tasmania, a regional state of Australia. The sample included two males and four females. All participants regularly used a smartphone and used their mobile devices while grocery shopping for various purposes. Details of the participants are shown in Table 4.1. All of the participants' real identities have been removed and they have been given pseudonyms using random names.

Table 4.1: Interview participants' details.

| No | Name | Gender | Year of birth | Education | Occupation | Annual income (AUD) | Length of interview |
|----|--------|--------|---------------|-------------------|-----------------------------|---------------------|---------------------|
| 1 | Brian | Male | 1957 | PhD | University lecturer | Over 100k | 30 minutes |
| 2 | Katy | Female | 1954 | Diploma | Residential support officer | 80k | 15 minutes |
| 3 | Lizzie | Female | 1971 | Bachelor's degree | Casual academics | 45k | 20 minutes |
| 4 | Cyrus | Male | 1990 | Master's degree | Teacher | 20k | 14 minutes |
| 5 | Sarah | Female | 1967 | Year 11 | Driving assessor | 60-79k | 13 minutes |
| 6 | Hanna | Female | 1974 | Master's degree | Researchers | 80-100k | 22 minutes |

4.3.3 Data analysis

This section discusses the detailed process of data analysis. This research uses a Grounded Theory Method (GTM) based approach to analyze qualitative data. Grounded Theory was discussed in Section 3.4.2.

To analyze interview data, several steps were taken: data transcription, data familiarization, data coding and, finally grouping the data into themes.

4.3.3.1 Transcriptions

The audio of all interviews was recorded for analysis. Before the analysis, the researcher transcribed the data using word-processing tools. Data transcription focused on capturing both interviewer and interviewee's full statements. During transcription data was also cleaned by not capturing insignificant words and repeated words.

4.3.3.2 Data familiarization

Data familiarization was the first step of the data analysis. In this step, the researcher immersed themselves in the data. To understand and be familiar with data, the researcher read and re-read the data after transcription and listened to the audio recording of the interviews. No coding took place during this process however, the researcher took notes. Once the researcher felt that the data were familiar enough, coding began.

4.3.3.3 Data coding

Data coding is important in the grounded theory method. It shapes an analytic frame from which researchers build the analysis (Charmaz, 2006). The first step of coding is initial coding. This research adopted open coding for initial coding. Initial coding helps researchers to make a decision about defining core categories. For initial coding, this research used word-by-word coding. This approach helps us understand structures, the flow of words and how they make sense (Charmaz, 2006).

In open coding, data from the interview were reviewed repeatedly and frequently used terms were identified. After the terms were identified, the data were given initial codes. Initial codes are low level abstractions of the concept related to the research objective. Open coding

is an iterative process and it helps researchers to understand the participants' views. After analyzing all of the interview data, a total of 558 codes were generated at the primary level.

In the second stage of open coding, all the duplicate codes from the initial coding were removed and a total of 242 codes were identified. Figure 4.2 shows an example of the initial coding process.

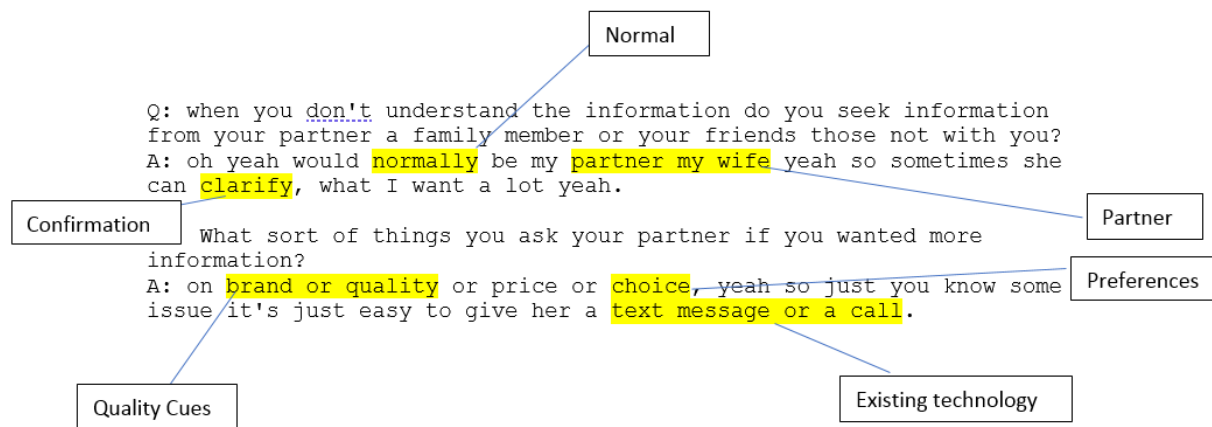


Figure 4.2 : Example of initial coding.

4.3.3.4 Axial coding

The next step is Axial coding, where the codes from open coding are used to build higher-level concepts. “Axial coding relates categories to subcategories, specifies the properties and dimensions of a category” (Charmaz, 2006, p. 60). The aim of axial coding is to sort and organize large data to make a new form (Charmaz, 2006). According to Corbin and Strauss (1990) axial coding answers questions such as, ‘who, how, when, where and what’; by answering these questions researchers can fully describe the studies.

At this stage axial code was formed from the open code. Open codes were reviewed iteratively, and similar codes were grouped together to form meaningful categories. Table 4-2 shows an example of axial codes derived from the interview. A total of 31 axial codes were generated from the initial coding. Axial coding did not represent the final theme. Final themes were developed by placing axial code into different concepts relevant to the research objective and supported by data.

Table 4.2: Axial coding example.

| Open code | Axial code |
|---|------------------------|
| Advertisement Advice Conversation Expert Expert Opinion Farmer | Information medium |
| Animal Handling Animal Welfare Bad Practice Brand Ethical Product | Extrinsic quality cues |
| Children Collaborator Family Friends Partner | Collaborator |

4.3.3.5 Themes

The final stage of data analysis is to develop themes from the axial codes. Similar axial codes were clustered to generate themes. Themes from the interviews explored collaborative premium beef shopping of consumers and the use of technology to support their collaborative shopping with remote shopping partners. The identified themes allow researchers to report participants' experience, reality, and meanings of the events (Braun and Clarke, 2006).

To develop themes from the axial code where similar concepts were apparent, the researcher used a white board to visualize the codes and themes. Multiple attempts were made to group the codes in order to find new concepts from the codes. The development of themes was an iterative process; after developing the themes the researcher re-assessed the axial code and actual interview script to ensure they linked to the themes. The resulting themes are described in the next section.

4.4 Findings

The main focus of the qualitative study was to understand premium beef consumers' in-store collaborative purchases with remote shopping partners, use of technology to communicate with remote partners, type of information they seek and share with remote collaborators during purchase. Based on these, the following themes were identified to describe interview findings:

- Purpose of collaboration
- Usage of technology during the shopping
- Information and collaborative communication
- Consumer future preference for in-store collaborative shopping

4.4.1 Purpose of collaboration

Participants collaborated with their shopping partners for various purposes. Five out of six participants mentioned that they collaborated with their friends or family members during grocery shopping. They collaborated with their friends and family for various purposes, however, the most common reasons were to confirm the purchase, find out their preferences and choices and help to make a decision. Participants normally collaborated with their friends and family when they did not understand any information or when they were confused about which product to purchase. Four out of five participants collaborated during premium beef purchases.

Brian mentioned that when he did not understand any product information, he contacted his wife to clarify during grocery shopping.

Brian: Oh yeah would normally be my partner my wife yeah so sometimes she can clarify, what I want a lot yeah.

He would usually contact his wife to ask about quality, brand, price or about her choice.

Interviewer: What sort of things you ask your partner if you wanted more information?

Brian: On brand or quality or price or choice, yeah so just you know some issue it's just easy to give her a text message or a call.

Katy collaborated with her friends and family occasionally to make a decision about food product purchases. However, she did this before going grocery shopping as she always

purchased the same things all the time, unless she was cooking for someone, she would ask them what they would like to have.

Interviewer: when you don't get information about particular products what do you do?

Katy: I would say most often, I buy the same things again and again so it's very rarely I will buy something different so but if I was having to be careful about what I was going to be cooking or something then I would probably ask the people that I was cooking for, what type of things I would use so rather than I wouldn't look up on my mobile when I was there I would probably just sort it out before I got there.

Interviewer: What sort of thing normally you ask them?

Katy: sorry yeah, I just don't I just it would only be on the occasion of somebody not being able to eat of all things you know that had a dietary requirements for some reason and I would be entertaining them and so I would make sure that you know they told me exactly what they could have.

She does not collaborate with anyone while she is in the shop as she knows what she wants to buy for herself.

Interviewer: let's say you're shopping alone right so do you communicate with your friends or family who is not with you during shopping to make a decision?

Katy: No, I don't communicate with anybody. I really can't think of anytime I would have done that. I just always do the same thing.

Lizzie does not communicate with friends and family during grocery shopping to get any information as she is the solo decision-maker in her house.

Interviewer: Apart from the product label or packaging do you seek information from your partner or family member or friends about any products while you're shopping?

Lizzie: No, it's just me I mean I'll ask the kids is there something they might like to choose their lunch box or something but no it's just me. when I'm shopping for home's just my decision.

However, she does communicate with her children to know if they have any preferences for any meal.

Interviewer: Why do you communicate with them to help you make decision about shopping or any other reason?

Lizzie: Their preferences so I'm learning I have to cook food that they eat it's very frustrating I know how to cook inexpensive food but if they don't eat it. So, learning

about their tastes and preferences and I use that as an opportunity to talk with them about food choices as well.

Mostly she collaborates with her children if they go grocery shopping with her or on rare occasions the children will call her while she is at the shop to remind her to buy a particular product.

Interviewer: How do you do that when they're not with you?

Lizzie: I don't if they come with me, yeah you know sometimes, I make them both come sometimes one will come because they want to. The other one will always want to be at home sometimes both them are at home. So sometimes they will call me and ask if they can turn the TV on.

Interviewer: Nothing to do with buying food or anything?

Lizzie: There might be an occasion where Mary will ring and say mom don't forget to get this or that. Reminding me.

Sarah does all the household shopping and prepares meals for her family. However, she sometimes collaborates with her partner and other family members to confirm the purchase if they have any specific preference for what to eat.

Interviewer: Do you seek information from your friends, family or partner while you're shopping?

Sarah : Only in what they want to actually purchase not if I got an issue with something because I'm the one who does all the shopping and all the meal preparation.

Interviewer: So, you don't ask them about any information about any particular Products?

Sarah: they wouldn't know my husband never step foot on the market.

Interviewer: So just to confirm what they want?

Sarah: I actually have to every shopping time I say I'm doing the groceries tomorrow night give me a meal that you want to eat. That's as far as their participation in the shopping goes.

Hanna collaborates with her partner to make decisions about what to eat rather than relying upon product information.

Interviewer: Do you seek information from your partner or family member or any other friends during shopping?

Hanna: Sometimes but more about what we would like to eat for example rather than information about the product.

4.4.1.1 Purpose of collaboration during premium beef purchase

All five participants collaborate with their friends and family at some point in grocery shopping from time to time. When they shop alone, they remotely collaborate with their friends and family via technology. Three participants mentioned that they remotely collaborate with their partner during premium beef purchases to confirm the purchase, to know their partner's preference and choice and to ask about quality cues such as price, cut and brand.

Brian remotely collaborates with his partner to ask about quality cues such as cut, price or which brand to buy and he finds the information he receives from his wife is very useful and helps him to make a better purchase decision.

Interviewer: when you are buying premium beef do you ever discuss it with your partner?

Brian: yes

Interviewer: Can you tell me more about it, like what you discuss?

Brian: Normally about the what cut and also price off course and quality you know sort of what to look for what to expect for what I'm paying.

Interviewer: How useful you useful is the information you receive from your partner during the shopping?

Brian: Oh, she's the boss's always useful.

Sarah remotely collaborates with her husband during premium beef shopping to know his preference for types of beef.

Interviewer: When you're buying premium beef do you ever discuss it with your partner?

Sarah: Yes, because he prefers Scotch fillet but it's not always affordable so yes, we do.

She also discusses quality cues with her husband such as cut, brand as well as the location to purchase the beef.

Interviewer: What else you discussed like such as price, cut to brand, color or anything else?

Sarah: Definitely the price and the cut yeah brand he would prefer me to go to a butcher if we were going to go and get scotch just to have a steak. But for all the other things are going like a beef stroganoff he doesn't care if it comes from a supermarket or if it comes from the butcher down near the supermarket so he just want do the way.

Hanna remotely collaborates with her partner to confirm and make decisions of what to eat for dinner.

Interviewer: When you're purchasing premium beef do you ever discuss it with your Partner?

Hanna: Probably in the context of deciding what to eat I might discuss that.

Interviewer: Can you tell me more about it like what sort of things you discussed like a price, cut, brand or color or anything else?

Hanna: It would be, well I guess there's two things if I'm cooking and I've gone the market and I've stopped to buy some things and I'm looking at the different meats that are there, I would then send a message saying there's some nice steaks here is that the sort of thing you feel like for dinner and she might say yes or no or, if it's her that's cooking for dinner and she's asked me to buy then I might say oh there's this particular one is that suitable for what you're thinking of making and maybe send a photo if I'm not sure.

All three participants remotely collaborate with their family to make decisions about premium beef purchases for various purposes. To communicate with their partners, they use mobile technology while in the shop. However, people who are living alone and knowledgeable about premium beef products are less likely to collaborate with their friends and family about premium beef. Katy and Cyrus are living alone, and they purchase the same thing again and again and do not remotely collaborate with anyone to make purchase decisions. Lizzie mentioned she is knowledgeable about premium beef attributes and she does not know anyone with more expertise than her who could help her to make a purchase decision about premium beef.

Interviewer: When you're buying beef, do you ever discuss it with your (partner/friend etc) or you just choose what you want?

Lizzie: No discussing, I don't have anyone to discuss. I used to like going to butchers hmm and occasionally I'll go to butcher, and I will discuss it with the butcher definitely but cause I've only there you know experience and I will get information from cooks on the television ones that I trust like a Jamie Oliver. I have just recently tried Kangaroo for the first time and it was delicious and I'm astounded that um I've grown up with beef and not kangaroo and kangaroo you know it's a bit of a political so I needed advice about the kangaroo but beef no because again it's something that I've grown up with you know.

Interviewer: So, you know all the product attributes of the beef?

Lizzie: Well no there's no one that I know that's more expert than me about it there's always more yeah that sort of thing but if someone says try that or whatever. But no one's ever said to me you've got to try the meat from this or that.

In this theme, the researcher identified the purpose of collaboration between a shopper and their remote partners. Participants collaborated during shopping for various purposes and all the participants reported that collaborating with their friends and family helped them to make a better decision and that it is useful. The following theme discusses consumers' usage of technology during shopping.

4.4.2 Usage of technology during shopping

Another theme that was identified from the interview was the usage of technology during shopping. In order to explore this theme, this section will discuss participants' use of technology during grocery and premium beef shopping and why they use technology. All the participants used smartphones and they took the device with them during grocery shopping. Four participants mentioned using a mobile device was part of their shopping, one participant used a mobile device while in the shop to communicate with her children, but nothing to do with shopping. And one participant did not use a mobile device while shopping.

Brian mentioned of using a mobile device to search for product information on the internet, scan product QR codes and communicate with his wife to make a purchasing decision. He stated that using the mobile device is part of his grocery shopping process.

Interviewer: Do you use your mobile device while you are grocery shopping?

Brian: Yes, yeah if I need the information or for a check a price, I use it quite a lot, like it's part of my shopping.

Interviewer: What do you do to get more information about a particular product when you don't understand any information?

Brian: I do search like internet search, some if I've got a QR code I might use a QR code as well.

Katy takes the mobile device with her when grocery shopping, however, she does not use the device while shopping. Lizzie uses a mobile device to keep in touch with her children during shopping.

Interviewer: Do you usually take your mobile device with you during grocery shopping?

Lizzie: Yeah, I usually have it, because the kids are at home and so maybe they'll call me.

Interviewer: Do you use the mobile device while you're shopping?

Lizzie: No not anything to do with shopping I only use it for telephone calls

Cyrus uses a mobile device during grocery shopping for internet searches. He searches for product-related information on the internet when he needs more information about particular products.

Interviewer: What do you do to get more information about a particular product when you don't understand?

Cyrus: I'll usually go in my phone and like Google the product back out any information I don't understand I suppose particularly if it's ethical produce that's kind of it.

Sarah uses a mobile device during shopping for internet searches and to communicate with her family. When she wants to find information about any particular product, she googles the product to get more information. Hanna also uses mobile devices during grocery shopping to use the internet for product information searches and to communicate with her partner.

Interviewer: What do you do to get more information about the particular products?

Hanna: So sometimes I will look things up on the internet while I'm shopping.

All the participants who use mobile devices stated that their experience using a mobile device during shopping is good and convenient to search for product information as well as to communicate with their friends and family.

Brian said it is very convenient and easy to communicate with his wife during shopping. Lizzie just uses a mobile device to keep in touch with her children and 'anytime, anywhere' access made it easy for her. Cyrus uses a mobile device to access the internet during shopping and his experience using a mobile device is "very casual".

Interviewer: What is your experience using mobile during the shopping?

Cyrus: just very casual so I just kind a like look up What I to need to look up and then just make my own decision.

Sarah mentioned that she tends to miss voice calls in the shop, so she prefers to use text messaging to communicate with her partner. Hanna is also satisfied with current mobile technology.

Participants used mobile devices during shopping to search for information and to communicate with their partners for various purposes. Most of the consumers interviewed thought it was convenient to use mobile technology during shopping. In the following section, the researcher will discuss what kind of product-related information premium beef consumers shared with their remote partners and what was their preferred mode of communication to collaborate with their remote shopping partner using mobile technology.

4.4.3 Information and collaborative communication

The Information and Collaborative Communication theme will discuss what kind of information premium beef consumers' share or discuss with their remote shopping partner during shopping and their preferred mode of communication using mobile technology. Premium beef has various product information which influences the consumers' purchase decision, exploring this theme will identify which information is important during joint decision making.

Mobile technology supports different types of communication channels such as voice calls, text messages, photo sharing and communication via the internet. From the previous theme, five out of six participants used mobile devices during shopping to communicating and retrieve information from the internet or from their remote partners. Three participants contacted their remote shopping partners to discuss the purchase, one participant used mobile technology to communicate with her children but not to discuss or get any information about premium beef, and one participant used an internet source to get more information about the product when he was uncertain.

Brian liked to discuss meat cut, price and quality cues of the products. The most important information he discusses with his remote shopping partner is value for money and whether the product is worth paying for.

Interviewer: Among all the information what is the most important information about premium beef product you like to discuss?

Brian: it's probably I guess value for money is really what I'm asking I said I'm going to pay certain amount for a certain type of beef, is that appropriate for the quality yeah because if it's very expensive is it worth buying you know from this particular person or buying from that sort of cut or the other way around am I expecting too much if I'm not paying much money am I expecting to get a good quality cut for low price that's all its quality is the main thing or value.

Lizzie does not discuss premium beef product attributes with her partner or children, however, she does discuss meat with the butcher and gets information from television about cooking. However, she is keen to get information about other types of meat such as kangaroo.

Interviewer: When you're buying beef, do you ever discuss it with your (partner/friend etc) or you just choose what you want?

Lizzie: No discussing, I don't have anyone to discuss. I used to like going to butchers hmm and occasionally I'll go to butcher, and I will discuss it with the butcher definitely but cause I've only there you know experience and I will get information from cooks on the television ones that I trust like a Jamie Oliver.

I have just recently tried Kangaroo for the first time and it was delicious and I'm astounded that um I've grown up with beef and not kangaroo and kangaroo you know it's a bit of a political so I needed advice about the kangaroo but beef no because again it's something that I've grown up with you know.

Interviewer: Do you know all the product attributes of the beef?

Lizzie: Well no there's no one that I know that's more expert than me about it there's always more yeah that sort of thing but if someone says try that or whatever. But no one's ever said to me you've got to try the meat from this or that.

Cyrus does not collaborate with anyone during premium meat shopping, however, he searches for product information on the internet. The most important information for him is product dietary information, net weight of the product, fat content and marbling.

Interviewer: How do you normally evaluate the product when you purchase?

Cyrus: I used Google to help me understand where a lot of the meat products are from as well as looking at the dietary information so I would often look at say the product itself the weight of the products are the net weight and just like evaluate the fat or how much marbling is in the meat depend on the cut, rather I can't really say much more.

Sarah collaborates with her partner to know his preference of premium beef products. She also discusses some product quality cues with her partner such as price, cut and purchase location.

Interviewer: What else you discussed like such as price, cut to brand, color or anything else?

Sarah: Definitely the price and the cut yeah brand he would prefer me to go to a butcher if we were going to go and get scotch just to have a stake. But for all the other things are going like a beef stroganoff he doesn't care if it comes from a supermarket or if it comes from the butcher.

Hanna collaborates with her partner to discuss what type of meat to purchase but she does not seek any information about premium beef products. However, she seeks information related to other meat products.

Interviewer: Is there anything particularly important information you discuss like other than type?

Hanna: I haven't had the experience with beef, but it would be more I'm more of an aware of it with pork products that checking to see if they're free-range And what the background of the meat is so there we would say might send a message saying oh is that one free-range okay that you can buy that but beef I haven't thought about it as much.

Product information plays an important role in collaborative shopping when making a joint decision. People who do not collaborate with their remote shopping partner use other sources to obtain information. To collect information from remote shopping partners, consumers use mobile technology and use different communication methods to communicate.

Brian mentioned that his preferred method of communication with his wife is a multimedia message (MMS) where he takes a picture of the product and adds a written description. However, if he wants a quick answer, he uses a text message or for an instant reply, he makes a voice call. In the premium beef context, sometimes he would call his wife to ask her about the product and follow up with visual information to show her the product.

Interviewer: what were your preferred method of contact with your remote partner using mobile technology such as SMS MMS voice call or photo sharing or any other method?

Brian: Probably that the three I would do it's like MMS, take a photo is this the right one or is this look okay, text if I'd need a quick answer and if I want instantly, I'd use

the voice call. I wouldn't normally leave a voice message. I would make the decision if I don't get any response.

Interviewer: You did say you use a mobile phone to communicate with a partner so in the beef context so how do you communicate when they're not with you

Brian: Normally voice call and then maybe follow up with photos to actually say you know this is what I'm looking at. very rare would it be a video call.

Lizzie uses voice calls to communicate with her children from the shop. Sarah uses text messages to communicate with her partner because she tends to miss voice calls while shopping. She also prefers to share a picture of the product with her partner. Hanna prefers to use an instant messaging app such as *Whatsapp*; she shares product photos with her partner as well and sometimes makes a voice call.

Interviewer: Which one is the most favorite or least favorite for example SMS MMS voice call or photo sharing or any other way?

Hanna: probably text message, usually through WhatsApp or something like that, sometimes I do send photos and sometimes I call.

Premium beef consumers think that mobile technology is very convenient and easy to use in an in-store collaborative context. 'Anytime, anywhere' access of mobile devices makes it easy for them to contact their remote partner. Brian mentioned mobile technology is a good solution for collaborating with a remote partner because he can instantly get information from his partner and according to Hanna, it is immediate and they can contact their partner via message rather than talk in a noisy environment.

Interviewer: What made you think of using mobile technology as a potential solution for collaborating?

Brian: Just very convenient and, it means you can discuss things while the product's in front of you, rather than sort of going home and relaying the story you can actually sort of if there's a follow-up question then it's instantly dealt with.

Hanna: Because it's immediate. It's a way of communicating and particularly in a situation where it's it could be loud and there's other people around it's nice to be able to send messages rather than just talk.

Various information related to premium beef products was important when consumers were making joint decisions, such as price, cut, type, location and brand. Consumers used

mobile devices to communicate with their partners and used different communication channels based on the situation. The most common method of communication was text messaging and photo sharing. In the next Section, the consumers' preferences for application and features will be discussed.

4.4.4 Consumer future preference for in-store collaborative shopping

In this Section, the theme of premium beef consumers' preferences for how to share information and what information to share during in-store collaborative shopping is explored.

All six participants were interested in future in-store collaborative shopping with their remote partners using technology.

Participants were asked whether they would share premium beef product quality cues (intrinsic and extrinsic quality) information in the future with their remote shopping partner. Brian mentioned he would share or discuss all product information with this partner to make decisions, however, not all at the same time but in a different shopping situations.

Interviewer: Would you like to share the following information with your shopping partner or remote shopping partner while you are in-store to make a decision or for other reasons?

| <i>Intrinsic quality cues</i> | <i>Extrinsic quality cues</i> |
|--------------------------------------|--------------------------------------|
| <i>Cut</i> | <i>Price</i> |
| <i>Muscle color</i> | <i>Country of Origin</i> |
| <i>Marbling</i> | <i>Animal welfare</i> |
| <i>Fat content</i> | <i>Quality labels</i> |
| | <i>Brand name</i> |
| | <i>Place of purchase</i> |
| | <i>Packaging</i> |
| | <i>Expiry date</i> |

Brian: We probably share at different times just about all of those, I'm not sure animal welfare because I think we'd assume that most of the butchers here are ethical so we would expect it. We probably wouldn't discuss it so yes it's something we've expect from our suppliers but all the rest at some point we'll probably discuss nearly all of those. Obviously not at the same time but at different shopping excursions are different purchasing times we've probably covered just about all of those including fat and texture and those sorts of things.

Katy would share information about the brand she preferred. Because she trusted the brand and the quality. Lizzie would share all information based on her needs at the time. She expected to share information with her friends and family in the future to validate and confirm the purchase. Cyrus did not collaborate with anyone about purchasing premium beef, however, he was interested in collaboration in the future. Sarah would share the information with her partner and the most important information was the country of origin as well as price because she wanted to support local farmers.

Sarah: country of origin would be one because my husband prefers to support the Australian farmers. He doesn't quite understand marbling whereas I do but definitely price would come as well.

Hanna is interested in intrinsic quality cues. She would share intrinsic quality cues with her partner — such as cut — if she is planning a specific meal.

Hanna : Yeah I think for planning a specific meal then it would be the intrinsic qualities that I might discuss with the partner so is this cut appropriate for the dish that you're thinking of making that sort of thing and where the extrinsic things I would definitely use those in deciding whether to buy it so looking to check that it's Tasmanian and not from Argentina or something but I don't know whether I would share that information.

Participants were asked whether there was any other information they would like to share with their remote partner in the future. Brian mentioned that, if it were available during purchase, such as serving suggestions, or any other way to inform them if the product is value for money. Sarah reported that she would share information with her daughter if there were any sale prices at the shop. Hanna would share whether there were any new products at the shop.

Interviewer: Is there any other information you would like to share with your friends or family like such as store location about new products or other shopping-related information or experience?

Brian: I guess if it was available, we would I guess it's one of those things most the time you do what you do because it's convenient or you used to it but if there was opportunities I might consider other things I guess I said yeah it's like serving suggestions or yeah if there was another way of sort of saying well this is value for money because you know for your dollar you get you know tender meat or whatever those extra things might be useful but because they're not available I probably don't think to look for them at the moment yeah that ability would probably lead to use

Hanna: If I saw a new thing then I might want to share that where I'd say oh I haven't seen that before I've already planned dinner but can you remind me we should try this sometime that sort of thing.

All participants were asked what their preferred method for sharing information (such as visual or textual information) in the future would be. Brian's preference was a combination of pictures and text or calls, however, it would depend on how much time he had. He preferred pictures because with the picture he could show product features such as color, cut or texture. With call or text, he could confirm and explain to his partner about the purchase.

Interviewer: How would you like to share information with your remote shopping partner using mobile technology?

- *Visual information (picture or video)*
- *Textual information (text messages)*

Anything else?

Brian: probably combination just a standard picture and voice or text but that depends you know how busy I am.

Interviewer: why would you use the picture and why would you use the text?

Brian: Picture just because it's yeah it's a lot easier to say this is you know what I'm looking at yeah so it's coloring or style or cut sort of thing just to confirm that that's what we're looking for and then text just to confirm or voice you know to say well this is does this look right you know because my wife does most of the cooking so I would confirm that that's what she's looking for yeah just confirmation most the time

Katy only shopped for herself. However, she was interested in collaborating with a family member in the future. Her preferred method was text and pictures.

Interviewer: Let's say you want to communicate with someone during shopping using your phone so how would you do that?

Katy: I probably text message, yeah, I could if I was unsure that something, they've told me about that I wanted to buy I'll probably send a text message take a photo and say is this it so I probably do that. And, because I just buy for myself, you know if you have a family there is more dynamic.

Lizzie preferred using voice communication during shopping. She would share a picture of the product only if her remote partner wanted one.

Lizzie: I would use voice calls if I was communicating with someone. At the moment I wouldn't think that a picture would be very reliable isn't that strange.

Interviewer: Would you use a photo to show your collaborator the physical properties (color, marbling or cut) of the meat?

Lizzie: Only if they needed or only if they asked me to do that. I wouldn't think that would convey information. It's strange, because you can't because there's so many qualities about it that you can't catch in the way it looks.

Cyrus preferred to use social media or blogs to share information with friends, while Sarah preferred sharing visual information with her partner. She and her partner preferred visual information.

Cyrus: there are text messages or social media could be one that means texting even posting something on the blog or something sharing information.

Sarah: I take it photo and send it through the photo we're very visual people.

Hanna preferred text messages, however, she thought sharing photos was more efficient as with pictures she could show product characteristics.

Hanna: Not video, probably text would be my preference if that works but sometimes photo is more efficient or if there's lots of information then sending photos can be easier.

The researcher asked all the participants if they would use any device or mobile application to help them collaborate with their remote shopping partner during premium beef purchases. Five out of six participants said that they would. Participant 3 would not use any technology to help her purchase meat products with her remote collaborator, however, she would use such technology when buying other food products such as cake.

Interviewer: Would you use a device or mobile application which would allow your remote collaborator to help you select the right piece of meat to best meet your requirements?

Lizzie: I wouldn't imagine doing that with something like meat, well I can imagine doing it with something like a birthday cake or something like that.

Brian mentioned that without any dedicated application they were already collaborating by sharing photos and text. However, he was interested in using a shared application where he

and his partner could collaborate in real-time. Katy also mentioned something like FaceTime (Apple's video calling application) where both parties could interact in real-time to choose the product.

Brian: Yes, if that was available and I'm guessing we sort of really doing that at the moment with taking pictures and talking about it. but if there was a shared application that we could both use at the same time you know so that she could because if you say well this is what I'm looking at but if you had an app I can use QR code you know I swiped the QR code sends her the QR code she can look up the same information at home and we can then discuss what we're looking at the same time I think that might be useful.

Katy: Face time or something like that wouldn't you know just go ahead have a look check this out so what do you think of that does that look a right size of that is it right color, does that look nice I think so.

Cyrus would have liked to use a forum or online discussion dedicated to premium beef. Sarah also preferred a real-time collaborative application. Hanna was not sure what type of application she wanted to use, however, she would have liked to use a system that would provide more information about the local product.

Cyrus: Some sort of like forum maybe or discussion was a pretty useful messaging system someone else perhaps knows more about beef or knows what they want in a product would be nice to have that interesting implement.

Interviewer: Are you happy with that what you used already or for the future purpose if you have to decide which device is telling you to do how can you imagine how it would work for you?

Hanna: It's I find the one issue that I have found like that is that when I just look for something on the internet then it's obviously international and then it's often US-based and they have different names for different cuts of meats and things like that so it's sometimes not immediately easy to relate it to what I'm looking at right now and here.

Most of the participants were interested in using collaborative applications, where they could collaborate with their remote shopping partner in real-time and choose the product, but all of the participants were satisfied with the technology that they already had available to them. One of the participants was also interested in collaborating with the public where he could learn different people's opinions about the product. Another participant wanted precise information about the product as she mentioned that there was too much information on the internet and

she became confused. A dedicated mobile application could make it easier for her to find information.

4.5 Discussion

The purpose of this study was to explore premium beef consumers' in-store collaborative shopping with remote shopping partners and how consumers used mobile technology to communicate with their shopping partner. The qualitative study shows that participants often remotely collaborate with their friends and family during premium beef purchase. However, it depends on time, occasion, and purpose. The main trigger for remote collaboration was confirming the purchase. When consumers wanted to confirm the purchase, whether they were purchasing the right meat product, right brand or with the right price they communicated with their partner to confirm with them to meet their preferences and choices. Mobile devices played a vital role during in-store remote collaborative premium beef shopping. Consumers relied on mobile devices to communicate with their remote shopping partners. The most preferred method of communication was text messages and voice calls for immediate responses. Consumers also used mobile devices to conduct internet searches for product information.

The study also identified the types of information consumers shared with their remote collaborator during remote collaboration. The most important information consumers shared were price, cut, type, shopping location and brand. They discussed this information to confirm the purchase with their remote shopping partner. Finally, this study identified consumers' future preferences for using technology to support their remote collaborative shopping. Consumers preferred real time interaction where they could communicate with their remote shopping partner, share real time information and make joint decisions. They also wanted accurate local product information to decide on what to purchase.

The qualitative study shows that consumers valued their friends and family's opinion to make purchase decisions. In the context of remote collaborative shopping, current mobile technology plays an important role as mobile communication is accessible anytime anywhere. However, they were only using existing communication features of mobile technology, there were no dedicated tools to support premium beef consumers' remote collaborative needs where they could access product information, communicate with their partner real time and compare different products.

4.6 Conclusion

This chapter presented a conceptual framework regarding premium beef consumers' in-store collaborative shopping with remote collaborators. The framework guided the semi-structured interview, conducted with premium beef consumers to understand their in-store collaborative shopping and usage of technology to support their collaborative needs. This chapter also discussed interview procedures and the findings from the interview. The interview findings provided direction to design a quantitative study and data collection tool. The next chapter will provide details of the quantitative study.

CHAPTER 5 – QUANTITATIVE DATA ANALYSIS AND RESULTS

5.1 Introduction

This chapter will discuss the quantitative phase of this research. The quantitative phase focuses on meat consumers (beef, chicken, lamb, and pork) in-store collaborative shopping and usages of mobile technology to support their in-store collaborative shopping. Quantitative data was collected using an online survey questionnaire and analyzed using descriptive statistics. The purpose of the quantitative study was to expand the research and have an in-depth understanding of the meat consumers' in-store collaborative shopping with remote shopping partners. A quantitative study was designed based on the qualitative findings and literature review. A conceptual framework for premium beef consumers in-store collaborative shopping was extended to support other meats collaborative meat shopping based on the qualitative study and literature.

Following this, the chapter discusses the extended conceptual framework and quantitative phase of the study including data analysis and results.

5.2 Conceptual framework

Based on the qualitative findings and the literature review, the conceptual design framework for supporting in-store collaborative premium beef shopping was extended to support other meat (beef, chicken, lamb and, pork). The extended framework (Figure 5.1) illustrates the connection between meat product attributes, consumer, and technology. Compared to the conceptual framework presented in Section 4.2, this framework extended meat product attributes to other meat; chicken, lamb, pork including beef.

The qualitative finding suggested that premium beef consumers collaborated with their friends and family during shopping to know their choice and preferences. They used a mobile device to communicate with their friends and family to do remote collaboration. They also shared various product-related information to make the purchase decision. Qualitative results also indicated that consumers remotely collaborated for other food products or meat. However, some product attributes varied depending on the meat type. Also, consumers looked for different product information depending on meat types. As there was no general behavior

pattern for all meat types (Escriba-Perez *et al.*, 2017). Therefore, the quantitative study expands the research by focusing on other types of meat consumers' collaborative in-store shopping with a remote collaborator. Details of the quantitative study are provided in the following sections.

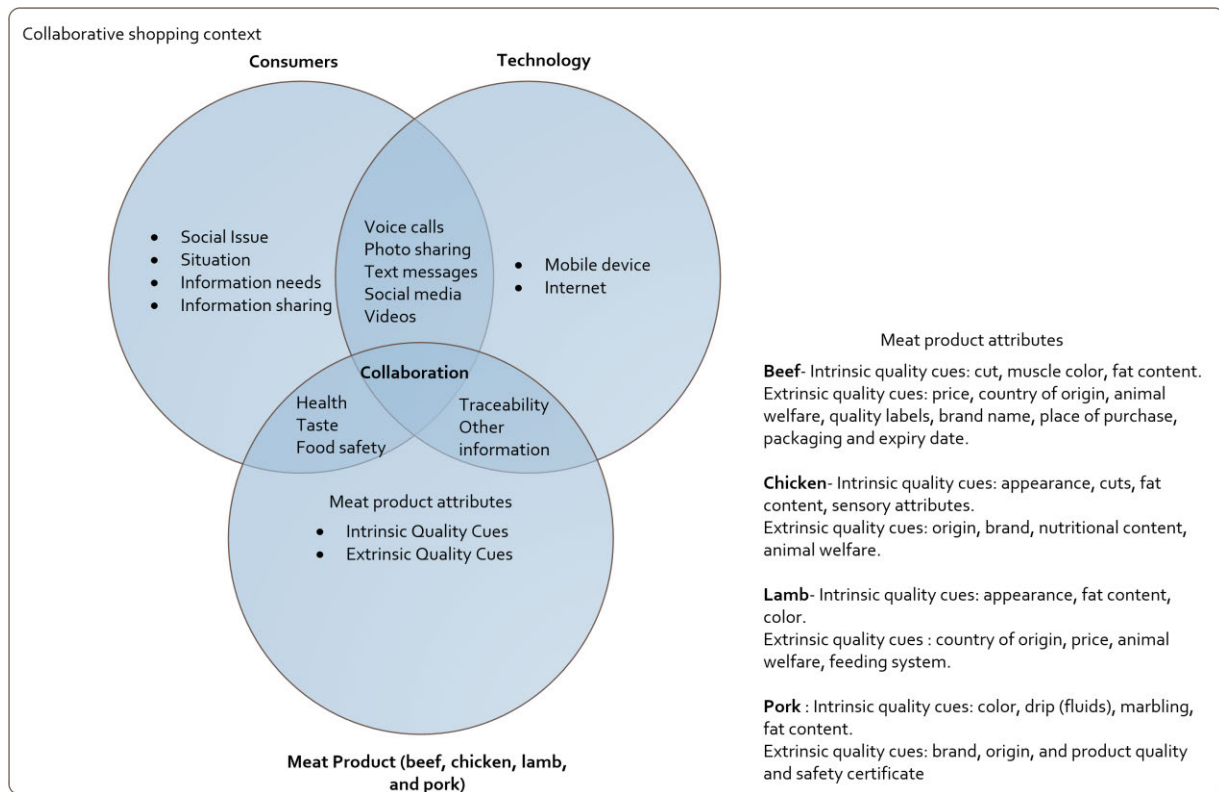


Figure 5.1: Conceptual design framework for in-store collaborative shopping for meat consumers.

5.3 Quantitative data collection

An online survey was conducted to collect quantitative data. The main purpose of the study was to understand the in-store collaborative shopping habits and mobile technology usage of meat (beef, chicken, lamb, and pork) consumers.

The survey was divided into six sections. Sections are following:

1. In the first section, demographic information was collected such as gender, age, educational level, occupation, and yearly income.
2. Section 2 asked questions regarding the use of mobile technology during grocery shopping.

3. Section 3 asked questions related to consumers' meat shopping such as what type of meat they purchased, how they chose meat based on product attributes and how they assessed product information.
4. Section 4 was about consumers' collaborative meat shopping behavior.
5. Section 5 asked about consumers' uses of technology to communicate with their remote shopping partners, including their experience, and personal feelings of interacting with their partner. To measure the experience, questions were adopted from Ghani, Supnick and Rooney (1991) and feelings of social presence question was adopted from Short, Williams and Christie (1976).
6. Section 6 asked consumers about their future preferences and needs for remote collaboration using mobile technology.

The online survey was conducted via the Survey Monkey (SurveyMonkey) web service and links to the survey were distributed via an e-mail invitation (sent to university staff and students), social media post (researchers personal social media page), and an University intranet news post. Participation was voluntary. The online survey was approved as a minimal risk study by the Tasmanian Research Ethics Committee, under Ethics reference: H0017697 (3rd Amendment). See Appendix C for ethics approval letter.

5.3.1 Data screening

The quantitative data were screened before the main analysis took place. Data examination and screening was crucial to identify and avoid data analysis errors (Pallant, 2013). Missing data — which occurred when participants did not complete the questionnaire or did not answer one or more survey questions — were identified and removed from the study. In this phase of the research, 70 participants responded. The total number of questionnaires suitable for analysis was 52. 18 questionnaires were eliminated due to incomplete responses.

5.4 Descriptive statistics

This section presents a descriptive analysis of the quantitative study. Descriptive analysis transformed the collected data into a form of information that describes the situation and factors. First, participant demographic information will be discussed followed by participant uses of technology, and then collaborative meat shopping and future preferences for technology to conduct remote collaborative meat shopping.

5.4.1 Participant Demographics

This section presents the demographic data of the participants. All the participants were from Tasmania, Australia. Of the 52 final participants, there were 31 (59.62%) who identified as male and 21 (40.38%) who identified as female. Participants spanned all age ranges of 18–23, 24–29, 30–35, 36–40, 41–45, 46–50, 51–55, 56–60 and 60 or above. Most (17 or 32.7%) of the participants were from the 24–29 age range and the fewest were from the 46 and over ranges — with at least one participant in each age range (Figure 5.2).

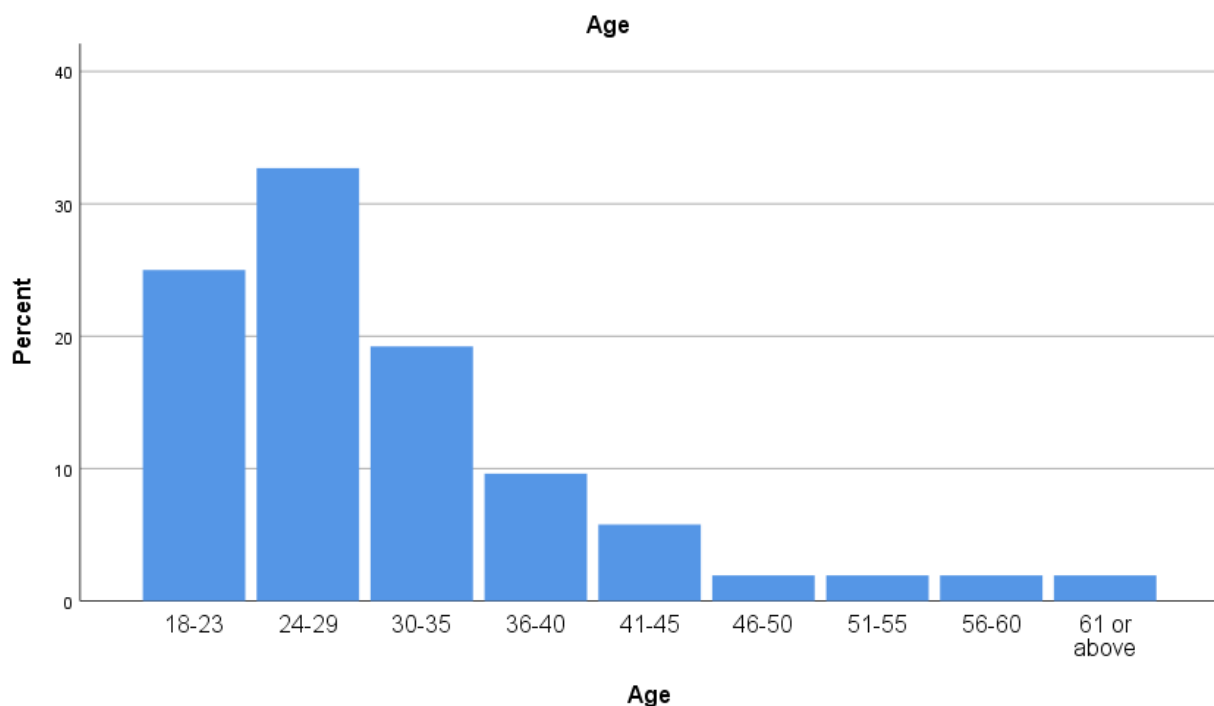


Figure 5.2: Participants' age range

All the participants had acquired high school or further education, and were therefore considered literate. Eight (15.38%) participants completed high school, 16 (30.77%) participants completed bachelor's degrees, 20 (38.46%) participants completed master's degrees, and eight (15.38%) participants held a doctoral degree (Figure 5.3).

33 (63.46%) of the participants described their occupation as university students, 14 (26.92%) were employed with four (7.69%) self-employed and one (1.92%) participant was unemployed (Figure 5.4).

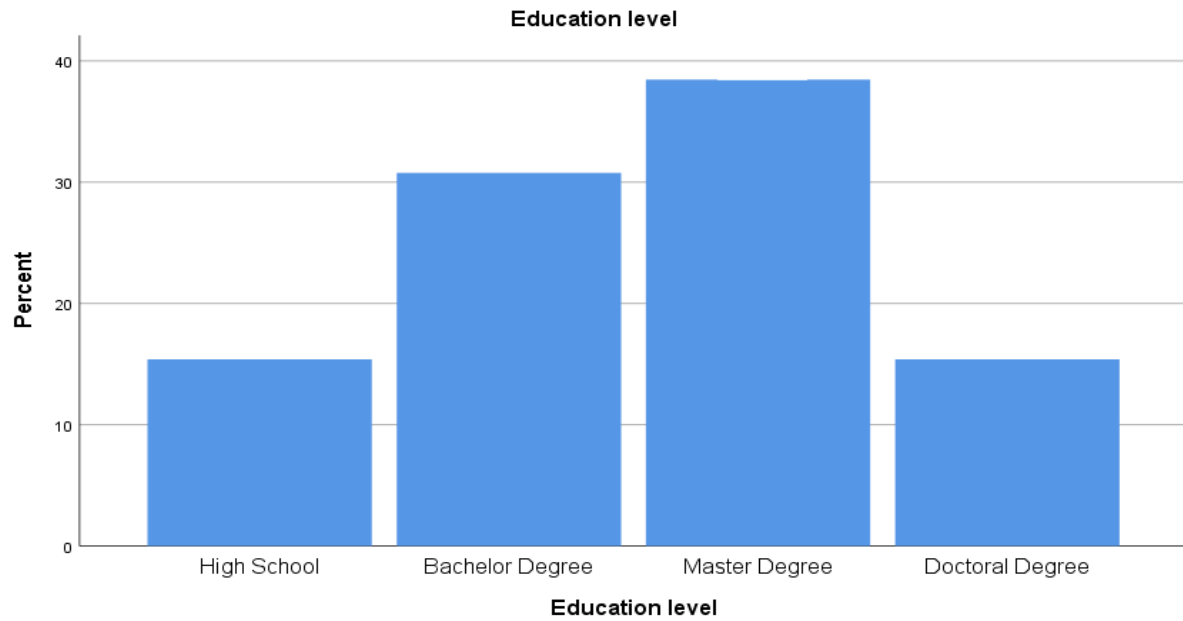


Figure 5.3: Participants' education level.



Figure 5.4: Participants' occupation.

Participants were from all income ranges. Figure 5.5 represents the participants' reported yearly incomes.

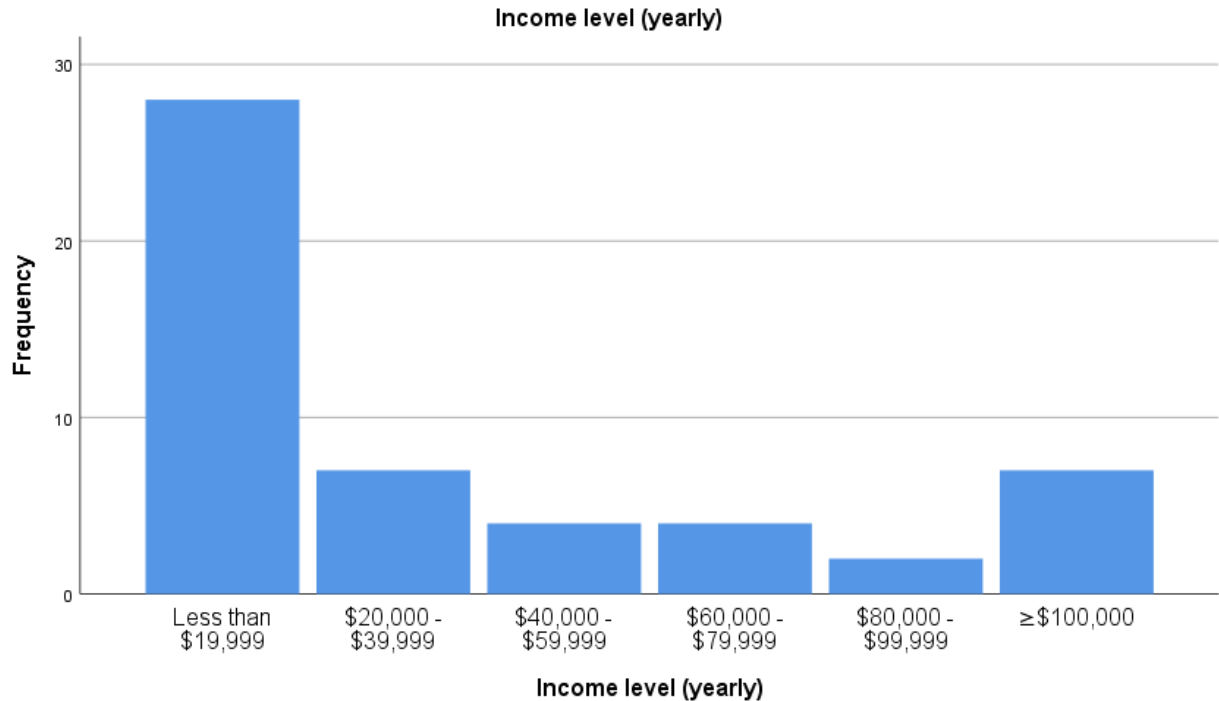


Figure 5.5: Participants' reported yearly income

5.4.2 Mobile phone use during grocery shopping

This section describes consumers' smartphone use, whether they used the smartphone during grocery shopping and how often they used it. All 52 participants owned and used a smartphone. 51 (98.08%) participants took their phone with them during grocery shopping and 46 (88.46%) participants used their smartphone during grocery shopping for various purposes. Based on a five-point Likert scale, participants were asked to rate how often they used their device during grocery shopping from never to very often. Figure 5.6 shows that all the participants used their mobile device at some point. 13% of participants used it rarely, 39% used it sometimes, 27% used it often and 21% participants used it very often.

To verify why participants used their mobile device during grocery shopping, questions were asked to provide explanations in-terms of information seeking, searching, sharing, communication, and other reasons; the participants were asked to select more than one option that applied. Figure 5.7 shows participants' responses regarding the purpose of mobile phone use during grocery shopping.

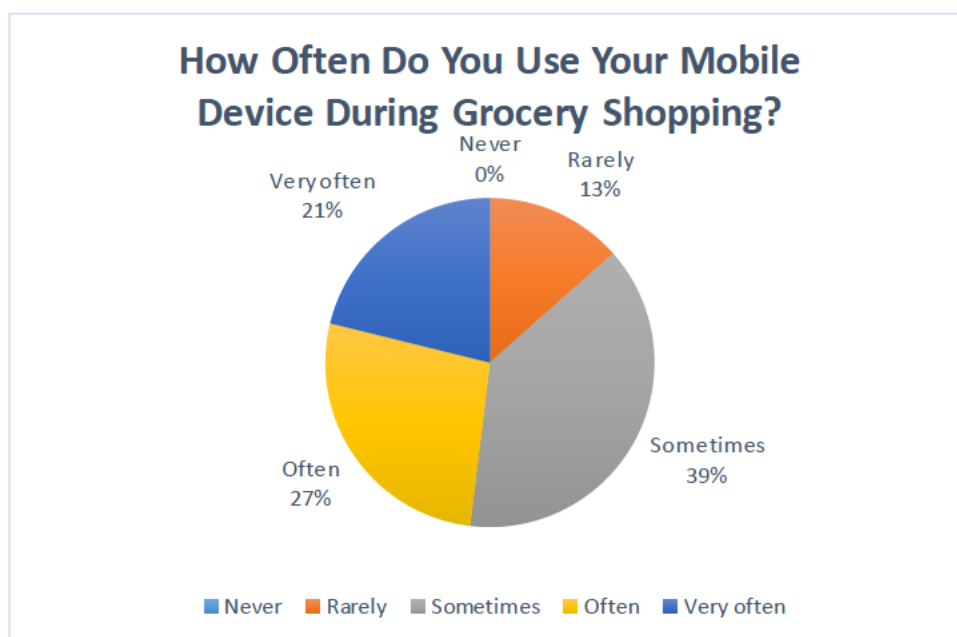


Figure 5.6: Participants' mobilephone use during grocery shopping.

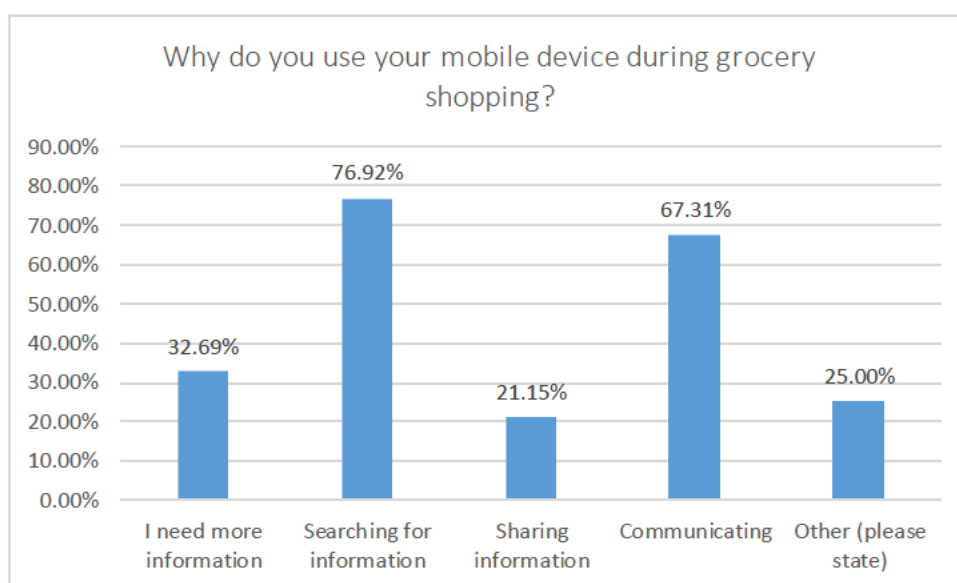


Figure 5.7: Participants' reasons for using a mobile device during grocery shopping.

From Figure 5.7, it can be seen that most of the participants used their device for information searching 76.92% (40), the second-most popular reason for using a mobile device was to communicate with others 67.31% (35), 32.69 % (17) used their device because they needed more information about the product, 21.15% (11) participants used their device to share information with others during grocery shopping, and 25% (13) for other purposes such as

checking shopping lists, paying for groceries, comparing prices, and contacting family members to check whether they had forgotten to buy something.

5.4.3 Meat purchase

This section presents the results of participants' meat purchase-related questions.

Firstly, they were asked what type of meat they purchased; they were asked to select all types of meat they consume. All 52 (100%) participants purchased chicken, 44 (84.62%) participants purchased beef, followed by lamb 34 (65.38%) and pork 33 (63.46%). Seven (13.46%) participants also stated other types of meat that they purchased such as kangaroo, duck, deer, and seafood.

Next, each participant was asked to select meat product attributes — such as intrinsic and extrinsic product quality cues — that they looked for when they purchased meat. Participants were asked to select all that apply. Table 5.1 shows what types of product attributes participants looked for during meat purchases.

Table 5.1: Participants' choice of meat product attributes

| <i>Product Attributes</i> | <i>Beef</i> | <i>Chicken</i> | <i>Lamb</i> | <i>Pork</i> |
|---------------------------|-------------|----------------|-------------|-------------|
| <i>Cut</i> | 69.2% | 57.7% | 53.8% | 42.3% |
| <i>Colour</i> | 57.7% | 57.7% | 38.5% | 40.4% |
| <i>Marbling</i> | 46.2% | 19.2% | 28.8% | 15.4% |
| <i>Fat content</i> | 55.8% | 36.5% | 46.2% | 42.3% |
| <i>Price</i> | 76.9% | 76.9% | 61.5% | 59.6% |
| <i>Country of origin</i> | 40.4% | 34.6% | 32.7% | 23.1% |
| <i>Animal welfare</i> | 28.8% | 40.4% | 23.1% | 23.1% |
| <i>Quality labels</i> | 42.3% | 40.4% | 23.1% | 25.0% |
| <i>Brand</i> | 30.8% | 30.8% | 17.3% | 21.2% |
| <i>Place of purchase</i> | 28.8% | 28.8% | 21.2% | 17.3% |
| <i>Packaging</i> | 38.5% | 36.5% | 28.8% | 21.2% |
| <i>Expiry date</i> | 71.2% | 73.1% | 57.7% | 53.8% |
| <i>Nutritional value</i> | 34.6% | 32.7% | 28.8% | 23.1% |
| <i>Appearance</i> | 53.8% | 50.0% | 42.3% | 32.7% |

| | | | | |
|---------|------|------|------|------|
| Other 1 | 5.8% | 7.7% | 3.8% | 1.9% |
| Other 2 | 1.9% | 5.8% | 1.9% | 0.0% |

Price (Beef 76.9%, Chicken 76.9%, Lamb 61.5%, Pork 59.6%), expiry date (Beef 71.2%, Chicken 73.1%, Lamb 57.7%, Pork 53.8%) and cut (Beef 69.2%, Chicken 57.7%, Lamb 53.8%, Pork 42.3%) were the top three product attributes that participants looked for during all types of meat purchase. Muslim participants also looked for halal certification during beef, chicken and lamb purchase.

Participants were asked how they found meat-related information; they were asked to select all the information sources that applied. Figure 5.8 shows that participants received most product information from packaging or product label (86.54%), then the second-most used information source was visual inspection of the product (61.54%), 51.92 % of participants searched for information from the internet and 28.85% from the butcher. 11.54% of the participants received information from advertisements.

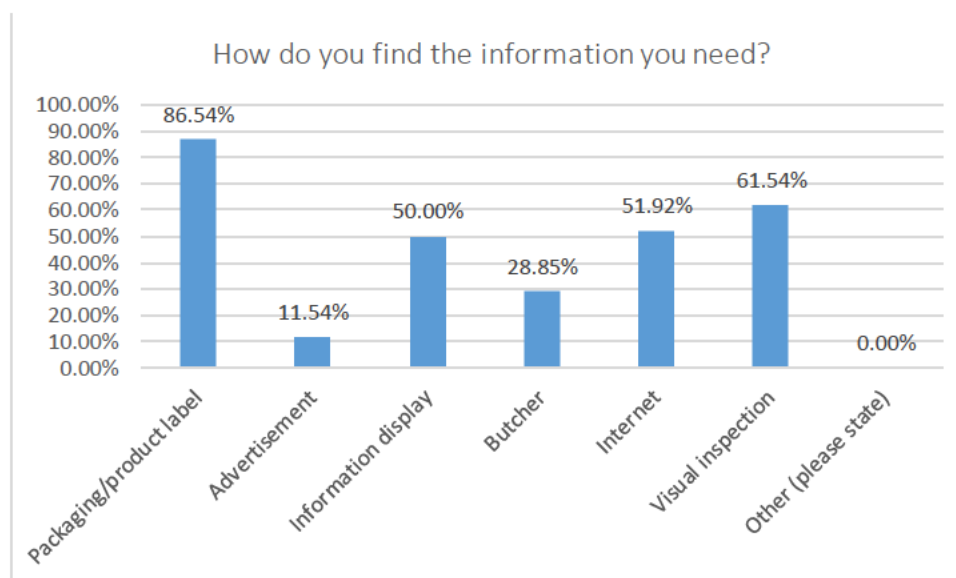


Figure 5.8: Participants' information source.

Participants were also asked to provide an answer regarding what they did when they did not understand the product information. Their first choice was searching the internet for the information (84.62%), second choice, was to ask their friends and family for information (51.92%) followed by talking to the butcher (34.62%). One of the participants did not purchase without understanding, and another participant did not require supporting information as she was raised by a chef.

Additionally, participants were asked to rate the quality of the information they received in terms of easy to understand, useful, trustworthy and easy to access through the use of a 5-point Likert scale from strongly disagree to strongly agree (Figure 5.9).

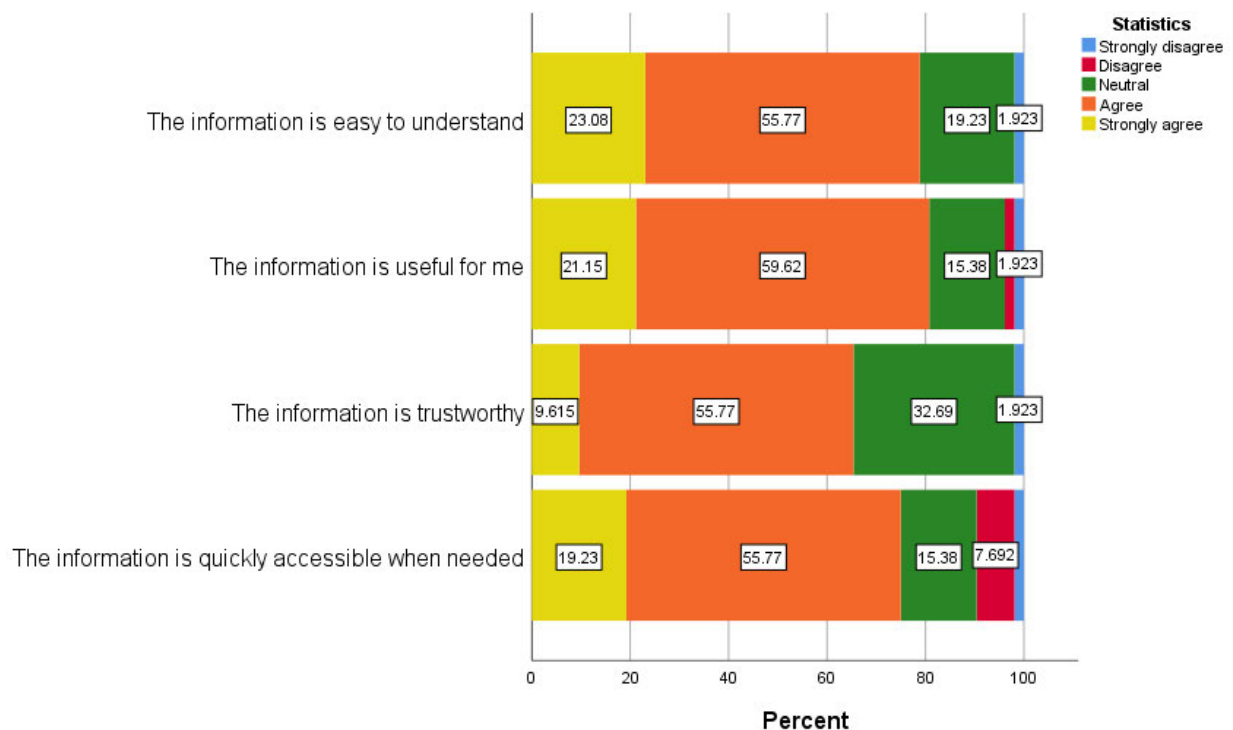


Figure 5.9: Information quality rating.

Over half of the participants agreed that information was easy to understand (55.77%), useful (59.62%), trustworthy (55.77%) and quickly accessible (55.77%).

5.4.4 Collaborative meat shopping

This section presents the findings related to consumers' collaborative meat shopping. 42 (80.8%) out of 52 participants discussed what type of meat to purchase with their friends and family. 38 (73.1%) of them sought meat product-related information from their family and friends. Participants sought various information such as product information (89.47%), cooking information (73.68%), shopping location (71.05%) and other information (2.63%) (see Figure 5.10).

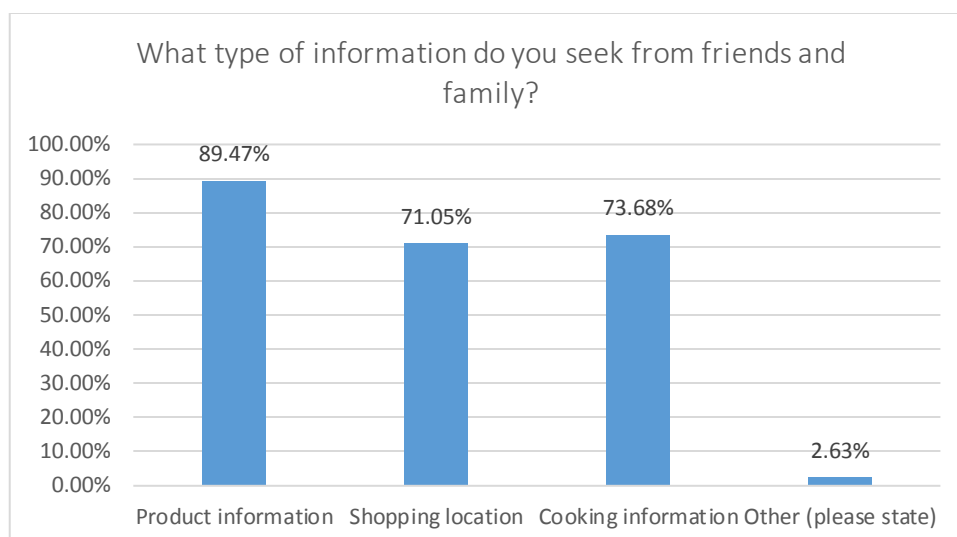


Figure 5.10: Type of information sought during meat purchase.

Next, each participant was asked how often they communicated with their friends and family during meat shopping when they were shopping alone to help make the purchase decisions. Figure 5.11 shows participants' remote collaboration with their friends and family during shopping. 13.46% never communicated, 25% of participants rarely communicated, 38.46% of participants communicated sometimes and 11.54% of participants communicated often and the same percentage communicated very often.

If you are shopping alone, do you communicate with your friends, family or partner to help you make purchase decisions?

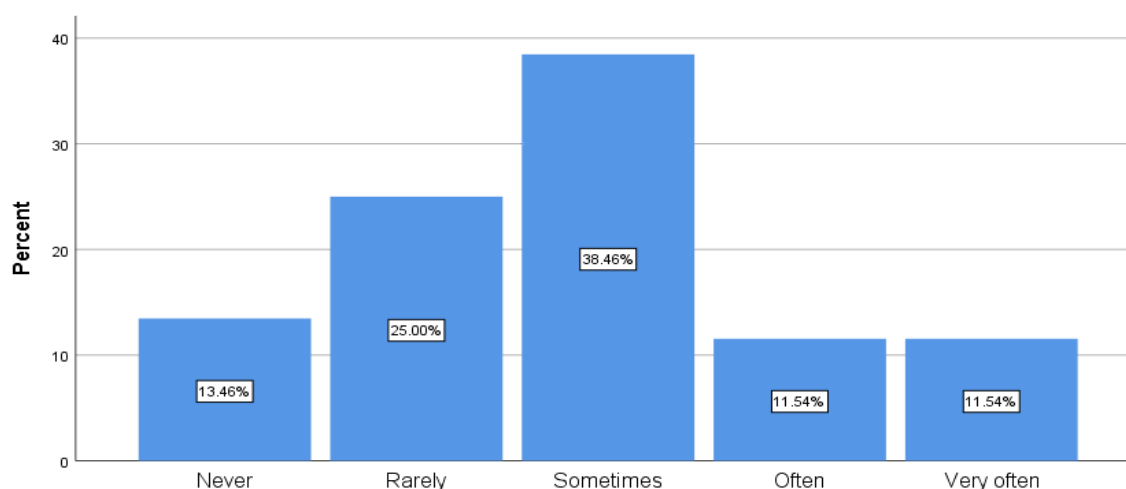


Figure 5.11: Frequency of participants' communication with their remote shopping partners.

5.4.5 Use of mobile devices to communicate with remote shopping partner

This section presents the participants' usage of technology during meat shopping to communicate with their remote shopping partner. 48 (92.31%) participants mentioned that they use a mobile device to communicate with their friends and family during meat shopping when they are shopping alone. They were also asked to rank from 1 to 4 the purpose of remote collaboration such as seeking information, for feedback/opinion, confirming the purchase and sharing information. Figure 5.12 represents participants' purpose based on the overall rank score. The first purpose is seeking information (2.77), the second is confirmation (2.76), the third for feedback/opinion (2.42) and the last purpose is to share information (2.09).

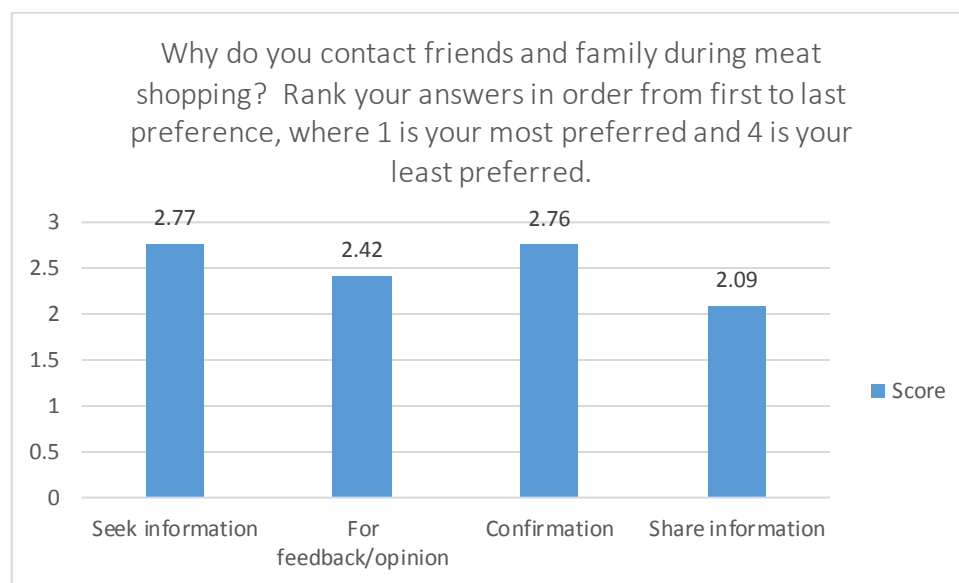


Figure 5.12: Purpose of remote collaboration.

Participants were asked to rank their communication methods from 1 to 5. Figure 5.13 shows the findings based on the overall score.

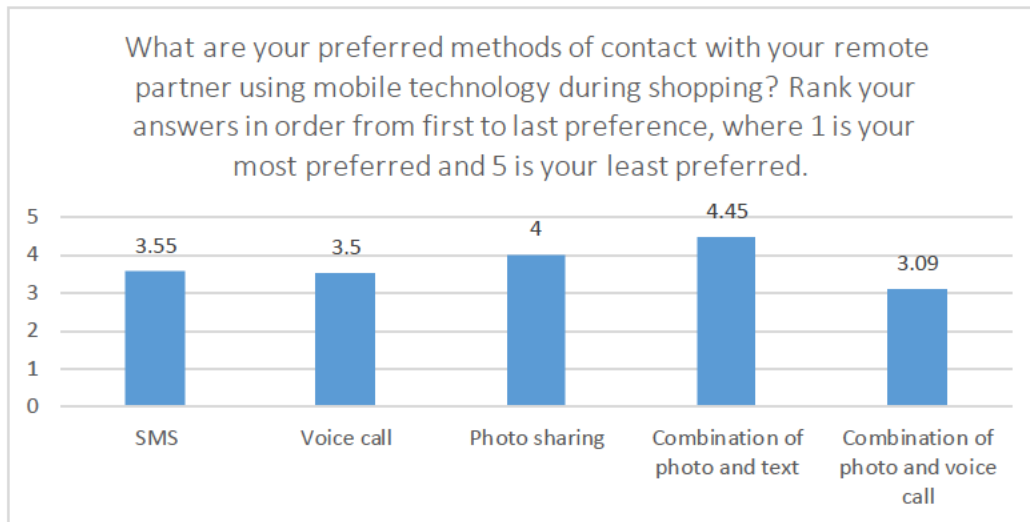


Figure 5.13: Preferred communication methods.

From the participants' scores, a combination of photo and text using instant messaging application were the most preferred communication method (4.45) followed by only photo (4), then text message (3.55), voice call (3.5), and a combination of photo and voice call (3.09) was the least the least preferred method.

Figure 5.14 shows participant experience of using mobile technology to communicate with their remote shopping partner. A five-point Likert scale from very bad to excellent was used to measure the perceived quality of their experience. Most of the participants' experiences were quite good (53.19%), 29.79% of participants' experience was neutral and 14.89% of participants' experience was excellent. Only 2.13% of participants' experience was bad. Only 2.13% of participants' experience was bad.

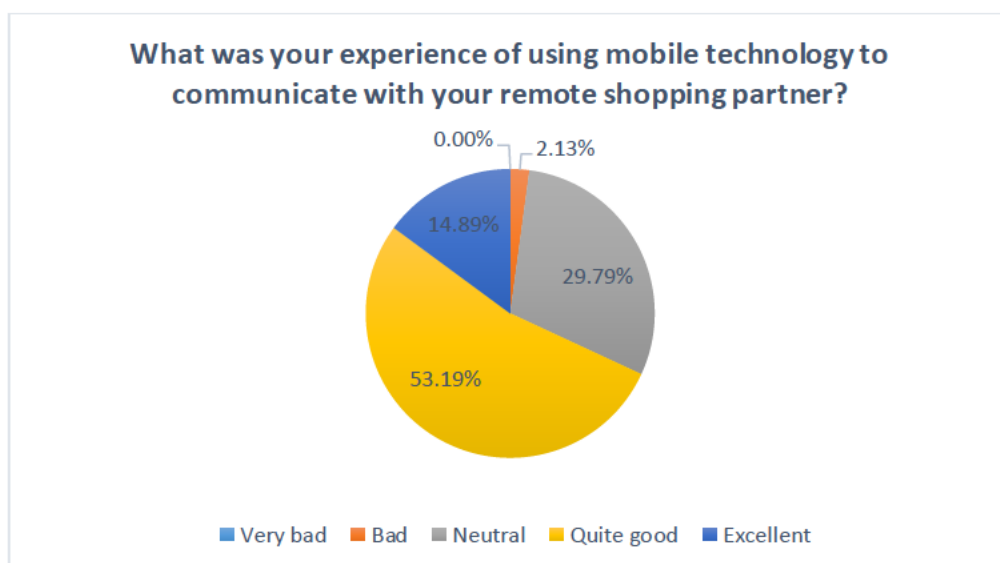


Figure 5.14: Participants' remote collaboration experience.

The survey also asked questions regarding how participants feel interacting with their remote shopping partner during their most recent remote collaborative shopping activity. 27.27% of participants mentioned it was personal, 20.45 % said it was unemotional, 13.65% mentioned it was warm, 9.09% said it was expressive, non-expressive and humanizing respectively. 4.55% said it was impersonal, 4.55% said close, and only 2.27% said it was closed interaction (Figure 5.15).

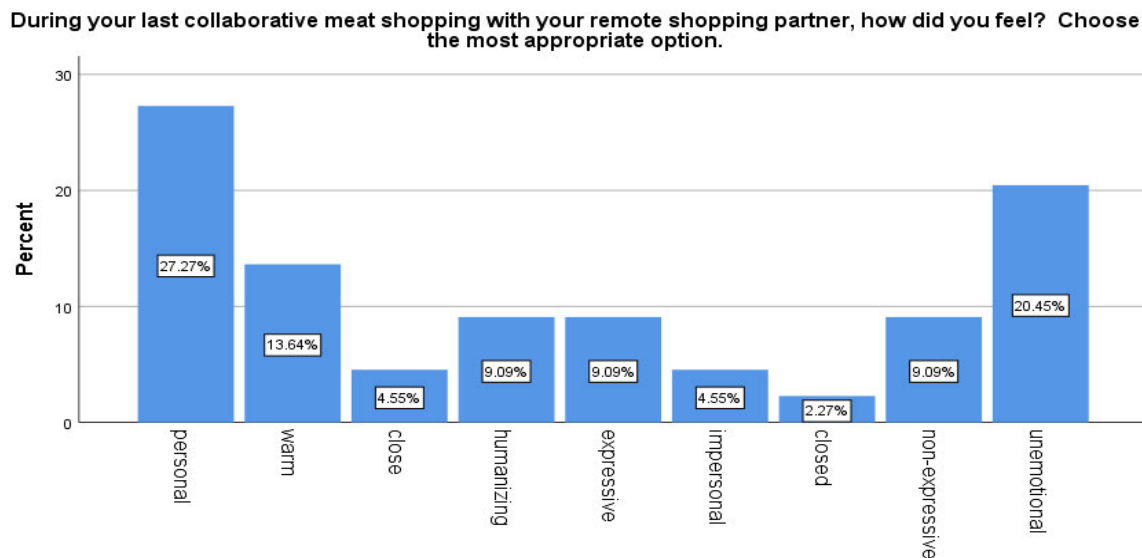


Figure 5.15: Participant feelings regarding their most recent remote collaboration.

Participants were asked to comment on their answer choices. Most of the participants communicated with their partner for information gathering, to discuss different meat quality cues, make the right choices, share opinions, check with their partner whether they had forgotten anything and for cooking. For some, it was personal interaction and for some, it was a common communication during shopping.

Next, participants were asked about their enjoyment of remote collaboration during their most recent meat purchase. 30.43% of participants said it was an enjoyable experience for them, 26.09% mentioned it was a fun activity, while 19.57% said it was a boring. It was an interesting experience for 15.22% of the participants and for 4.35% and 2.17% it was exciting and unenjoyable respectively (Figure 5.16).

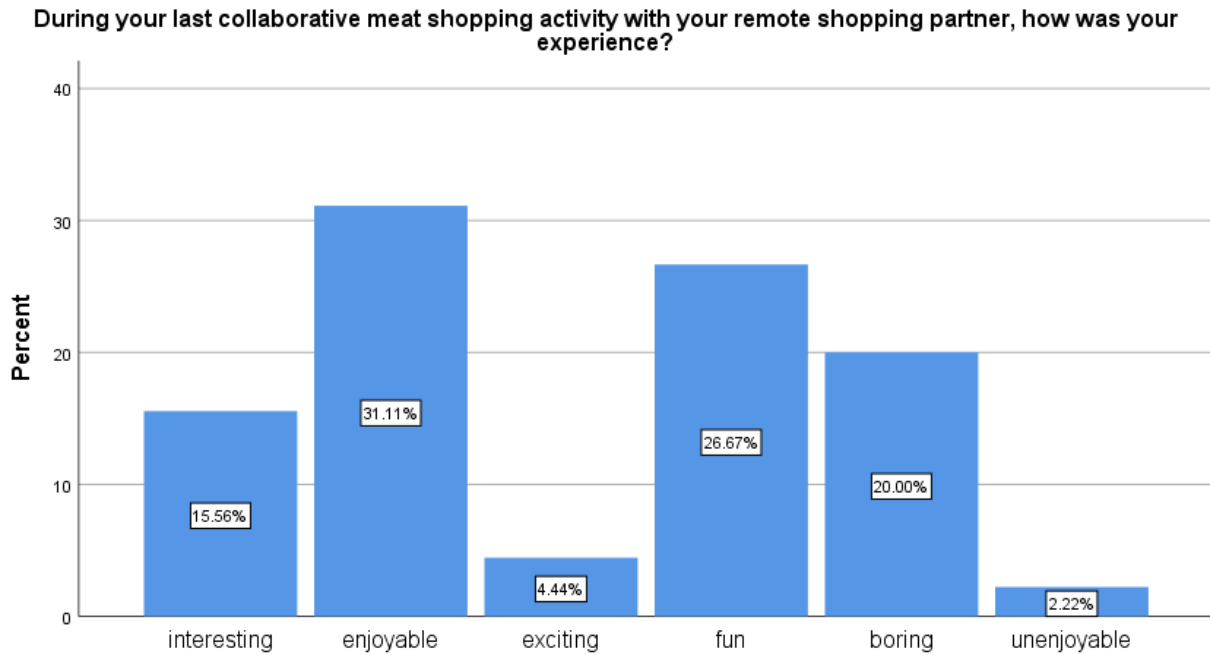


Figure 5.16: Participants' enjoyment during the last remote collaborative meat shopping.

Participants also provided comments on their experience. Comments included: “It was a fun and enjoyable experience because I love shopping with my partner and choosing the right product to make my partner happy”. Also, they get to share the meal with them. For some, it was a regular activity and communication with their remote partner was purely for information seeking. Also, some participants mentioned it was a boring activity as grocery shopping was part of daily life.

5.4.6 Future remote collaboration using mobile technology

This Section presents the findings of questions related to the participants' future needs for remote collaborative meat shopping with their partner using mobile technology. 86.27% of participants mentioned they want to share information during shopping with their remote shopping partner to make a purchase decision or for other reasons. Participants were asked to choose the activity (all that apply) they would like to do during shopping with their remote shopping partner. They were interested to seek opinions/feedback (80.39%), confirm purchase (72.55%), share the shopping experience (39.22%) and 11.76% other activity including cooking information, share deals and seek halal information (Figure 5.17).

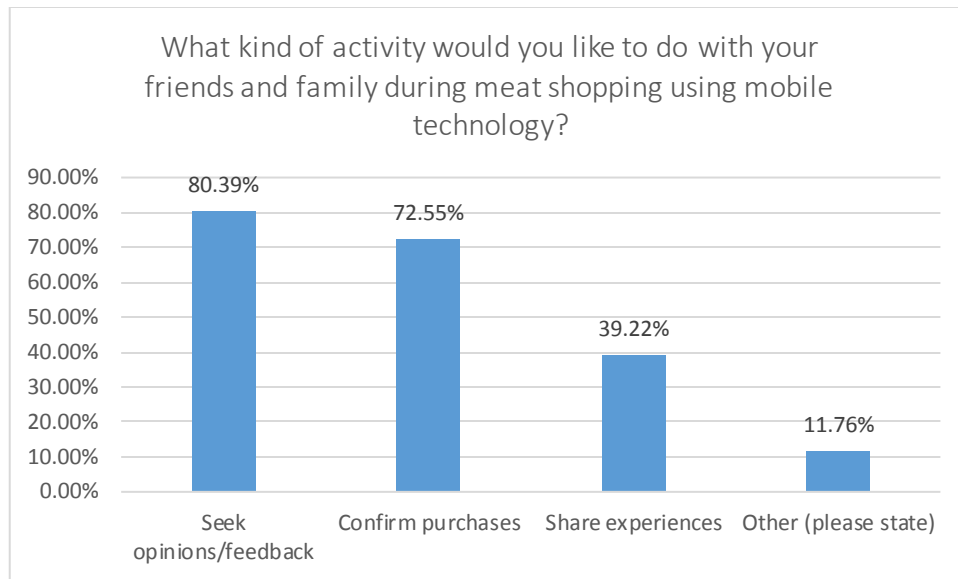


Figure 5.17: Activity participants want to share in the future.

Participants were asked to identify their preferred methods for communication with their remote shopping partners in the future. 79.17% of participants preferred visual information, 50.00% preferred voice communication, while only 47.92% wanted to communicate by text messages (Figure 5.18).

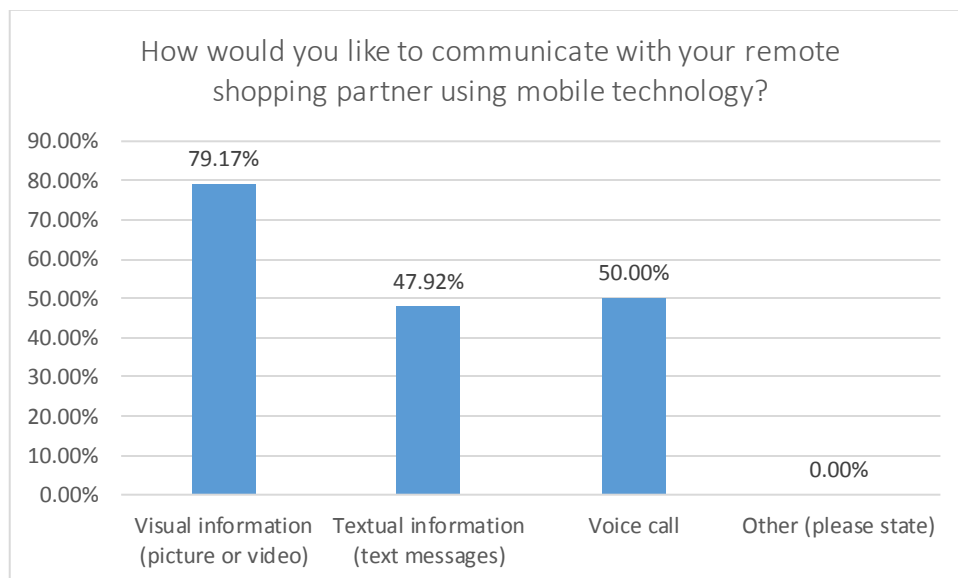


Figure 5.18: Future preferences for remote collaborative communication.

5.5 Discussion

This Chapter presented the results of the quantitative study. Quantitative data were collected using an online survey from meat consumers. The main aim of the study was to understand meat consumers' use of mobile technology during meat shopping, collaborative meat shopping with their remote shopping partner including why and how they communicate and future preference of remote collaborative shopping.

The quantitative results show that mobile devices were part of consumers' grocery shopping. Almost all the participants used a mobile device during grocery shopping at some point. The main purpose of using the mobile device was to search for product information and communication. During the meat purchase, consumers mostly looked for various product-related information and the most searched for information was the price, expiry date and cut of the meat. In general, they obtained this information from product packages, information display or visually inspecting the product.

The majority of the participating consumers also collaborated with friends and family to discuss meat purchases. 80.8% of participants discussed what type of meat to purchase with their friends and family and 73.1% sought various information such as product-related information, purchase location or cooking methods of meat to make the purchase decisions.

92.31% of consumers remotely collaborated with their friends and family during meat purchases when they shopped alone to seek information, for feedback or opinions about the products, confirming the purchase and sharing information. They used a mobile device to communicate with their partner. The most common method of communication was a combination of photo and text, followed by voice calls, text messages, and photo sharing. Their experiences of using the current mobile communication method to remotely collaborate were good. The majority of participants mentioned it as a personal and enjoyable activity for them. They were using existing mobile communication methods to remotely collaborate with their partners.

The quantitative study also showed consumers' future preferences for remote collaborative shopping and how they wanted to communicate. 86.27% of participants were interested in remotely collaborating with their shopping partner to seek opinions, confirm the purchase, share shopping experiences, seek a recipe, or learn of price reductions. Their first

preference for the future remote collaboration was visual communication where they could show pictures or video of the product to their remote collaborator. The second preference was voice communication and the third was textual communication.

CHAPTER 6 — DISCUSSION AND CONCLUSION

6.1 Introduction

This Chapter presents the discussion and conclusions of this research. First, a summary of the study is presented followed by the research objectives and the answers to the research questions found. This Chapter also presents the contribution of the research and limitations of the research. Lastly opportunities for future work are presented.

6.2 Study overview

The main aim of this research was to explore meat consumers' collaborative shopping in the context of in-store shopping. The focus was to understand meat shoppers' collaborative shopping with a remote shopping partner and how technology was being used to support their remote collaboration. To gain a deeper understanding of the context of collaborative shopping, meat shopping, and what the current challenges and problems were, a comprehensive literature review (see Chapter 2) was conducted. In the literature review, consumers' meat shopping behavior was explored. Also, how technology was being used in grocery shopping was explored. Existing literature identified that during food or meat shopping people sought product information to evaluate products to make a final purchase decision. To obtain product information, people used various information sources such as product labels, advertisements, the internet, salespeople, information sheets, and other available sources. Friends and family were another important information source for buyers. Although previous research has mentioned that food consumers value friend and family's opinions regarding food and meat purchase, there has not been any significant research on the premises of remote collaborative shopping and how it is supported by technology. Thus, this research investigates the meat consumers' remote collaborative shopping with remote shopping partners. The research was conducted in two phases: a qualitative and a quantitative study (see Chapter 3).

In the beginning, the scope of the research was exploring premium beef consumers' remote collaborative shopping through a qualitative study (see Chapter 4) to understand premium beef consumers' remote collaborative shopping. The qualitative study led to the quantitative study. In the quantitative study (see Chapter 5), other meat (beef, chicken, lamb, and pork) consumers' remote collaborative shopping habits and preferences were explored.

The specific objectives of this study were:

1. To explore meat consumers' collaborative shopping practices in the context of in-store shopping.
2. To investigate how mobile technology is being used to support collaborative purchasing in bricks-and-mortar settings in the context of meat purchasing.
3. To identify the factors that need to be considered to design technological artefacts to support meat consumers' collaborative shopping tasks.

The research questions are:

1. What influences in-store meat shoppers to collaborate with remote shopping partners?
2. How does mobile technology play a role in supporting meat consumers' collaborative shopping in-store?
3. What factors need to be considered for improving the experience (technological, sensory, information seeking, and sharing) of collaborative remote shopping for meat consumers?

In the following subsections, the outcome of each objective is discussed, and associated research questions are answered.

6.2.1 Objective 1

- **To explore meat consumers' collaborative shopping practices in the context of in-store shopping.**

The first objective of the study was to explore remote collaboration in the meat shopping context and the associated Research Question is: *What influences in-store meat shoppers to collaborate with remote shopping partners?*

A mixed-methods study with meat consumers found that the majority of participants were involved in remote collaboration during meat purchase. There were several factors influencing consumers' in-store collaboration; seeking confirmation from their remote partner was one of the main purposes for remote collaboration. Consumers confirmed with their partner at the point of purchase to gain validation that the purchase was the right cut or brand with the right price. Another reason identified for remote collaboration in the meat context was location: asking remote shopping partners about which location was better for purchasing the type of meat they wanted in relation to price and quality. Meal preparation was another reason for remote collaboration in the meat context such as, confirming with a remote partner what types

of meat they wanted for a particular recipe. Consumers also remotely collaborated with their friends and family when they accidentally encountered good deals on any meat product. In that case they shared that information with their remote shopping partner.

It was also found that remote collaboration was also influenced by consumers' knowledge and whether they were living alone or not. Consumers who lived alone did not remotely collaborate with anyone and they purchased the same type of product all the time. Some preferred to collaborate with other consumers in online platforms to know more about the product to make better purchase decisions. Consumers' religious beliefs also influenced remote collaboration with friends and family. For instance, Muslim consumers searched for halal processed meat. To confirm halal processing they communicated with their friends and family at the point of purchase.

For most of the consumers, remote collaboration was a regular activity during meat shopping, and a personal interaction with their partner. However, for some consumers it was just part of their regular grocery shopping. The majority of the consumers also enjoyed remote collaboration as they found it to be a fun and interesting activity for them to communicate with their partner. Results also showed that the relationship between buyer and remote partner had an influence on remote collaboration.

6.2.2 Objective 2

- **To investigate how mobile technology is being used to support collaborative purchasing in bricks-and-mortar settings in the meat context.**

The second objective of this research was to understand how consumers were using mobile technology in a remote collaborative meat shopping context the associated Research question is: *How does mobile technology play a role in supporting meat consumers' collaborative shopping in-store?*

Both the qualitative and quantitative studies showed that every consumer used a mobile device and almost everyone took it with them during grocery shopping.

Consumers used the mobile device during grocery shopping for various purposes such as searching the internet for product information, shopping lists, communicating with friends and family. The mobile device also played a vital role in supporting remote collaborative

shopping. This was the only mode of interaction with remote shoppers when consumers shopped alone.

The most common method of communication was a combination of photo and text message, as visual information allowed consumers to show the product attributes to the remote partner; next was text message followed by voice call. Most of the consumers preferred a combination of textual communication and sharing visual information with a remote partner. If the participants wanted a quick response they made voice calls however, due to the busy supermarket environment they tried to avoid voice calls.

Mobile technology was the only means of communication with a remote shopping partner used and most of the consumers' experience of using a mobile device to remotely collaborate with their remote shopping partner was positive.

6.2.3 Objective 3

- **To identify the factors that need to be considered to design technological artefacts to support meat consumers' collaborative shopping tasks.**

The third objective of this research was to identify what were the most important factors that needed to be considered for the design of technological tools to support consumers' remote collaborative shopping in the meat shopping context. The associated research questions is: *What factors need to be considered for improving the experience (technological, sensory, information seeking and sharing) of collaborative remote shopping for meat consumers?*

From the qualitative and quantitative study, this research found that meat consumers were interested in remotely collaborating with their remote shopping partner using mobile phone technology. Their main intention for remote collaboration was to seek product feedback, confirm the purchase, and share shopping experiences. This research identified that current mobile technology was sufficient for meat consumers to remotely collaborate with their partner using mobile communication channel. Advancement of mobile technology allows anytime, anywhere access and with access to the internet people can communicate with anyone and search for information. The majority of the participants used their device at some point of purchase to communicate or search for information. Also, the experience of using current mobile technology was good for the majority of the participants. However, they were interested in using dedicated mobile applications for collaborative meat purchases, where they could

communicate with their remote shopping partners in real-time to seek opinions, share experiences or information, or discuss product quality, type and price. Consumers are more interested in visual communication. For some consumers, remote collaborative shopping was a boring and unenjoyable activity as it was part of their regular grocery activity. Also, for some consumers, interaction between them and their remote partner was non-expressive and impersonal. To enhance the consumers' experience of remote collaborative in-store meat shopping using mobile technology these factors need to be considered. This research also found that consumers valued local products to support their community, as a results they searched for local product information.

6.3 Discussion of findings

This section discusses the key findings of the research according to research questions in relation with existing literature.

6.3.1 Discussion related RQ1

Research Question 1: *What influences in-store meat shoppers to collaborate with remote shopping partners?*

In collaborative meat shopping, consumers' need for collaboration arose when they needed to confirm the purchase with their shopping partner regarding their choices. Shopping partners' choice of the meat was influenced by several factors; what types of recipe they wanted to cook, their favorite brand, and favorite cuts of the meats. Meat consumers also collaborated with remote shopping partners even if their primary goal was not meat purchasing. For instance, if they accidentally encountered any good deals on meat in the supermarket, it reminded them that their family member wanted to have that particular meat, they would communicate with their remote partner to discuss whether to purchase the meat.

These findings support previous research from information behavior researchers (Wilson, 2000) (discussed in Chapter 2 section 2.7) who have identified that personal, psychological, and situational factors are important for information seeking behaviors.

Psychological factors: Including relationship status, knowledge, cultural belief. The results of this study shows that remote collaboration between collaborators was influenced by the relationship status of the consumers. Almost all of the participants who collaborated were

driven by their depth of relationship with the remote partner and their need for understanding their preferences. For example, shoppers wanted to make the right purchase to make their partners happy by confirming the purchase with their partner. Also, discussing meat purchases with shopping partners was a regular activity for many and it was fun and enjoyable activity with their partner. Previous research in collaborative shopping in other domains also supported these findings, that shopping with friends and family was a fun activity and often they spent more time shopping because consumers were able to share their experiences and interact with others with similar interests (Pfeiffer and Benbasat, 2012; Kim *et al.*, 2013). Consumers who were single or living alone were most likely to not collaborate with any friends and family to purchase meat. Unless they were cooking for a special occasion, they would communicate with their guest to ask what type of meat they would like to eat. Also, some sought information from other consumers who were not related via an online platform. This research also found that consumers' knowledge also affected their collaboration with a remote collaborator. For example, some consumers believed that they had all the required knowledge about which meats to buy, from where to buy it, they did not collaborate with anyone regarding product information.

Another psychological factor that affected consumers' remote collaboration was consumers' cultural beliefs. This study found that during remote collaboration Muslim consumers discussed if the meat was halal processed which was affected by their religious culture. Muslim consumers primary concern before meat purchase is whether the meat is halal or not.

Sensory factors: Products sensory attributes also influenced consumers remote collaboration. sensory attributes are taste, textures, and appearance of the product. However, during collaborative purchase, consumers are unable to taste the product, but they can recall their previous experience of that product and discuss with their remote shopping partner. According to this study, product appearance affects remote collaborative shopping. Consumers share visual information with their remote shopping partner to confirm the color or appearance of the meat product. This is supported by Verbeke's work, which also found that sensory characteristics were one of the influential factors during meat purchase (Verbeke, 2006).

Marketing factors: Remote collaborative meat shopping is also influenced by marketing factors. Marketing factors includes products information, such as extrinsic and intrinsic quality cues. During collaborative shopping, buyers discuss this information with their remote

shopping partner. Consumers receive product information at the point of purchase and with the help of remote collaborator they create quality perception to make the purchase decision. Section 2.5 discussed the different types of meat and their product quality information. Every type of meat has its own quality cue information. However, in remote collaborative meat shopping consumers discuss similar information such as price, brand, specific cuts, product origin, recipes, as well as location regardless of type of meats.

From the literature (Section 2.6) it can be seen that previous research has identified that consumers' meat purchase behavior influenced by psychological factors, sensory factors, and marketing factors (Font-i-Furnols and Guerrero, 2014), however, the previously discussed model has only focused on individual consumers. In contrast to existing literature, this research has found that meat consumers' remote collaborative shopping behavior is also influenced by psychological factors, sensory factors, and marketing factors. But these factors are influenced by remote shopping partner during shopping.

6.3.2 Discussion related to RQ2

Research Questions 2: How does mobile technology play a role in supporting meat consumers' collaborative shopping in-store?

Mobile devices are part of many consumer's grocery shopping. They use mobile devices to communicate or for information searching during shopping. Every meat consumer depends on mobile device to remotely collaborate with their shopping partner. The most preferred method of communication was a text message with pictures. They also communicated with voice calls and text only messages. The shopping situation also affected consumer's choice of communication methods, for example, if they had less time to do shopping, they would make a voice call for an immediate response. Also, the shop environment was found to influence the consumer. Some consumers avoided voice calls in the shop due to the noisy environment.

This research has identified that current mobile technology is sufficient for consumer's remote collaborative activity in the meat shopping context. Also, existing literature has shown that consumers use mobile technology to communicate with their shopping partners during shopping to discuss the purchase. They use voice calls, text messages, photo sharing communication methods (Morris *et al.*, 2014; Tohidi and Warr, 2013).

However, meat consumers were interested in a dedicated mobile application which would support their collaborative meat shopping by allowing them to shop together with their remote shopping partner. Previous research (see Section 2.4) has shown that consumers were increasingly using technology to support their in-store and online shopping. It also enhanced consumers' decision-making process and shopping experiences (Pantano and Migliarese, 2014; Priporas *et al.*, 2017; Schmitt, 2019).

6.3.3 Discussion related RQ3

Research Question 3: *What factors need to be considered for improving the experience (technological, sensory, information seeking and sharing) of collaborative remote shopping for meat consumers?*

Previous sections discussed what influenced the meat consumers to remotely collaborate with their shopping partners and how mobile technology was playing a role to support their remote collaboration. Although meat consumers were satisfied with current mobile technology, they were willing to use applications that would support their remote collaborative tasks.

Drawn from the influencing factors for remote collaboration, consumers' relationships status is the main factors that encouraged them to collaborate with their friends and family. Existing food-related HCI research (Section 2.3.1) has been focusing on designing and implanting technological artifacts that support people's food purchase to eating. Previous research has shown that technology can enhance people food related behavior — in terms of healthy eating, cooking and sustainable food purchasing (Grimes and Harper, 2008; Comber *et al.*, 2012). These technologies also support social communication.

However, previous HCI research only focused on individual consumer's needs and preferences. In order to design a collaborative shopping tool, it is important to understand consumers' needs from their relationship perspective and how they make joint decision. This research identified how relationships influence meat consumers remote collaborative activity and how they perform the task. Future research needs to investigate what relationship aspect is most important to design technology for consumers to support their remote collaborative shopping. As this was out of scope of this research.

In remote collaborative shopping, consumers are not together, thus, a consumer does not feel a sense of presence from their partner. This study found that even though some

consumers felt that communicating with their partner was a personal and fun experience, others stated that they did not feel communication was personal or exciting. In-order to enhance consumers' sensory experience during remote collaborative shopping, different design elements could be incorporated in remote collaborative shopping tools. Previous research in collaborative shopping (see Section 2.2) showed that various design and interaction methods could be incorporated into technological artefacts to support consumers' food purchases or online collaborative shopping in different domains. For instance, live chat, using an avatar to increase the social presence, collaborative product reviews or using augmented reality to enhance consumers' experience of using technology. In the meat shopping context such design and interaction methods could be incorporated to enhance consumers' technological, sensory and information sharing experience.

Another factor that needs to be considered is product related information. This study found that meat consumers valued local products. During information searches they were sometimes unable to find information on local products and this made them frustrated. Incorporating product information into the remote collaborative tools would help consumers to evaluate the product faster and more accurately. It would also help the local economy.

As mentioned earlier, relationship status influenced consumers to collaborate. However, consumers who were single sometimes searched for public opinions about meat products. Previous research has shown that in other domains, consumers often use public or expert opinion to review products and make purchase decisions. Identifying how meat consumers use public opinion and whether it has any effect on relationship status can be beneficial to design remote collaborative tool.

As discussed in Chapter 2 section 2.4, physical stores will not be replaced by digital stores in the short term, however implementing technology to support shoppers in the physical store will make their shopping experience easier (The-Future-Of-Grocery, 2015; Agratchev, 2014). As physical stores satisfy the sensory needs of shoppers, especially in the food shopping context, where consumers can see and evaluate the food based on appearances (Schmitt, 2019). This research identified that consumers use mobile technology in the meat shopping context for remote communication or for information searching. Technology makes it simpler for consumers to communicate and seek information from different sources. However, consumers are satisfied using simple communication methods such as phone calls, SMS or instant messaging.

6.4 Contribution of the research

This research has provided insight into remote meat collaborative shopping and how consumers use mobile technology to support their remote collaborative shopping. To the best knowledge of the researcher, this is the first study that has explored meat consumers' collaborative shopping. This study has contributed to the knowledge and understating of meat consumers' remote collaboration. This study can provide an understanding of meat consumers' collaborative shopping and factors that influence their collaboration to the industry and other researchers.

The following sections highlight the contributions made by this research to the body of knowledge and its implications. The contributions are divided into three categories: theoretical, methodological, and substantive contributions.

6.4.1 Theoretical contribution

The main contribution to the body of knowledge is bringing together remote collaborative shopping theory with meat shopping theory to inform and improve the experience of collaborative meat shopping. This research predominantly contributes to the knowledge of HCI and food shopping, collaborative shopping, and the types of collaborative shopping and consumers' meat shopping behavior. This research has identified the needs of collaborative shoppers, especially in remote collaborative shopping and the benefits which accrue from it.

Secondly, meat consumers' shopping behaviors were explored — such as how they shopped, what kind of information they searched for during shopping, and how they evaluated the purchase. This research has investigated how technology was being used to support consumers to make their purchase decisions. Prior to this research, there had not been a significant investigation into collaborative meat shopping. This research investigated multiple type of meat (Premium beef, chicken, beef, lamb, and pork) purchased via remote in-store collaborative shopping. It found that meat quality cues differ based on the meat type and that people search for different quality cues in different meats during purchase.

During in-store collaborative shopping for any meat, this research found that the critical cause for collaboration is confirming the purchase with their remote shopping partner. Despite the difference in quality information of the meat, however, people collaborate with their remote shopping partner for similar reasons for all types of meat.

6.4.2 Methodological contribution

This research adopted an emergent mixed-methods design to conduct the research. Emergent mixed methods design is not a pre-determined research methodology. It emerges during the first data collection, when one methodological approach is not sufficient to conclude the research. Using a sequential mixed methods approach, this research collected qualitative and quantitative data. For the qualitative study a semi-structured interview instrument for the data collection on remote collaborative premium beef shopping was developed and data was analyzed using a Grounded Theory Based approach. From the interview findings survey questions were developed for a quantitative study to extend the research. Adopted methodological and data analysis approaches proved to be effective and created a meaningful data collection instrument. As a result the qualitative study provided valuable insights of collaborative in-store premium beef shopping, such as their remote collaborative shopping behavior and how they use technology to perform the remote collaborative task. And the findings of the qualitative study informed the quantitative survey instruments. The survey helped to extend the research and further explored meat consumers in-store collaborative shopping.

6.4.3 Substantive contribution

At the substantive level, this research has contributed by establishing an understanding of the technological, social, and knowledge requirements for remote collaborative meat shopping.

This research has identified how meat consumers are using mobile technology to meet their remote collaborative shopping needs, why they collaborate with their remote friends and family and what their future preferences are.

Initially, this research identified the need for the study from the literature. The literature study focused on collaborative shopping in different domains and how it helped consumers to make joint decisions. Then meat consumers' shopping behavior was studied in-terms of how they made purchase decisions, what type of information they searched for and how they acquired the required information to evaluate the product. From the marketing perspective consumers' purchase behavior was studied. Also, how technology was being used by the retail industry and consumers was studied. Based on the literature findings, this research has developed a conceptual framework to illustrate the premium beef consumers' in-store collaborative shopping. Creating a case study approach, premium beef consumers' in-store

collaborative shopping with remote collaboration was explored. This has generated insights of in-store collaborative shopping and usage of mobile technology. Later, this research extended the conceptual framework to support other types of meat in-store collaborative shopping. The survey instrument was created for chicken, beef, lamb and pork meat consumers to explore their collaborative shopping. Both studies provided valuable insights into consumers' needs for collaboration during meat purchase from the technological, social and information behavior perspectives.

6.5 Limitation of the research

Every research project has limitations which impact the work to some degree. This Section discusses the limitation of this study. Limitations of this research are discussed in terms of the scope of the research, data collection and self-reported data.

One of the key limitations was the scope of this research. This research only focused on meat consumers' collaborative shopping with remote collaborators and mobile technology. The main purpose was to explore meat consumers' remote collaborative shopping. This also limited the number of participants who took part in the qualitative and quantitative study. Initially this research started as a sponsored premium beef project, however, the project was later expanded to cover other meats in order to increase participation, broader impact, and to gain an increased depth of understanding of the consumers' collaborative shopping. This expansion has benefited the project but had an impact upon the methodology.

Qualitative studies are usually not generalizable as they focus on specific phenomena in certain populations (Leung, 2015), however, qualitative research provides valuable insights into phenomena. This lack of generalisability was addressed by using a second-phase quantitative study. Nonetheless, this study only focused on a specific region of Australia. Consumers' collaborative meat shopping in different regions or countries might be different.

Data collection was another limitation of the research. As this research only focused on the specific area of collaborative shopping for meat it was hard to find participants for the data collection. Participants came from various backgrounds, and all were meat consumers, but all were reached through a small number of channels which may not lead to a representative subset of the population. (Many of our participants, for example, were young, were students, and owned smart phones).

The data collection method was only limited to interview and online surveys due to time limitations. Recruiting participants for interview was a difficult process as the interview focused on premium beef and not all meat consumers are premium beef consumers. This resulted in low numbers of interview participants. Other data collection methods were considered, such as participant observation during shopping. However, for ethical reasons and an inability to gain permission to conduct the observation in shop premises, this research could not observe participants.

Self-reported data is potentially another limitation of the study. All the collected data was self-reported by the participants. Although self-reported data has advantages in-terms of identifying target participants' personal real-world experiences, it has potential bias, such as inaccuracy of recalling past memories, and self-consciousness (Paulhus and Vazire, 2007).

6.6 Future work

This research is exploratory in nature. While this study only explored meat consumers' remote collaborative shopping in the context of in-store meat shopping in Tasmania, Australia, future research could focus on other cultures and countries and compare the consumers' remote collaborative shopping behavior in different regions and uses of technology.

Also, this study only focused on remote collaborative shopping. Further study could explore in-store collaboration or online collaborative shopping in the meat shopping context to identify the difference between different types of collaborative shopping situations.

Exploring the remote collaborative shopping of different food products could show additional insights and technology requirements for the target consumers. Future work could also incorporate different data collection methods such as focus groups or observation and use a different approach to recruiting participants.

Finally, this research suggested that current mobile technology is sufficient for meat consumers' in-store collaborative activity however, they are interested in dedicated applications that will support their collaborative meat shopping needs. The results of this study could inform future development of similar studies and assess whether mobile phone technology continues to meet consumers' needs.

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Appendix A – Interview Questions

Interview Questions

Demographic Questions

Gender:

Age:

Education:

Occupation:

Income level (yearly):

Personal Preferences Questions

- Do you prefer seeking information individually or with others?
- What sort of mobile technology do you own?
- What technology do you usually take grocery shopping with you?
- Do you use technology while you are grocery shopping?

Understanding the current situation

- Do you communicate with someone else to make decisions on grocery shopping?
- Do you ever find that you don't understand the product information when you're shopping?
- What do you do to get more information about a particular product?
- Do you seek information from your partner, a family member, an acquaintance or friend?
- What sort of things would you ask your (partner/friend etc) if you wanted more information?
- How useful is the information you receive from your shopping partner while shopping?

Use of technology during shopping

- Let's say your (partner/friend etc) is not with you, do you communicate with them to help you make decisions about shopping?
- How do you do that?
- Have you ever been shopping in a store and contacted another person about your shopping activity using your mobile phone?

- Why did you contact others during shopping? Example, seek information, share shopping experience, other reasons.
- What was your experience using the mobile technology?
- What were your preferred methods of contact with your remote partner using mobile technology?
For example, SMS, MMS, Voice call, Photo sharing or other.
- What made you think of using mobile technology as a potential solution for collaboration task?

Information needs

Ok, this research is about premium beef purchasing. I'm going to ask you some specific things about buying premium beef.

- When you're buying beef, do you ever discuss it with your (partner/friend etc)?
- Can you tell me about that?
- Do you discuss:
 - Price
 - Cut
 - Brand
 - Color
 - Traceability information
 - Brand
 - Etc?
- What is the most important information about premium beef you like to discuss?
Example price, cut, brand, color, traceability information, brand or others.
- What do you do if you want to discuss this with your (partner/friend etc) and they're not with you?
- What is the purpose of discussing this with a remote partner? Example, seeking opinion, sharing the product or shopping experience or others.
- Why?
- Is information retrieved from the remote partner easy to assess and evaluate and help you make a better purchase decision?
- Do you use your mobile phone to help you purchase premium beef or to contact your (friend/partner etc)?
- Are there other ways that you gather information about premium beef when you need to know something? What are they?

Future collaboration with a remote partner using mobile technology

- Would you like to share the following information with your shopping partner or remote shopping partner while you are in-store to make a decision or for other reasons?

| Intrinsic quality cues | Extrinsic quality cues |
|------------------------|------------------------|
| Cut | Price |
| Muscle color | Country of Origin |
| Marbling | Animal welfare |
| Fat content | Quality labels |
| | Brand name |
| | Place of purchase |
| | Packaging |
| | Expiry date |

- What other information you would like to share with your friends and family? For example, store location, about new product or other shopping related information?
- Why would you want to share the above information with others?
 - Seek opinion/ feedback
 - Confirm purchase
 - Share experience
 - Others
- How would you like to share information with your remote shopping partner using mobile technology?
 - Visual information (picture or video)
 - Textual information (text messages)
 - Anything else?
- Would you use a photo to show your collaborator the physical properties (color, marbling or cut) of the meat?
- Is there anything else you'd like to tell me? (about your collaborative beef purchase)

Appendix B – Online Survey questionnaire

Online survey questionnaire

Demographic Information

Gender

Male ☐ Female ☐ Other ☐

Age

18-23 ☐ 24-29 ☐ 30-35 ☐ 36-40 ☐ 41-45 ☐ 46-50 ☐ 51-55 ☐ 56-60 ☐
61 or above ☐

Education level

Less than high school ☐
High School ☐
Bachelor Degree ☐
Master Degree ☐
Doctoral Degree ☐

Occupation

Student ☐
Employed ☐
Self-employed/Home duty ☐
Unemployed ☐
Retired ☐
Other ☐

Income level (yearly)

Less than \$19,999 ☐
\$20,000 - \$39,999 ☐
\$40,000 - \$59,999 ☐
\$60,000 - \$79,999 ☐
\$80,000 - \$99,999 ☐
≥\$100,000 ☐

Section 1: Use of mobile phone during grocery shopping

This section asks questions related to your mobile phone usage during grocery shopping. Please

1. Do you use a mobile phone?

Yes ☐ No ☐

2. Do you use a smartphone?

Yes ☐ No ☐

3. Do you take your phone with you while grocery shopping?

Yes ☐ No ☐

4. Do you use your mobile device or any other technology while you are grocery shopping?

Yes ☐ No ☐

5. How often do you use your mobile device during grocery shopping?

Please rate by clicking on the check box: 1 never to 5 very often

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

6. Why do you use your mobile device during grocery shopping?

I need more information ☐

Searching for information ☐

Sharing information ☐

Communicating ☐

Other (Please state)

Section 2: Meat shopping

This section asks questions related to your meat purchase. Please answer all questions.

7. What type of meat do you purchase?

Beef ☐ Chicken ☐ Lamb ☐ Pork ☐ Other ☐

8. When you purchase meat what attributes do you look for?

Please select all the attributes that you look for:

| Product Attributes | Beef | Chicken | Lamb | Pork |
|-----------------------|------|---------|------|------|
| Cut | | | | |
| Colour | | | | |
| Marbling | | | | |
| Fat content | | | | |
| Price | | | | |
| Country of origin | | | | |
| Animal welfare | | | | |
| Quality labels | | | | |
| Brand | | | | |
| Place of purchase | | | | |
| Packaging | | | | |
| Expiry date | | | | |
| Nutritional value | | | | |
| Appearance | | | | |
| Others (Please State) | | | | |
| Others (Please State) | | | | |

9 How do you find the information you need?

- Packaging/product label ☐
- Advertisement ☐
- Information display ☐
- Butcher ☐
- Internet ☐
- Visual inspection ☐
- Others (Please State)

10 When you do not understand meat product information what do you do?

- Search the internet ☐
- Talk to the butcher ☐
- Ask friends and family ☐
- Other (Please state)

| Please rate by clicking the check box: 1 disagree to 5 agree | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|
| 11 The information is quickly accessible when needed | | | | | |
| 12 The information is trustworthy | | | | | |
| 13 The information is useful for me | | | | | |
| 14 The information is easy to understand | | | | | |

Section 3: Collaborative Meat shopping

This section asks questions about your meat purchase with others (friends and family members). Please answer all questions.

15 Do you discuss what type of meat to purchase with your friends and family?

Yes ☐ No ☐

16 Do you seek meat-related information from your partner, friends or family during purchase?

If your answer is no skip the next question and go to questions 18.

Yes ☐ No ☐

17 What type of information do you seek from friends and family?

Product information ☐

Shopping location ☐

Cooking information ☐

Others (Please state)

18 If you are shopping alone, do you communicate with your friends, family or partner to help you make purchase decisions?

Please rate by clicking on check box: 1 Never to 5 Always

| | | | | |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Section 4: Use of technology to communicate with shopping partner.

This section asks question about communicating with your friends and family during shopping using

19 Do you use your mobile phone/other technology to communicate with your friends and family?

If your answer is no skip this section and go to next section.

Yes ☐ No ☐

20 Why do you contact friends and family during meat shopping?

Seek information ☐

For feedback/opinion ☐

| | |
|-----------------------|--------------------------|
| Confirmation | <input type="checkbox"/> |
| Share information | <input type="checkbox"/> |
| Others (Please state) | <input type="text"/> |

21 What are your preferred methods of contact with your remote partner using mobile technology during shopping?

| | |
|--|--------------------------|
| SMS | <input type="checkbox"/> |
| MMS | <input type="checkbox"/> |
| Voice call | <input type="checkbox"/> |
| Photo sharing | <input type="checkbox"/> |
| Combination of photo and text | <input type="checkbox"/> |
| Combination of photo and voice call | <input type="checkbox"/> |
| Other communication application (Please state) | <input type="text"/> |

22 What was your experience of using the mobile technology to communicate with your remote shopping partner?

Please rate by clicking check box: 1 Bad to 5 Excellent

| | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|

23 During your last collaborative meat shopping with your remote shopping partner, how did you feel?

| | | | |
|---------------|--------------------------|----------------|--------------------------|
| personal | <input type="checkbox"/> | impersonal | <input type="checkbox"/> |
| warm | <input type="checkbox"/> | cold | <input type="checkbox"/> |
| close | <input type="checkbox"/> | closed | <input type="checkbox"/> |
| humanizing | <input type="checkbox"/> | de-humanised | <input type="checkbox"/> |
| expressive | <input type="checkbox"/> | non-expressive | <input type="checkbox"/> |
| emotional | <input type="checkbox"/> | unemotional | <input type="checkbox"/> |
| was sensitive | <input type="checkbox"/> | insensitive | <input type="checkbox"/> |

Would you please explain why did you choose above option?

24 During your last collaborative meat shopping activity with your remote shopping partner, how was your experience?

| | | | |
|-------------|--------------------------|-------------|--------------------------|
| interesting | <input type="checkbox"/> | boring | <input type="checkbox"/> |
| enjoyable | <input type="checkbox"/> | unenjoyable | <input type="checkbox"/> |
| | <input type="checkbox"/> | | |

exciting ☐
fun ☐
bad ☐

Would you please explain why did you choose above option?

Section 5: Future collaboration with a remote partner using mobile technology during meat shopping.

25 Would you like to share information with your shopping partner or remote shopping partner while you are in-store to make a decision or for other reasons?

Yes ☐ No ☐

26 What kind of activity would you like to do with your friends and family during meat shopping using mobile technology?

Seek opinions/feedback ☐
Confirm purchases ☐
Share experiences ☐
Others (Please State)

27 How would you like to communicate with your remote shopping partner using mobile technology?

Visual information (picture or video) ☐
Textual information (text messages) ☐
Other (Please state)

Appendix C — Ethics approval for quantitative study

Ethics Amendment Approved: H0017697 Human-Computer Interaction to Support Collaborative In-Store Shopping - A case study with Premium Beef Consumers

Social Sciences Ethics <ss.ethics@utas.edu.au>

Thu 11/7/2019 12:28 PM

To: Julian Dermoudy <julian.dermoudy@utas.edu.au>

Cc: Matthew Springer <matthew.springer@utas.edu.au>; Shahan Chowdhury <shahan.chowdhury@utas.edu.au>; Social Sciences Ethics <ss.ethics@utas.edu.au>

Dear Dr Dermoudy

Ethics Ref: H0017697

Title: Human-Computer Interaction to Support Collaborative In-Store Shopping - A case study with Premium Beef Consumers

This email is to confirm that the following amendment was approved by the Chair of the Tasmania Social Sciences Human Research Ethics Committee on 7/11/2019:

Changes of data collection methods

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the National Statement on Ethical Conduct in Human Research (NHMRC 2007, updated May 2015).

Please be reminded that all ethical approvals granted are subject to conditions as required by the National Statement. A copy of the conditions of approval is available at

<http://www.utas.edu.au/research-admin/research-integrity-and-ethics-unit-rieu/human-ethics/human-research-ethics-review-process/managing-your-ethics-approved-projects>

This email constitutes official approval. If your circumstances require a formal letter of amendment approval, please let us know.

If you have any questions, please contact SS.Ethics@utas.edu.au or 03 6226 2975.

--

Executive Officer - Ethics

University of Tasmania Electronic Communications Policy (December, 2014).

This email is confidential, and is for the intended recipient only. Access, disclosure, copying, distribution, or reliance on any of it by anyone outside the intended recipient organisation is prohibited and may be a criminal offence. Please delete if obtained in error and email confirmation to the sender. The views expressed in this email are not necessarily the views of the University of Tasmania, unless clearly intended otherwise.

Appendix D — Email invitation for survey recruitment

Research Participants Needed

Matthew Springer <matthew.springer@utas.edu.au>

Tue 3/10/2020 11:15 AM

To: mits_sem1@leven.cis.utas.edu.au <mits_sem1@leven.cis.utas.edu.au>; bict_sem1@leven.cis.utas.edu.au <bict_sem1@leven.cis.utas.edu.au>; Staff_Leven <staff@leven.comp.utas.edu.au>

Cc: Shahan Chowdhury <shahan.chowdhury@utas.edu.au>

Dear all,

Shahan Chowdhury, a PhD researcher from the University of Tasmania's, ICT discipline is seeking meat consumers (beef, chicken, lamb, pork) who sometimes collaborate while shopping.

We are interested in investigating the ways people currently shop together when they are physically separated. We want to understand how we use technology to make collaborative purchases.

There are lots of benefits that come from collaborating while shopping, including making better product choices and having more fun than shopping solo. But sometimes while strolling the aisles of your local supermarket alone, you need some advice. You might text a partner, look up some information online, or go straight for the supermarket's app. But what is the best way to collaborate while shopping? Is what you're doing now the best option?

Participants in this study will complete an online survey taking up to 15 minutes. Participation in this study is voluntary. This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee: Ethics reference number [H0017697].

Qualified participants must:

- Be 18 years old or above.
- Have some responsibility for grocery shopping.
- Be regular or occasional meat consumers.

For more information on the study, the online consent form and survey questions are available here:

<https://www.surveymonkey.com/r/J2CTTH>

Yours

Dr Matthew Springer

B.Com B.Comp, B.IS (Hons) PhD (Information Systems)

Lecturer and ICT Degree Coordinator (Launceston)

Academic Integrity Advisor

College Inclusion Diversity and Equity Committee Member

Discipline of Information & Communication Technology | School of Technology, Environments & Design

University of Tasmania

Rm. V-111, Newnham Campus

Launceston TAS 7250

Locked Bag 1359

+61 3 6226 8302 | +61 426 855 249

The Ally Network

I believe in an inclusive university culture for people of diverse sexuality and gender identities.



CRICOS 00586B



Appendix E - Intranet advertisement for survey recruitment

12/2/2019

Meat eaters needed for study

You are here: [Staff Intranet](#) > [News and Events](#) > [Meat eaters needed for study](#)

Meat eaters needed for study



Jenni Klaus
Science Engagement Officer

PhD researcher from the University of Tasmania's, ICT discipline is seeking meat consumers (beef, chicken, lamb, pork) who sometimes collaborate while shopping.

The team is interested in investigating the ways people currently shop together when they are physically separated. They want to understand how we use technology to make collaborative purchases.

There are lots of benefits that come from collaborating while shopping, including making better product choices and having more fun than shopping solo. But sometimes while strolling the aisles of your local supermarket alone, you need some advice. You might text a partner, look up some information online, or go straight for the supermarket's app. But what is the best way to collaborate while shopping? Is what you're doing now the best option?

Participants in this study will complete an online survey taking up to 15 minutes. Participation in this study is voluntary. This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee: Ethics reference number [H0017697].

Qualified participants must:

- Be 18 years old or above.
- Have some responsibility for grocery shopping.
- Be regular or occasional meat consumers.

For more information on the study, the online consent form and survey questions are available here: <https://www.surveymonkey.com/r/J2CTTH>

Appendix F — Information sheet for online survey participants



Human-Computer Interaction to Support Collaborative In-Store Shopping – A case study with Premium Beef Consumers

Participant Information Sheet

1. Invitation

Dear Participant,

I am **Shahan Ahmad Chowdhury**. I'm a doctoral student from the University of Tasmania's Discipline of ICT. I am conducting this research study in partial fulfillment of my PhD under the supervision of Dr Julian Dermoudy, and Dr Matthew Springer.

I would like to invite you to take part in this research. The focus of the study is to understand consumers' collaborative shopping practice in the context of meat purchasing. How do consumers collaborate with remote shopping partners from the shop, what is the purpose of doing that, what is the most important information they share, and what is the impact of mobile technology on this collaborative task?

This research is a part of the *Pathways to Market* project, which is funded jointly by the Australian Research Council, the University of Tasmania, and industry participants.

2. What is the purpose of this study?

The aim of this study is to understand meat (beef, chicken, lamb, pork) consumers' uses of technology and needs and their preferences of technology to obtain product information.

3. Why have you been invited to participate?

You have been identified as a potential participant in this study because you are a grocery shopper and a meat consumer.

Participation in this study is voluntary. If you decide not to participate, it will not affect any relationship you may have with the University of Tasmania.

You have the right to withdraw from the study at any time without giving any reason.

4. What will you be asked to do?

You will be asked to answer a series of survey questions about your meat purchase and whether you collaborate with your friends or family who are not present at the point of purchase with you to make decisions. You will be asked how you collaborate and the role of mobile technology and your preferences for using mobile technology to contact your remote shopping partner?

The study is divided into two parts. In the first part you will be asked to provide demographic information such as, age, education, yearly income. In the second part you will be answering survey questions.. Your response will be stored in online survey database.

The study is estimated to take approximately 15 minutes to complete.

5. Are there any possible benefits from participation in this study?

There are no direct benefits from this study.

Your response will also be used to understand consumers' collaborative purchase and needs and preference of technology to do collaborative purchasing, which will help design better technology for the meat consumer in the future.

There is no possible risk associated with the study. However, if you feel uncomfortable answering any question, you may choose to stop anytime.

6. What if I change my mind during or after the study?

You are free to withdraw from the study anytime without giving any explanation.

Incomplete responses will be destroyed, if participants wish to withdraw. Participants are unable to withdraw from the study once the data has been analysed and published.

7. What will happen to the information when this study is over?

Raw data will be kept for a period of five years after the first publication to allow others to repeat the study, or to re-analyze the data if any challenges occur. At the end of that time period the data will be destroyed and disposed of.

8. How will the results of the study be published?

The result of this study will be published in journal/conference proceedings and in a PhD thesis. If you wish to enquire about the result in the future you may contact the investigator through email.

All participants will be unidentifiable in the publication.

9. What if I have questions about this study?

If you have any further questions regarding this study please contact the investigator:

Name: Mr. Shahan Ahmad Chowdhury

Email: Shahan.Chowdhury@utas.edu.au

Phone: 03 6324 3599

Thank you for your participation.

"This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Ethics reference number [H0017697]."

Appendix G — Ethics approval for qualitative study

Social Science Ethics Executive Officer
Private Bag 01 Hobart
Tasmania 7001 Australia
Tel: (03) 6226 6254
Fax: (03) 6226 7148
ss.ethics@utas.edu.au



HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

22 October 2018

Dr Winyu Chinthammit
Information and Communication Technology
Private Bag 1359

Dear Dr Chinthammit

Re: MINIMAL RISK ETHICS APPLICATION APPROVAL
Ethics Ref: H0017697 - Human-Computer Interaction to Support Collaborative In-Store
Shopping - A case study with Premium Beef Consumers

We are pleased to advise that acting on a mandate from the Tasmania Social Sciences HREC, the Chair of the committee considered and approved the above project on 22 October 2018.

This approval constitutes ethical clearance by the Tasmania Social Sciences Human Research Ethics Committee. The decision and authority to commence the associated research may be dependent on factors beyond the remit of the ethics review process. For example, your research may need ethics clearance from other organisations or review by your research governance coordinator or Head of Department. It is your responsibility to find out if the approval of other bodies or authorities is required. It is recommended that the proposed research should not commence until you have satisfied these requirements.

Please note that this approval is for four years and is conditional upon receipt of an annual Progress Report. Ethics approval for this project will lapse if a Progress Report is not submitted.

The following conditions apply to this approval. Failure to abide by these conditions may result in suspension or discontinuation of approval.

1. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval, to ensure the project is conducted as approved by the Ethics Committee, and to notify the Committee if any investigators are added to, or cease involvement with, the project.

A PARTNERSHIP PROGRAM IN CONJUNCTION WITH THE DEPARTMENT OF HEALTH AND HUMAN SERVICES

2. Complaints: If any complaints are received or ethical issues arise during the course of the project, investigators should advise the Executive Officer of the Ethics Committee on 03 6226 6254 or human.ethics@utas.edu.au.
3. Incidents or adverse effects: Investigators should notify the Ethics Committee immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
4. Amendments to Project: Modifications to the project must not proceed until approval is obtained from the Ethics Committee. Please submit an Amendment Form (available on our website) to notify the Ethics Committee of the proposed modifications.
5. Annual Report: Continued approval for this project is dependent on the submission of a Progress Report by the anniversary date of your approval. You will be sent a courtesy reminder closer to this date. **Failure to submit a Progress Report will mean that ethics approval for this project will lapse.**
6. Final Report: A Final Report and a copy of any published material arising from the project, either in full or abstract, must be provided at the end of the project.

Yours sincerely

Jude Vienna-Hallam
Executive Officer
Tasmania Social Sciences HREC

Ethics approval (amended) for qualitative study

Ethics Amendment Approved: H0017697 Human-Computer Interaction to Support Collaborative In-Store Sho

SS.Ethics@utas.edu.au <SS.Ethics@utas.edu.au>

Thu 3/28/2019 8:06 AM

To: Julian Dermoudy <julian.dermoudy@utas.edu.au>

Cc: Matthew Springer <matthew.springer@utas.edu.au>; Shahan Chowdhury <sa.chowdhury@utas.edu.au>

Dear Dr Dermoudy

Ethics Ref: H0017697

Title: Human-Computer Interaction to Support Collaborative In-Store Shopping - A case study with Premium Beef Consumers

This email is to confirm that the following amendment was approved by the Chair of the Tasmania Social Sciences Human Research Ethics Committee on 26/3/2019:

Prize draw for participants

New primary supervisor - Julian Dermoudy

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the National Statement on Ethical Conduct in Human Research (NHMRC 2007, updated May 2015).

Please be reminded that all ethical approvals granted are subject to conditions as required by the National Statement. A copy of the conditions of approval is available at <http://www.utas.edu.au/research-admin/research-integrity-and-ethics-unit-rieu/human-ethics/human-research-ethics-review-process/managing-your-ethics-approved-projects>

This email constitutes official approval. If your circumstances require a formal letter of amendment approval, please let us know.

If you have any questions, please contact SS.Ethics@utas.edu.au or 03 6226 6254.


Kind regards

Jude

Jude Vienna-Hallam
Executive Officer
Office of Research Services
University of Tasmania
Private Bag 01
Hobart TAS 7001
Phone: (03) 6226 6254
Fax: (03) 6226 2765
Email: SS.Ethics@utas.edu.au
Web: <http://www.utas.edu.au/research-admin>

Appendix H – Advertisement for interview

Social media post



[REDACTED]

was 🧑 looking for volunteers.

December 10, 2018 · 🌐 ▼

...


Interview Participants Wanted

- Looking for interview participants who have some responsibility for grocery shopping.
- They should be regular or occasional premium beef consumers.
- Participation is voluntary, and the interview will take about 30 minutes.
- This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee: Ethics reference number [H0017697].

The focus of this study is to understand consumers' collaborative shopping practices in the context of premium beef purchasing. We are interested in learning more about when people are shopping in-store and contact someone outside the store for advice, the sorts of information that is shared and the role of mobile technology in this collaboration.

If you or anyone you know are interested in participating, please send me a private message or comment down below.

Thank you.

 12

13 Comments 5 Shares

Intranet post

You are here: [Staff Intranet](#) > [News and Events](#) > [Beef eaters wanted for study](#)



Beef eaters wanted for study

University of Tasmania PhD Candidate Shahan Ahmad Chowdhury is seeking consumers of premium beef who sometimes collaborate while shopping.

Collaboration is a popular research theme in the ICT sector and with the Pathways to Market research group, Chowdhury has focused his area of investigation on premium beef.

There are lots of benefits that come from collaborating while shopping, including making better product choices and having more fun than shopping solo. But sometimes while strolling the aisles of your local supermarket alone, you need some advice. You might text a partner, look up some information online, or go straight for the supermarket's app. But what is the best way to collaborate while shopping? Is what you're doing now the best option?

Chowdhury is interested in investigating the ways people currently shop together when distance is a factor in order to improve how we use technology to make collaborative purchases in the future.

Participants in this study will be interviewed for up to 30 minutes. This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee: Ethics reference number [H0017697]. Participation is voluntary.

There is more information about this study available here: [Information sheet](#)

If you are interested in participating, please email Shahan.Chowdhury@utas.edu.au

Was this page helpful?

About this page



Page owner: Jenni Klaus

Last updated: 5 Feb 2019

Useful links

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[University Library](#)

[Campus information](#)

[Students homepage](#)

[University courses](#)

[Our values](#)



PhD researcher from University of Tasmania, Discipline of ICT is seeking consumers of premium beef who sometimes collaborate while shopping. We are interested in investigating the ways people currently shop together when distance is a factor in order to improve how we use technology to make collaborative purchases in the future. Focus of the study is premium beef context.

Qualified participant must:

- Be 18 years old or above.
- Have some responsibility for grocery shopping.
- Be regular or occasional premium beef consumers.

Study:

Participants in this study will be interviewed for up to 30 minutes. Participants will receive a \$10 gift voucher as a token of appreciation upon completing the study.

If you are interested in taking part in the study, please contact:

Shahan.chowdhury@utas.edu.au

This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee: Ethics reference number [H0017697].



**Information and
Communication
Technology**

Appendix I – Qualitative study information sheet

Information sheet 1st version



**College of Sciences
and Engineering**

Human-Computer Interaction to Support Collaborative In-Store Shopping– A case study with Premium Beef Consumers

Participant information sheet

1. Invitation

Dear Participant,

I am **Shahan Ahmad Chowdhury** doctoral student from University of Tasmania, Discipline of ICT, School of Technology, Environments and Design, College of Sciences and Engineering. I am conducting this research study in partial fulfillment of my PhD under the supervision of **Dr Julian Dermoudy** and **Dr Matthew Springer**.

I would like to invite you to take a part in this interview. The focus of this study is to understand consumers' collaborative shopping practice in the context, of premium beef purchasing. How consumers collaborate with remote shopping partners from the shop, what is the purpose of doing that and what is the most important information they share and the impact of mobile technology on collaborative task.

This research is a part of Pathways to Market project, funded jointly by the Australian Research Council, the University of Tasmania and industry participants.

2. What is the purpose of this study?

The aim of this study is to understand premium beef consumers' uses of technology and needs and preferences of technology to obtain product information.

3. Why have I been invited to participate?

You have been identified as a potential participant in this study because you are primary or shared grocery shopper and premium beef consumer.

Participation in this study is voluntary. If you decide not to participate, it will not affect your relationship with the University of Tasmania.

You have right to withdraw from the study anytime without giving any reason.

4. What will I be asked to do?

You will be asked to answer a series of interview questions about your premium beef purchase and if and when you collaborate with your friends or family who are not present at the point of purchase with you to make decisions. How do you collaborate and the role of mobile

technology and your preferences for using mobile technology to contact your remote shopping partner?

The study is divided into two parts. In the first part you will be asked to provide demographic information such as, age, education, yearly income. In the second part you will be answering interview questions. Your response will be audio recorded for analysis.

The study is estimated to take approximately 30-45 minutes to complete.

5. Are there any possible benefits from participation in this study?

Participants have no direct benefits by being involved in this study. However, their responses will be used to understand consumers' collaborative purchase and needs and preference of technology to do collaborative purchasing, which will help design better technology for the premium beef consumer in the future.

Participation in this study is completely voluntarily. Participants will not receive any form of financial benefits.

6. Are there any possible risks from participation in this study?

There is no possible risk associated with the study. However, if you feel uncomfortable answering any question, you may choose to stop anytime.

7. What if I change my mind during or after the study?

You are free to withdraw from the study anytime without giving any explanation.

Incomplete responses will be destroyed, if participants wish to withdraw from the study anytime.

Participants are unable to withdraw from the study once data is analysed and publish.

8. What will happen to the information when this study is over?

Raw data will be kept for a period of five years after the first publication to allow others to repeat the study, or to re-analyze the data if any challenges occur. At the end of the time period data will be destroyed and disposed.

9. How will the results of the study be published?

The result of this study will be published in journal/ conference proceedings and in a PhD thesis. If you wish to enquire about the result in the future you may contact the investigator through email.

All participants will be unidentifiable in the publication.

10. What if I have questions about this study?

If you have any further question regarding this study please contact the investigator:

Name: Mr. Shahan Ahmad Chowdhury or Dr. Matthew Springer

Email: Shahan.Chowdhury@utas.edu.au or matthew.springer@utas.edu.au



UNIVERSITY of
TASMANIA

***College of Sciences
and Engineering***

Phone: 03 6324 3599

"This study has been approved by the Tasmanian Social Sciences Human Research Ethics Committee. If you have concerns or complaints about the conduct of this study, please contact the Executive Officer of the HREC (Tasmania) Network on +61 3 6226 6254 or email human.ethics@utas.edu.au. The Executive Officer is the person nominated to receive complaints from research participants. Ethics reference number [H0017697]."

Human-Computer Interaction to Support Collaborative In-Store Shopping – A case study with Premium Beef Consumers

Participant Information Sheet

1. Invitation

Dear Participant,

I am **Shahan Ahmad Chowdhury**. I'm a doctoral student from the University of Tasmania's Discipline of ICT. I am conducting this research study in partial fulfillment of my PhD under the supervision of Dr Julian Dermoudy, and Dr Matthew Springer.

I would like to invite you to take part in this research. The focus of the study is to understand consumers' collaborative shopping practice in the context of premium beef purchasing. How do consumers collaborate with remote shopping partners from the shop, what is the purpose of doing that, what is the most important information they share, and what is the impact of mobile technology on this collaborative task?

This research is a part of the *Pathways to Market* project, which is funded jointly by the Australian Research Council, the University of Tasmania, and industry participants.

2. What is the purpose of this study?

The aim of this study is to understand premium beef consumers' uses of technology and needs and their preferences of technology to obtain product information.

3. Why have you been invited to participate?

You have been identified as a potential participant in this study because you are a grocery shopper at a premium beef outlet.

Participation in this study is voluntary. If you decide not to participate, it will not affect any relationship you may have with the University of Tasmania.

You will be given \$10 gift voucher as a token of appreciation for your time involved in the study.

You have the right to withdraw from the study at any time without giving any reason.

4. What will you be asked to do?

You will be asked to answer a series of interview questions about your premium beef purchase and whether you collaborate with your friends or family who are not present at the point of purchase with you to make decisions. You will be asked how you collaborate and the role of mobile technology and your preferences for using mobile technology to contact your remote shopping partner?

Appendix J – Qualitative study consent form

Consent form 1st version



**College of Sciences
and Engineering**

Human-Computer Interaction to Support Collaborative In-Store Shopping– A case study with Premium Beef Consumers

Participant Consent Form

1. I agree to take part in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves answering questions about my collaborative food shopping specifically premium beef product purchase and use of mobile technology to do collaboration. The whole study will take approximately 30-45 minutes.
5. I understand that interview session will be audio recorded.
6. I understand that participation involves no foreseeable risk(s).
7. I understand that all research data will be securely stored on the University of Tasmania premises for five years from the publication of the study results and will then be destroyed.
8. Any questions that I have asked to have been answered to my satisfaction.
9. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
10. I understand that the results of the study will be published so that I cannot be identified as a participant.
11. I understand that my participation is voluntary and that I may withdraw at any time without any effect. However, once data is analysed and publish I cannot withdraw from the study.
12. I would like to take part in follow up study ☐

Participant's name: _____

Participant's signature: _____

Date: _____



UNIVERSITY of
TASMANIA

**College of Sciences
and Engineering**

Statement by Investigator

☐

I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

If the Investigator has not had an opportunity to talk to participants prior to them participating, the following must be ticked.

☐

The participant has received the Information Sheet where my details have been provided so participants have had the opportunity to contact me prior to consenting to participate in this project.

Investigator's name: _____

Investigator's signature: _____

Date: _____



Human-Computer Interaction to Support Collaborative In- Store Shopping – A case study with Premium Beef Consumers

Participant Consent Form

1. I agree to take part in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves answering questions about my collaborative food shopping specifically premium beef product purchase and use of mobile technology to do collaboration. The whole study will take approximately 30-45 minutes.
5. I understand that interview session will be audio recorded.
6. I understand that participation involves no foreseeable risk(s).
7. I understand that all research data will be securely stored on the University of Tasmania premises for five years from the publication of the study results and will then be destroyed.
8. Any questions that I have asked to have been answered to my satisfaction.
9. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
10. I understand that the results of the study will be published so that I cannot be identified as a participant.
11. I understand that my participation is voluntary and that I may withdraw at any time without any effect. However, once data is analysed and publish I cannot withdraw from the study.
12. I accept 10\$ gift voucher as token of appreciations ☐
13. I would like to take part in any follow up study ☐

Participant's name: _____

Participant's signature: _____

Date: _____



Statement by Investigator

☐

I have explained the project and the implications of participation in it to this volunteer and I believe that the consent is informed and that he/she understands the implications of participation.

If the Investigator has not had an opportunity to talk to participants prior to them participating, the following must be ticked.

☐

The participant has received the Information Sheet where my details have been provided so participants have had the opportunity to contact me prior to consenting to participate in this project.

Investigator's name: _____

Investigator's signature: _____

Date: _____

Appendix K – Quantitative study consent form

Human-Computer Interaction to Support Collaborative In-Store Meat Shopping

Participant Consent Form

1. I agree to take part in the research study named above.
2. I have read and understood the Information Sheet for this study.
3. The nature and possible effects of the study have been explained to me.
4. I understand that the study involves answering questions about my collaborative food shopping specifically meat product purchase and use of mobile technology to do collaboration. The whole study will take approximately 15 minutes.
5. I understand that survey response will be stored in online database.
6. I understand that participation involves no foreseeable risk(s).
7. I understand that all research data will be securely stored on the University of Tasmania premises for five years from the publication of the study results and will then be destroyed.
8. I understand this is an online survey .
9. I understand that the researcher(s) will maintain confidentiality and that any information I supply to the researcher(s) will be used only for the purposes of the research.
10. I understand that the results of the study will be published so that I cannot be identified as a participant.
11. I understand that my participation is voluntary and that I may withdraw at any time without any

effect. However, once data is analysed and published I cannot withdraw from the study.


* 1. I agree to take part in this study.

☐ Yes

☐ No

Prev

Next

Powered by
 **SurveyMonkey**
See how easy it is to [create a survey](#).