Assessing the Impact of Food Safety Requirements on the Performance of Canadian Agri-Food Exporters

by

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ABSTRACT

ASSESSING THE IMPACT OF FOOD SAFETY REQUIREMENTS ON THE PERFORMANCE OF CANADIAN AGRI-FOOD EXPORTERS

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This thesis assesses the impact of food safety requirements on the performance of Canadian agri-food exporters. Drawing from the resource-based theory of the firm, the first model focuses on the determinants of food safety challenges, and the second model measures the impact of food safety challenges on the export performance of firms using two indicators; sales growth and number of export markets. The probit results show that food safety challenges matter, and they are one of the key drivers of export performance for Canadian agri-food exporting firms; though the impact of food safety challenges on export sales growth is bigger than the number of export markets. The OLS regression results show that food safety challenges are influenced by prior investments in the internal food safety resources as well as the implemented food safety systems within the firm.
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Chapter 1: Introduction

1.1: Background

The increased globalization of food supply has provided for consumers a wide choice of food products, and the expectation of consumers is that these food products are safe, nutritious, and of desirable qualities. However, global food supply has also brought changes to the landscape of food safety risks among countries and for that matter, what consumers have to deal with.

In light of an increasingly interdependent world and accelerated global food system, changes in food consumption pattern, advances in scientific and technological development and response to consumer concerns, there has been a drastic change in regulatory food systems away from a largely domestic focus to a one centered on international dimensions. A wide range of safety control systems have evolved for food products. These are mainly driven from two sides; public regulations and private regulations. The predominant focus on food safety control is on public regulation (Henson and Hooker, 2001, Henson and Caswell, 1999; Henson and Humphrey, 2010), and this is promulgated through direct regulation and product liability standards (see for example Buzby et al., 2001; Henson and Caswell, 1999). However, presently, agri-food systems are increasingly permeated and overlaid by a plethora of private food safety standards, which operate alongside public regulatory systems. Although not legally binding in a regulatory sense, can be de facto mandatory for suppliers (Henson and Northern, 1998; Henson and Reardon, 2005). These private standards come as self-regulations and response to third-party certification (Henson and Reardon, 2005). Thus, both public/governmental regulations and private standards are growing faster and increasingly becoming challenging.

The changing phase and diversity of food safety requirements across countries raises concern about the impact of these requirements on trade, as the scale of agri-food trade increases. Compliance to these requirements make it more challenging in the context of trade because by

1 Direct regulation is in the form of standards, inspection, product testing, and other programs that attempts to ensure the quality of a product by specifying how it is produced and/or its final quality.

2 Product liability on the other hand is an ex post regulation that punishes companies that produce products of insufficient quality through damage awards to those harmed by their actions.

3 Self-regulation includes internal control systems that assure product quality, where the company sets, monitors, and self-certifies the control parameters. It can take place at the level of the individual firm or be instituted by trade organizations that cover the predominance of market supply.

4 Certification involves the setting of product quality standards and their monitoring and certification by parties outside the firm, for example customers, industry trade associations, or bodies such as the International Organization for Standardizations (ISO).
nature, food safety requirements are different across countries. According to Mitchell (2003), and Henson and Humphrey (2010), these regulations are implemented through either one and/or all of the following: (a) Product standards (such as product testing, inspection, Maximum Residue Levels (MRLs), etc.); (b) Process standards (e.g., food packaging procedure, heating meat to a required temperature before packaging, etc.); (c) System and management-based requirements (e.g., HACCP, etc.); and (d) Outcome-based regulations (e.g., GAP, GMT). Product and process regulations assess specifically the ingredients of the end product, and the method by which the end product is produced respectively, while the system- and outcome-based regulations are lax regulations but with the ultimate goal that the end product is safe for consumption. For instance, while both product and process standards may result in similar production techniques, the fact that the requirements are different might result in one country’s exclusion of another country’s products, or even mutual product exclusion (Mitchell, 2003). A typical example is between the United States (US) and European Union (EU) as they have different mandated standards for their meat producers; US requires producers to adhere to HACCP plans, and the government inspects the final product (FSIS, 1998), while the EU also uses HACCP plans but has very specific practices such as meat producers checking pig hearts for disease and mandating that meat casings be purchased from EU-approved firms (Caswell and Hooker, 1996). Thus, the complexity results from the fact that, one country or region might use a process standard, while another uses a product standard. Also, countries might have different process standards based on a country’s risk tolerance level (Mitchell, 2003).

Most prior analysis of food safety requirements and trade has focused on bilateral trade and especially public regulations (Henson and Jaffee, 2008; Orden, 2010). These analyses suggest that food safety requirements do impede trade. For instance, in the search for a consistent set of data to facilitate analyses across markets and over time, attention has been given to border rejections of agri-food products in major industrialized country markets (UNIDO, 2010). Given these records relate to specific and actual instances of non-conformity with regulatory requirements that result in a product consignment being refused entry, intuitively they can be used to identify patterns of compliance problems. For example, Buzby, Unnevehr and Roberts (2008) analyzed FDA administrative data on the agency’s refusals of import shipments from 1998-2004 by food industry group and violation type. The study found that 65 percent of the
violations were adulteration\(^5\), 33 percent were for misbranding, and 2 percent were for other violations, with majority of violations among vegetables and vegetable products; fruit and fruit products; and fish and seafood products. Similarly, report by Baylis et al., 2011 show that stricter food safety standards ended in food refusal into the EU market, though it resulted in major deflection to other markets. Efforts have been made at both the bilateral (for example within NAFTA), and multilateral (notably within the World Trade Organization and Codex Alimentarius) levels to alley the scope for food safety regulations to impede trade. This is critically necessary to prevent governments from resorting to food safety regulations as a protectionist device. However, evidence is still that trade is impeded due to associated costs of compliance.

Despite the efforts from bilateral analyses on the impact of food safety requirements on trade, it fails to answer the question of why food safety requirements impede trade and how this varies across firms. If we want to define solutions, then, there is need to examine the compliance challenges at the firm level and how they vary across firms. This helps to focus on the nature and scale of challenges firm face complying with food safety requirement, due to their scale of investments, organizational changes, and various cost instruments. This makes this analysis important for many reasons.

Firstly, firms are the primary agents that perpetuate export activities for every export-oriented economy, thereby taking the risk involved in exports. Thus, they are directly influenced by both domestic and international food safety requirements. Secondly, the impact of food safety regulations affects the degree of a firm’s export competitiveness among other competing firms. In the quest to respond to the necessary changes and innovations in food control systems, firms bear extra cost (both tangible and intangible\(^6\)) as they implement various regulations directed at product and/or process efficient ways. This innovational production cost, coupled with their transaction cost in relation to their sales revenue, determines whether firms will have competitive edge over others or not. Another important reference is that as consumers demand higher standards of food safety, it beholds firms to supply these safer foods but at a price equivalent to the cost of supply, and this serves as an incentive for these firms (Holleran et al., 1999). This

\(^5\) As defined in the Food, Drug, and Cosmetic Act, adulteration implicates the content of a product, such as the addition of a substance that makes it inferior, impure, or not genuine (FDA, 1999)

\(^6\) Tangible costs of acquiring the new technology, and intangible costs such as the unfamiliarity with the new technology, disruption for existing arrangements, and training the workforce, etc. (Masakure et al., 2009).
adds to the individual firm’s profitability, which eventually aggregates to affect the exporting
countries’ economic viability. Lastly, results from this type of analysis allow for both public and
private initiatives, which are appropriate and needful to help alleviate the problems these firms
encounter in the advent of their export operations.

This study particularly seeks to answer the following questions: How do food safety
requirements and standards impact on firm’s export performance? and what factors drive the
impact of food safety requirements on firm’s export performance?

1.2: Economic Problem
Ultimately, the economic rationale of various food safety regulation and standards is to provide
public goods (for example, in the form of controls on potentially hazardous practices in food
production), and as a means to reduce the transaction and health costs associated with
information asymmetries between buyers and sellers (for example, the presence of hazards that
have credence attributes such as pesticide residues) (Josling et al., 2004). Invariably, the
stringency of these regulations and the need for firms to implement, increase the cost they bear
(e.g., short-run cost due to increase in labour and capital, re-designing of products and/or
certification procedures). More so, these costs vary across firms according to the markets they
serve and the resources they possess or can access. Therefore, beyond these costs that ultimately
lead to aggregate trade effects, absolute bans can occur where serious falter to these regulations
occur. Overall, these costs which differ in scope can eventually enhance as well as reduce its
overall competitiveness.

The fact that food safety requirements in context of trade impose costs on firms and the
scale of these costs reflects the challenges they face in complying. Thus, need to understand the
scale and nature of these compliance challenges in order to identify ways in which to effectively
reduce trade effects of food safety regulations and also define ways in which to assist firms in
complying as part of efforts to enhance their trade performance.

1.3: Economic Research Problem
Whilst the general literature suggests that compliance with food safety requirements is an issue
for agri-food exports from Canada, mainly, with reference to the observed impact (for border
rejection data) at the country level (see for example, Henson and Mendoza, 2013), the literature
has largely ignored the impacts of food safety requirements in context of trade at firm level.
Most analysis at bilateral level and by implication, focused on public regulations whilst largely ignoring private standards. Thus, efforts to assist exporters are very much designed and implemented without covering the full impact of these regulations. Indeed, this bilateral analyses suggest that compliance to these regulations is a challenge due to the fact that the aggregate impact at the country level is interlinked with the impact at the firm level, because the firm serves as the basic unit for national export performance. However, there is a paucity of research and available literature (see for example Campbell and Gossette, 1994) focusing on firm level analysis, specifically, the impact of food safety regulations and standards on Canadian firm export performance.

A few studies (see Chen et al. (2006), Wilson and Otsuki (2003), and Masakure et al. (2009) have contributed to literature on the impact of various standards and technical regulations on firm export performance. For instance, Chen et al. (2006), quantifies the impact of standards and technical regulations on firms export intensity and market diversification. They report that there is statistical evidence that various food safety standards impact firms export intensity, and diversification while testing procedures significantly impact firm’s market diversification ability. Wilson and Otsuki (2003) report that there is an inverse relationship between firm export performance and compliance to safety and technical standards. According to Masakure et al.’s (2009) study, a lax in food safety standard certifications and procedures among agri-food exporting firms impact their export performance and partly puts their agri-food products at lower value markets. The literature is limited in scope and specifically do not address specific issues as relates to Canada as an exporting country even though they point out the fact that regulations has impact on firm’s export performance.

Information on the impact of regulations is essential for the viability of firm’s export activities, as they are weighed on the premise of their resource accessibility and export capabilities. Additionally, since resources are scarce to the firm and must be used in the most effective and efficient ways, analyzing the compliance challenges in relation to export markets will help identify key factors influencing the impact of food safety requirements on exporters, thus complementing and enhancing the efforts of industry organizations as well as policy makers to prioritize compliance issues in relation to their allocations of effort and resources. These findings will lead to a number of implications. Firstly, it will provide insight on the factors that drive the food safety challenges and its impact on firms’ export performance; thus guide policy
makers and sector organizations to formulate effective strategies to address these challenges. Secondly, it will also serve as a reference of analysis for agri-food exporters within and beyond Canada, as well as guide the design and implementation of supportive programs that have the potential to promote the efforts and activities of agri-food exports.

Therefore, this study fills the knowledge gap by assessing the impact of food safety requirements on the performance of Canadian agri-food exporters. Specifically, to identify the factors that determine the food safety challenges firms face in their export markets, and to estimate the effect of food safety requirements on firm’s export performance.

1.4: Organization of Study
Following the introduction, Chapters 2 and 3 review key literatures on food safety and trade effects as well as the measurement and determinants of export performance respectively. This is followed with Chapter 4, which discusses the conceptual framework; Chapter 5 explains the empirical framework used for the study, and Chapter 6 presents the results and discussions of the study. The thesis ends with Chapter 7, the overall summary and conclusion.
Chapter 2: Food Safety and International Trade

2.1: Introduction

While there has been significant decline in explicit trade barriers such as tariffs and quotas over the past decades (Pinho and Martins, 2010; Josling, 2008), technical regulations and particularly, food safety regulations and standards are increasingly mentioned as determining factors impacting the propensity and intensity of export (Chen et al., 2006; Grant and Anders; 2010; Pinho and Martins, 2010); therefore, food safety issues have received much attention and importance in the arena of international food trade. Specifically, the proliferation and evolution of food safety standards in industrialized countries has evolved prominently in the academic literature (Henson and Caswell, 1999; Garcia-Martinez et al, 2005; World Bank, 2005; Henson and Humphreys, 2010; Masakure et al., 2011) for its potential and apparent impact on public health, consumer satisfaction and overall influence in the trade of agricultural and food products.

This chapter is divided into six sections with the aim to provide an overview of food safety regulations and standards, its impact and institutional governance. Specifically, the second section explains the nature of food safety hazards and the need for food safety regulations, while the third elaborates on food safety regulations and private standards, and how it is changing over time. This is followed with a discussion on the food safety in the context of trade agreements and international regulations of food safety regulations and standards. The fifth section highlights the impact of food safety regulations and standards on exports, and finally, concludes with a summary.

2.2: Nature of food safety hazards and demand for food safety regulations

Over the last decade, international trade in high-value food products has expanded following the changes in consumer tastes and advances in production, transport, and other supply-chain technologies. The increase in food consumption due to changes in the trend of consumer demand as well as commercial developments have generated new opportunities for the competitive supply of these high-value foods in both developed and developing countries. This fosters high importation of food products in order to meet demand, but this does not exempt the concerns on how to achieve food safety for consumers. Food safety concerns become central in food importation, because it potentially increases the risk of food-borne hazards (see for example Calvin, 2003; Calvin et al, 2002). In this context, “food safety” refers to the attributes of food
that have potential effects on human health, while all other product attributes are taken to fall under the umbrella of “food quality”; such that food safety attributes can be considered a subset of food quality attributes, and to some extent, there may be an increasing blurred distinction between the two (Henson, 2008).

These food safety risks embrace everything as they pertain to human health, covering well-established and perceived impacts from agents and sources including: (1) Microbial pathogens (i.e., illness-causing bacteria, viruses, parasites, fungi, and their toxins); (2) residues from pesticides, food additives, livestock drugs, and growth hormones; (3) environmental toxins such as heavy metals (e.g., lead and mercury); (4) persistent organic pollutants (e.g., dioxin); (5) unconventional agents such as prions associated with bovine spongiform encephalopathy (BSE) or “mad cow disease” in cattle; (6) zoonotic diseases that can be transmitted through food from animals to humans (e.g., tuberculosis); and (7) foods produced or processed with practices perceived to involve risks, such as irradiation (Buzby and Unnevehr, 2003; Josling et al., 2004). The potential and validated ways that raise concerns about the nature and incidence of these food safety hazards are the changes that occur along value food chains (Josling et al., 2004). A variety of organisms, contaminants, and chemicals enter the food supply chain at various stages; from the feeding of animals and control of plant pests on the farm, to processing and packing of products for sale in commercial facilities. This risk incidents are even much aggravating as it is often difficult to trace back. Hence the length, production scale and production methods matter a lot in relation to incidence of food safety risks, and thus, inspires the need for requisite regulations to ensure that consumers have safe and reliable food supply.

Even though scientists generally agree that food safety risks are low relative to many human health risk such as cancer, and heart diseases (Mead et al., 1999), there is evidence that food safety risk hazards have devastating impact in the acute and long-health consequences on consumers (Lindsay, 1997; World Bank, 2005). For instance, Mead et al. (1999) and Roberts (2011), explain that among food safety hazards, human health risks is highest from foodborne pathogens such as Campylobacter and Salmonella, each of which, for example causes well over a million illnesses annually in the United States. Unfortunately, consumers cannot always judge or observe the level of pesticide residues a particular food product contains at the point of

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7 Trace back is the ability to track food from the consumer point of purchase to the grower (Calvin, 2003).
purchase or prior to consumption. Uncontrollably, these pathogens and contaminants are common worldwide.

Undoubtedly, the change in food consumption patterns as a response to consumer demand is the first reference to the increased attention to food safety regulations and standards. The evidence of increased scientific knowledge on unsafe food and the health consequences on consumers, as well as the lack of complete information available to consumers makes it necessary to have governmental regulations and private standards. For instance, when consumers eat unsafe food and/or not demand as much food safety as would be socially preferable, they do not only impose private cost on themselves but also create social cost which reflects in the additional resources allocated to medical care, committed resources to trace the source of outbreak, and loss of workdays (Buzby, 2002; Segerson, 1999; Golan et al., 2000). Thus, health care resources, employers, and other sectors of the economy share the cost of inadequate food safety with the original consumer of the unsafe food. Further, according to Mitchell (2003), producers will ideally provide food safety to meet the point that reflects consumer demand for food safety, and not the demand of the rest of society, as consumers’ willingness to pay determines the price that the producer receive. Again, because of the difficulty on the part of consumers to trace back which food product potentially served as a hazard to their health, it makes room for cheating on the part of suppliers; thus drives the need for requisite regulations and standards to avert such practices. These regulations and standards are also justified even under normal liability circumstances.

Additionally, Mitchell (2003) posits that food safety concerns to consumers increase with growing income. This is because consumers value knowing that their food is free of toxins, foreign materials, and pathogens, hence be willing to pay the premium for such food safety levels. For instance, Hayes et al. (1995) found that U.S. consumers were willing to pay a premium of 15 to 30 percent per meal to reduce the risk of becoming ill from the food they buy to eat, while a number of studies cited by Baker (1999) found that consumers are willing to pay a premium for reduced pesticide in produce. Similarly, Huang et al.’s studies (2000; 1999) show that the premium that consumers are willing to pay for foods with low pesticide residues

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8 When an economic agent does not know which of several possible outcomes (safe food, unsafe food) will result from a transaction, economists say the market is characterized by imperfect information. When one party to a transaction does not know as much about the good being exchanged as the other does (for example, a consumer does not directly observe how meat is handled), economists say the market is characterized by asymmetric information)
increases with income. Likewise, other surveys indicate that consumers with high interest in food safety are willing to pay more for food with lower risk of disease. However, this may be different in the real market settings (Caswell, 1998). Indeed, with prevailing modern food processing facilities, refrigerated transport as well as increasing research on temperatures, pathogens, and toxins, all in the effort to improve food safety, consumers are more likely to hold producers to a high standards in food safety.

Again, a major driver of increasing demand for regulations is the need to meet the increasing pace in international agri-food trade. In order to provide the socially desirable level of food safety, governments and private sector organizations have the responsibility to implement regulations and standards that address the various food safety and health risks that may evolve. Therefore, regulatory control reforms in response to consumer concerns to food safety, scientific developments regarding the risks associated with food, and concerns over the economic cost associated with food-borne hazards validate the proliferation and evolution of food safety standards in industrialized countries, which is now prevalent in developing countries (Henson and Reardon, 2005). Thus, in both private and public sectors alike, Sanitary and Phytosanitary Standards (SPS) continue to evolve internationally, nationally, and within individual supply chains to address food safety risk.

2.3: Food Safety Regulations and Private Standards

Following the advances in science, changes in markets, and increased consumer awareness of food safety risks, new approaches to food safety regulations has sprang up in industrialized countries over time. Currently, a wide range of safety control systems has evolved for the typical food product being offered for sale to consumers in retail stores or food service operations. Generally, the objectives of these standard-related measures/safety control systems include protecting health, safety and the environment, informing the consumer, ensuring interoperability between the products of different manufacturers, and identifying quality (Mehta et al., 2003).

Food safety standards can be promulgated in a variety of institutional forms that differ in the extent to which users have freedom of choice and action regarding compliance, as well as the role of the public and private sectors in publicizing and/or enforcing these standards (Henson and Humphrey, 2010). Aside the institutional classification system, food safety standards are also categorized based on the nature of the regulation and what is to be achieved of it. These groups of standards prevail as product standards, process standards, system and management-based
requirements, and outcome-based requirements (Henson and Caswell, 1999; Segerson, 1999).

In the literature, the institutional classifications system projects food safety standards as occurring either as public (governmental) standards or private standards. Public standards (also called public mandatory) are more accurately termed ‘regulations’. These standards are measures by which products, processes, and producers are judged. Prior to the formation of the World Trade Organization (WTO) in 1995, agri-food standards were largely the province of various government departments within nation states. Food safety therefore, has traditionally been seen as the preserve of governmental regulations as a means to achieve the socially-desirable level of protection to human health (Antle, 1996; Henson and Caswell, 1999; Caswell and Johnson, 1991). This is officially enforced through inspection of production facilities and/or finished products. Thus, governments are primarily responsible for inspecting food, determining its safety, and providing assurance to the public about the safety of the food supply (Hatanaka et al., 2005; Henson and Caswell, 1999). In addition to these public mandatory regulations, governments may promulgate standards with which compliance is voluntary, hence the existence of public voluntary standards⁹ (Henson and Humphrey, 2010).

However, the globalization of agri-food system has made it increasingly difficult for nation-states to regulate food safety and quality practices, therefore, the evidence of private standards. But, the literature predominantly employs the terms ‘private standards’ and ‘voluntary standards’ interchangeably (Henson and Humphrey (2010). Private standards increasingly encompass a variety of quality attributes that public standards do not (Hatanaka et al., 2005), as various actors in the agri-food system, including retailers, consumers, and social activists, seek products that are differentiated not only by that product’s physical characteristics but also by its production practices. Therefore, private standard approaches fostering food safety include self-regulation10, vertical integration, third-party certification11, and common approaches to risk identification, assessment, and management such as Hazard Analysis and Critical Control Point (HACCP) systems and voluntary guidelines of Good Agricultural Practices (Buzby, 2003).

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⁹ These are standards created by public bodies but whose adoption is voluntary. In the agri-food sector, the “Label Rouge” developed by the French is an example

¹⁰ This includes internal control systems that assure product quality, where the company/firm sets, monitors, and self-certifies the control parameters. It can take place at the level of the level of the individual firm or be instituted by trade organizations that cover the predominance of market supply (Henson and Caswell, 1999)

¹¹ This is a certification process where private or public organizations outside the firm access, evaluate and certify safety and quality claims of a firm's product based on a particular set of standards and compliance methods (Deaton, 2004)
By the classification based on the nature of food safety standards, there is highlight on the role of product and process standards. Product and process standards\textsuperscript{12} serve the medium by which public authorities regulate food systems and set minimum safety standards in order to achieve social food safety objectives (Mitchell, 2003; Henson, 2008). As noted by Busch (2000), Henson and Reardon (2005), and Mainsvile \textit{et al.} (2005), while standards are ubiquitous to any market economy, they serve a fundamental role in the organization of supply chains for products and services.

Further, both reflecting and supporting the promulgation of private food safety standards have been the development of quality meta-systems (Caswell \textit{et al.}, 1998) such as Hazard Analysis and Critical Control point (HACCP), Good Manufacturing Practice (GMP) and Good Agricultural Practice (GAP). Some of these meta-systems are also embedded in voluntary public standards at the national and/or international levels (for example ISO 22000), and may not be specific to agricultural and food products (for example ISO 9000), while others are propriety private standards developed by standards bodies (for example SQF 2000) or by individual food firms (Henson, 2008). According to Henson (2008), such meta-systems can be viewed as “codes of conduct” peculiar to achieving food safety activities of supply processes and governing the operations of the entire supply chain, from primary production to retail distribution. Also noted is the multi-tiered system of conformity assessment base around certification and accreditation (NRC, 1995), thus the fact that contemporary agri-food system are governed not only by public and private standards, but also by public and private modes of enforcement (Henson, 2008).

\textit{Ponte and Gibbon} (2005) confirm that the relations between public and private food safety and quality standards are complex, because though many meta-systems started out as voluntary “codes” of practice, they are increasingly pervading public regulations (for example, through the inclusion of HACCP in regulatory food safety controls). While these private standards evolve as a means to facilitate compliance with public regulatory requirements, regulators are increasingly adopting the mechanisms employed by private standards, and are referencing private standards, in their rule-making (Henson and Northen, 1998; Henson and Hooker, 2001).

\textsuperscript{12} Product standards specify characteristics that a product must attain before it is considered safe to sell. For example, most industrialized countries have maximum residue levels (MRLs) for pesticides. Process standards on the other hand specify techniques that must be used to process or package foods, with the belief that certain production techniques make foods more likely to be safe. For instance, some governments require that processed meat products be raised to certain temperature to kill bacteria before packaging.
Further, the enforcement of these diverse standards matter to how firms comply with them in their export markets. First, standards can be mandatory in a legal sense or required in practice because of the sheer proportion of buyers that require them (NRC, 1995). Alternatively, standards can be voluntary, such that the potential users are free to decide whether to comply. While mandatory standards are generally the preserve of public institutions, both public and private institutions can play a role in voluntary standards governance (Henson, 2008).
Irrespective of whether it is either a public voluntary or mandatory standards, they are enforced by public institutions and the necessary sanctions are applied in the case of non-compliance, and this may result in cost to the exporting firm. For instance, comprehensive inspection of imports would increase cost of trade in the advent of higher rejection rates. Also, in the advent of falter, firm’s products can be confiscated, rejected or entirely barred from future trade.

Voluntary consensus standards (private standards) arise from a formal coordinated process involving participants in a market with or without the participation of government. A variety of private entities may be involved in the establishment of voluntary consensus standards including industry and trade organizations, professional societies, standards-setting membership organizations, and industry consortia, which in some cases are coordinated by a public entity (Henson, 2008). Broadly, international standards (such as ISO 9000, ISO 22000, etc.) developed by the International Organization for Standardization (ISO) and national and/or regional standard bodies (for example Assured Food Standards, Freedom Food, etc.) take the form of voluntary consensus standards (Henson and Reardon, 2005; Henson, 2008; Henson and Humphrey, 2010). The standards developed by private standards-setting institutions such as, Safe Quality Food (SQF) Institute, and the British Retail Consortium (BRC) are examples specific to food safety and quality. Members of the standard-setting group strive to achieve consensus on technical specifications that best meet their collective needs. Use of the resulting standards is generally voluntary, although the majority of suppliers may apply them, resulting in the economic advantage associated with standardization and/or market requirements (Henson and Humphrey, 2010). Finally, *De Factor*\textsuperscript{13} mandatory standards arise from an uncoordinated process of market-based competition between private firms though standards promulgated by private entities are not legally mandated (Henson, 2008). However, through market transactions,

\textsuperscript{13} When a particular set of products or specifications gain sufficient market share so that it acquires authority. These specifications are then considered a *de factor* standard.
such standards may become mandatory in practice: Firms then have little or no option but to comply if they wish to enter or remain within a particular market. Thus, the enforcement of these standards

2.4: Food safety in the context of trade agreements

Although food safety measures are based on domestic/national laws and practices, institutional frameworks have evolved to control how these regulatory policies must operate (Josling et al., 2004). Bilateral and multilateral rules have become much stringent on the development and use of standards (Josling, 2006) in order to alley the scope for food safety regulations and standards to impede trade. Trade agreements signed in the 1990s, including the North American Free Trade Agreement (NAFTA) and the Uruguay Round of the General Agreement on Tariffs and Trade (GATT), which is managed by the World Trade Organization (WTO), set criteria to evaluate food safety policies; encourage co-operation among countries in policy development; and provide a mechanism for resolution of disputes (Hooker and Caswell, 1999), thus to ensure that national standards do not act as non-tariff barriers (NTBs) (Maskus et al., 2000).

In order to advance this, the main mechanism of regulation is set under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) under the auspices of the World Trade Organization (WTO). The primary function of SPS Agreement was to clarify the meaning of Article XX of the GATT, which established the rights of countries to use trade measures if they are necessary to protect animal, plant and human health, but elaborates on the procedures that countries should follow to ensure that they are not unduly restricting market access for other countries (Josling, 2008). The SPS agreement achieves its objectives through three international organizations recognized as the sources of internationally agreed-upon standards: the Codex Alimentarius Commission (Codex) for food safety measures, the International Office of Epizootics (OIE) for measures related to animal health and zoonoses

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14 Hillman (1991) defines NTBs as any governmental device or practice other than a tariff which directly impedes the entry of imports into a country and which discriminates against imports, but does not apply with equal force on domestic production or distribution.

15 Sanitary and Phytosanitary (SPS) regulations (i) protect animal or plant life or health within a territory from risks arising from the entry, establishment or spread of pests, diseases, disease carrying organisms, or disease causing organisms, (ii) protect human or animal life or health within a territory from risks arising from additives, contaminants, toxins, or disease-causing organisms in foods, beverages, or feedstuffs, (iii) protect human life or health within a territory from risks arising from diseases carried by animals, plants, or products thereof, or from entry, establishment or spread of pest, or (iv) prevent or hit other damage within a territory from the entry, establishment, or spread of pests (GATT SPS, 1994, Annex A).
affecting both animals and human health measures, and the International Plant Protection
Convention (IPPC) for plant health measures (Josling et al., 2004; Hoffmann, 2010). The
agreement has set out several principles which countries are to follow in order to minimize
unnecessary obstacles to trade (Josling et al., 2004, 2008). These include:

- **Harmonization**: Member countries are urged (but not required) to adopt international
  standards. These are the internationally agreed-upon standards from Codex Alimentarius
  (Codex), the International Office of Epizootics (OIE), and the International Plant
  Protection Convention (IPPC) for plant health measures. Any country that adopts their
  standards and procedures is presumed to be in compliance with the provisions of the
  Agreement.

- **Equivalency**: A WTO member must accept that the SPS measures of another country are
  equivalent to its own if it is objectively demonstrated that the other country’s measure
  achieve the member’s appropriate level of protection, even if the measures themselves
  differ. Also, a country is required to allow imports from subnational regions abroad that
  are free or nearly free of pests or disease.

- **Transparency**: Member nations are required to publish their regulations and provide a
  mechanism for answering questions from trading partners.

- **Science-based risk management**: SPS measures must be based on scientific principles and
  sufficient science evidence; more particularly, measures must be based on risk
  assessment so as to minimize distortions in trade.

The agreement recognizes the right of a country to set the appropriate level of risk (i.e., level of
protection) it wishes to achieve but this is set on principles (Josling et al., 2004). If the standard is
stricter than that set by Codex, and is challenged on any grounds for discrimination, the country
must be able to support its choice to prove otherwise based on a scientific risk assessment.
Overall, through the support for the use of Codex standards, based on the principles of
equivalence and transparency (Caswell and Bach, 2007), a significant improvement in the
multilateral food system constitutes the reduction of transaction costs for food industries.

Under the Agreement, countries are required to notify changes in their SPS regulations to
the SPS Committee. This forum has allowed other countries to informally question and challenge
standards; this has led to better country-level decision-making in some cases (Roberts et al.
2001; Roberts 2004) and majority of the times resulted in trade disputes (Buzby, 2003). Due to
the rapid growing of food safety standards in attempts to curtail incidents of food hazards, there is concern that technical regulations and standards, most notably relating to food safety and quality measures, and the associated systems of food control and inspection, can potentially act to impede trade in agri-food products (Josling et al., 2004). This is evident by the increasing empirical studies which ascertain the trade impact of food safety standards and quality measures both on developing and industrialized countries (see for example Peterson and Orden, 2005; Anders and Caswell, 2009; Disdier et al., 2008; Masakure, et al., 2009; Buzby and Roberts, 2011; Baylis et al., 2011; Orden, 2010).

According to Henson and Jaffee (2008), food safety regulations can have diverse impacts on trade in agri-food products. In some cases, they can prevent trade from happening at all; for example, where a country is required to obtain approval prior to the commencement of exports or where a ban is imposed. In others, they can impede the establishment of trade. For example, where initial consignments of product and/or samples are subject to close scrutiny or even seizure (Buzby et al., 2008; Buzby and Roberts, 2010; Baylis et al., 2011). More broadly, the costs of food safety standards compliance differ across export markets and this can substantially impose costs on exporters (Henson and Jaffee, 2004; World Bank, 2005) as well as distort firms’ competitiveness (Essaji, 2008). The overall consequence is that they impede export performance. This reduction in export performance is largely due to cost-raising effects of the standards, including product redesigning, building administrative systems, auditing and testing (Wilson and Otsuki, 2001, Fischer and Serra, 2000; Chen et al., 2006), and increased short run production cost through additional labour and capital (Maskus et al., 2005). However, some empirical studies also assert that food standards can provide the impetus for firms and sectors to upgrade production technologies and realize beneficial productivity gains (Maertens and Swinnen, 2009; Henson and Jaffee, 2004; World Bank, 2005; Anders and Caswell, 2009).

2.5: Impacts of food safety regulations on exports

With the proliferation of technical regulations and standards, there has been a marked enhancement in the regulatory intensity of the agri-food sector globally (Henson and Jaffee, 2008; Essaji, 2008). These measures are being implemented in order to provide safe public goods (that is, goods that provide low prevalence of pest or disease that affects agricultural production), and also as a means of lowering transaction and information cost (for example, the extent of credence such as whether a product has pesticides residues or is genetically altered) (Maskus et
al., 2001). However, the complexity in both food safety regulations and private standards impact export activities in different ways.

The first impact of food safety regulations is to it can result in an absolute prohibition of certain food products; this is the case where firms are totally banned from exporting to specific markets. Thus, importing countries may prevent import of certain food products based on past history of non-compliance or on the grounds of perceived risk associated to the food product supplied. For example, importation of Guatemalan raspberry were banned from the US and Canada once caught in the spotlight of repeated Cyclospora outbreaks from contaminated raspberries; thereby reducing an estimated number of producers from 85 in 1996 to 3 producers in 2002. In the same year (1996), demand for Guatemala blackberries also declined due to the raspberry incidence (Calvin, 2003).

Secondly, food safety regulations can be used for discriminatory purposes, and this may also impede trade. This discriminatory use of food safety standards can be that importing countries discriminating between food products from specific countries or may set very stringent food safety standards for specific food products, which may not be based on a scientifically based risk assessment. Thus, importing countries may not adhere to the transparency and science-based risk management principles set for SPS by the WTO. This can impede trade from happening at all and/or may set undue scrutiny to the exported food products these standards apply to. The eventual effect is that firms that export such products may have to adopt new process or product standards at a cost, thus can threaten entire specific product markets or industries (Buzby et al., 2001).

Further impacts from food safety regulations are the non-discriminatory uses; thus impacts due to the diversity in food safety requirements in different export markets. First, Mitchell (2003) reports that firms desire to uphold a good reputation for providing safe food, and this actually serves as a valuable asset that firms have as an incentives to protect. A firm can develop an edge over its competitors if it produces food using a technique known to enhance food safety (Reardon and Farina, 2001). Likewise, a firm can suffer increased costs or a loss of sales and equity, sometimes permanently, if someone becomes ill from eating one of its products (Buzby et al., 2001; Dolan and Humphrey, 2000; Henson and Northen, 1998; Segerson, 1999; Thomsen and McKenzie, 2001). Odwalla, a “natural” juice company, lost millions in sales and suffered a stock price decline of 68 percent when customers contracted E. coli from drinking its
apple juice (Buzby et al., 2001). In another instance, Perrier, a leading mineral water company, lost 50 percent in its US market share when one of its shipments was contaminated with benzene (Mitchell, 2003). Furthermore, firms implicated in a crisis may suffer from plants closed for cleanup or permanently shut down, food poisoning lawsuits filed, premiums raised for product liability insurance, and/or experience a rigorous food safety compliance program in order to access specific markets.

Another non-discriminatory use of food safety regulations which still impact trade is the fact that, it can drive or direct the flow of exports to one market or the other. Baylis et al. (2010) stated the concept of trade diversion and deflection effects of food import refusal; an anticipation where food import refusals would result in the blocked products being sent to other countries. For example, in 2003, after honey export from some Chinese shippers to the European Union were blocked because they were found to contain antibiotics, these products were found in the US market (Lumpkin, 2003).

A general indication of the importance of food safety standards and the challenges to export is the analysis of border rejection data. According to Henson and Mendoza’s (2013) analyses of border rejection16 data (refer to Table 2.1) from the US Food and Drugs Administration (FDA) import detention records, fruits and vegetables and products, seafood products, and cereal products collectively make up 78 percent, and individually account for 35 per cent, 25 per cent, and 18 per cent, respectively. The major food safety related issues that led to these rejections or products include issues related to bacterial contamination, unhygienic conditions, and food additive among many others. In using rejection data, the intention is to shed light on the compliance performance of countries exporting to the US. It is necessary from the outset, however, to reflect on how reliable rejection data is for this purpose and, perhaps more importantly, how patterns and trends in rejections should be interpreted. Broadly, the US border rejection data should be recognized as an imperfect indicator of the compliance problems faced by importers, while at the same time representing the most comprehensive data currently available17 (Henson and Mendoza, 2013). It is important to realize that the rejection data collected tells nothing about compliance problems where trade did not actually occur. In such

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16 This encompasses all forms of notifications to which food and feed imports were subject over the period 2002 to 2013.

17 As recognised by Buzby et al. (2008) in their analysis of US border rejections over the period 1998 to 2004.
instances, exporters may face considerable compliance challenges, or alternatively are already in compliance or could easily be so, but do not export for some other reason (for example, lack of more general price competitiveness, transport costs, etc.). Zero exports could also result from prohibitions on exports due to historic instances of non-compliance with food safety and quality regulations, and/or the non-approval of food safety control systems in the exporting country.

Second, border inspections cover a small fraction of total food imports, and in some cases do not record the number of consignments offered for inspection or the number of inspections undertaken (Henson and Mendoza, 2013). Thus, it is not possible to estimate the share of consignments that is rejected from any one country or over time. The crude rejection data reported above provides a broad picture of patterns and trends across products, and reflect changes in the volumes of exports over time.

In summary, the scope of impact from food safety regulations on exports differ among exporting firms depending on their efficiency; thus these regulations may result in an overall increase in exports for some firms while some firms may suffer decrease in their exports.

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18 It is estimated that only about one per cent of US food imports were subject to FDA inspection in the 2000 financial year (GAO, 2001).
Table 2.1: Number of US rejections of world agri-food products by commodity, 2002-2013

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals and cereal products</td>
<td>1,189</td>
<td>856</td>
</tr>
<tr>
<td>Feed materials</td>
<td>84</td>
<td>199</td>
</tr>
<tr>
<td>Seafood products</td>
<td>2,205</td>
<td>2,062</td>
</tr>
<tr>
<td>Fruit and vegetables and products</td>
<td>3,183</td>
<td>2,804</td>
</tr>
<tr>
<td>Herbs and spices</td>
<td>409</td>
<td>381</td>
</tr>
<tr>
<td>Nuts, nuts products and edible seeds</td>
<td>136</td>
<td>159</td>
</tr>
<tr>
<td>Other processed foods</td>
<td>945</td>
<td>829</td>
</tr>
<tr>
<td>Total</td>
<td>8,151</td>
<td>7,290</td>
</tr>
</tbody>
</table>

Source: Henson and Mendoza (2013)
2.6: Conclusions

The increasing demand for safe and nutritious food to meet consumer choice and satisfaction give credence for the importance of a global food supply chain. This expectation of a continuous international food trade gives room for various food safety risk which export markets and specifically consumers need to embrace. This has merited for various food safety regulations in order to curb the economic cost that can arise to consumers and society at large as a result food safety incidences.

These food safety regulations come in different forms and are changing over time. Public regulations are the main focus of food safety regulation within countries and internationally, but this is overlaid with private food safety regulations. These food safety regulations differ between countries, hence impact agri-food exporters differently for different export markets. Empirical research has demonstrated that public and/or private food safety regulations and standards can act as significant barriers to trade in agricultural and food products. Some studies show prove that agri-food exports from Canada face the same challenges from food safety regulations set in their export market transactions. For example, before Canada confirmed positive for BSE in May 2003, the U.S. imported 1.7 million heads of live cattle from Canada in 2002, most for the purpose of slaughter (Jin et al., 2004). With the BSE outbreak in Canada, the U.S. government banned imports of Canadian beef to minimize risks to the U.S. beef industry. Even though this impacted the beef industry as a whole, the industry is made of individual exporting producers or firms, and thus experience the major effect. This effect might have resulted in loss of sales, plant cleanup or permanent shut down for firms within that industry.

In spite of the evidence of food safety challenges that border rejection data show for aggregate level exports to one export market or the other, influence at firm level has received little evidence, mostly due to lack of data. It is therefore important to understand the impact of these food safety standards on firm’s export performance; but this can be done by understanding the dynamics of the many other factors that affect the firm and its export performance. This is explained in the next chapter.
Chapter 3: Understanding the Export Performance of Firms

3.1: Introduction

Export performance is one of the most widely researched topics in international marketing literature. This is particularly evident as export performance refers to the outcomes of a firm’s export activities (Canusgil and Zou, 1994; Katsikeas, Leonidou and Morgan, 2000), and considered as one of the major indicators of the success of a firm’s operations/export activities (Jalali, 2012). According to Katsikeas et al. (2000), superior export performance is of vital interest to three major groups: Public policy makers, business managers, and marketing researchers. From the standpoint of public policy makers, a better understanding and outcomes of export performance are important because it allows for the accumulation of foreign exchange reserves, increased employment levels, improved productivity, and enhanced societal prosperity (Czinkota, 1994) for a country. Research on export performance is of interest to business managers because it is seen as a tool to boost their corporate growth, increase capacity utilization, improve financial performance, strengthen competitive edge, and even ensure company survival in a highly globalized and competitive marketplace (Samiee and Walters 1990; Kumcu, Harcar, and Kumcu 1995; Terpstra and Sarathy, 2000). As a result, marketing researchers consider exporting a challenging but promising area for theory building in international marketing (Zou and Stan, 1998); thus make room for continual research advancement.

These extensive studies on export performance have been in numerous contexts, with focus across country, industry and firm levels (see for example Iyer, 2010; Jalali, 2012; Sousa, 2008; Styles, 1998; Shoham, 1998; Chetty et al., 1993). However, the impact of food safety regulations and private standards on export performance at firm level has so far received little attention. Therefore, it is important to understand the fit of food safety regulations and standards as an exogenous driver of export performance. The purpose of this chapter is thus to review the literature on export performance; first, to find an appropriate underlying theoretical framework, followed by explaining suitable ways of measuring export performance, and concluding with identifying the factors that determine export performance. Overall, this chapter aims to summarize the relevant findings in the literature; while the use of these findings for model development and analysis in the conceptual models and empirical framework chapters are explained.
3.2 Theoretical Foundations of Export Performance Analysis

3.2.1: Resource-Based Theory of the firm

This study assumes a firm-level analysis, and acknowledges that there is broad spectrum of external factors that determine a firm’s export performance. Present within these factors is the emphasis on food safety regulations and standards and the impact they exert on the firm’s export performance. Compliance with these regulations requires firms to have specific, adequate and differentiated resources in order to remain viable. In view of this, the resource-based view (RBV) of the firm is the theoretical foundation of choice for this study, because it is focused on firm-level resources, and has been widely used in previous empirical analyses (see for example Morgan et al., 2004; Dhanaraj and Beamish, 2003).

The RBV of the firm has received increased attention and is widely acknowledged as one of the most prominent and powerful theories for describing, explaining, and predicting organizational relationships (Barney et al., 2011). The resource-based theory conceives a firm as a unique bundle of tangible and intangible “resources” (assets, capabilities, organizational processes, managerial attributes, firm attributes information, and knowledge and so forth) (Barney, 1991; Daft, 1983; Wernerfelt, 1984). RBV scholars emphasize resources as central to understanding firm performance (e.g., Amit and Shoemaker, 1993; Peteraf, 1993), and also focus on how sustained competitive advantage is generated by unique bundle of resources at the core of the firm (Conner and Prahalad, 1996; Barney, 1991). Thus, RBV emphasizes firm’s resources as the fundamental determinants of competitive advantage and performance and adopts two assumptions in analyzing the sources of this competitive advantage (see for instance Barney, 1991 and Peteraf and Barney, 2003). First assumption is that firms within an industry (or within a strategic group) may be heterogeneous with respect to the bundle of resources they control (Bridoux, 2004, Barney, 1991). Second, it assumes that this resource heterogeneity may persist over time, because the resources used to implement firms’ strategies are not perfectly mobile across firms (i.e., some of the resources cannot be traded in factor markets and are difficult to accumulate and imitate). By this, the RBV argues that valuable firm resources are usually scarce, imperfectly imitable and lacking in direct substitutes (Peteraf, 1993). According to Barney (1991), a firm’s resource must therefore have four attributes: 1) it must be valuable; 2) it must be rare among a firm’s current and prospective competition; 3) it must be imperfectly imitable; and 4) it cannot be substituted for strategically equivalent resource. Thus, resources allow the firm
explore opportunities in the market or thwart competitive threats. These four characteristics of resources describe what Barney (2007) considers as strategic assets, so that if it is properly mobilized, built and sustained, can improve a firm’s competitive advantage and overall export performance.

Further, in Penrose’s earlier work (1959), a firm is defined as a collection of physical (e.g. property, plant, equipment, etc.) and human resources (e.g. knowhow, insights, judgment and experience of employees), with emphasizes on the heterogeneity of these resources across firms. Heterogeneity in these resources and capabilities explain the variations in firm performance (Makadok, 2001), and explains the need for firms to implement strategies aimed at improving the efficiency and effectiveness of these resources. To elaborate further, Penrose argues that the firm operates as an administrative unit where the choice of different uses of these resources over time is determined by administrative decision. By that, it is never the resources themselves but only the services that the resource can render that are the inputs in the production process, and in this distinction we find the source of uniqueness for each individual firm. Further, the specific combination and interaction of a firm’s resources provide the internal basis for responding to market opportunities and thus growth and expansion. Wernerfelt (1984) suggested that, “resources and products are two sides of a coin” and presents the possibility that by specifying the resource profile for a firm, it would be possible to find the optimal product-market activities.

RBV has developed very interesting contributions, among others, with regard to resources surviving competitive imitation when protected by isolating mechanisms (Rumelt, 1984) such as time compression diseconomies\(^{19}\), asset mass efficiencies, and causal ambiguity\(^{20}\) (Dierickx and Cool, 1989; Barney, 1991; Peteraf, 1993). Recently, much resource-based research has focused on intangible assets, which include information (Sampier, 1998), knowledge (e.g., Spender, 1996), and dynamic capabilities (Teece, Pisano and Shuen, 1997). The stickiness of these resources rise out of the fact that a firm’s resources are history dependent (historical uniqueness\(^{21}\)), causally ambiguous, and socially complex (King and Zeithaml, 2001; Eisenhardt and Martin, 2000). The RBV addresses the central issue of how superior performance can be

\(^{19}\) Time compression diseconomies refer to the time needed to acquire the resource through learning, experience, firm-specific knowledge, or trained proficiency in a skill.
\(^{20}\) Causal ambiguity refers to the ambiguity surrounding the connection between a firm's resource portfolio and its performance.
\(^{21}\) Historical uniqueness refers to advantages that accrue due to unique resources such as distinctive locations or due to first mover advantages such as reputation, brand loyalty, etc.
attained relative to other firms in the same market and posits that superior performance results from acquiring unique resources of the firm (Dhanaraj and Beamish, 2003).

Empirically, numerous studies have attempted to measure these attributes of firms’ resources and capabilities, and then to correlate these measures with firm’s performance. For example, Bharadwaj (2000) measured firm’s IT capability and its relationship to firm’s performance, and his result showed that IT logistics, human IT resources, and IT infrastructure had positive impact on firm performance. Using cross-boundary data for small and medium sized firms in U.S and Canada, Dhanaraj and Beamish (2003) affirmed in their comparative study that firm technological intensity, enterprise (represented as leader’s knowledge, commitment to export and innovation efforts), and firm size indicate a relatively significant entrepreneurial approach in the resource mix for Canada compared to those for the U.S sample. Thus, emphasizing larger and technology-oriented firms approach to export performance. Examples of other works include Robin and Wiserna (1995), Henderson and Cockburn (1994), and Makadok (1999) among many others (Barney and Arikan, 2001).

3.2.2: Complementary Theoretical Perspective

Nonetheless, the scrutiny and assessment of the resourced-based approach have pointed to a number of eminent problems. A major critique is the fact that it ignores the business (market) environment. According to Penrose (1959), markets and firms are implicitly interacting institutions, each necessary for the existence of other. The possibility of export growth and sales intensity lies in the resulting services produced from the heterogeneity and uniqueness of resources for every individual firm; therefore, Penrose addresses the issue arguing that whether or not we treat the resources of the firm or its environment as the more important factor explaining growth depends on the question we ask: If we want to explain why different firms see the same environment differently, why some firms grow and some do not, or, to put it differently, why the environment is different for every firm, we must take the resource approach; if we want to explain why a particular firm or group of firms with specified resources grow the way it does, we must examine the opportunities for the use of those resources. Bridoux (2004) also posits that some other criticisms relate to the unit of analysis, the condition of heterogeneity, and the behavioural assumption underlying the condition of non-imitability.
In spite of this, the inducements the external environment exerts on firm’s activities cannot be over emphasized. It facilitates the growing demand for particular products, changes in technology that call for production on a large scale than before, discoveries and inventions with particular promising uses, and the opportunities to obtain better market position. Even though these external inducements and obstacles are wide, there is also equally important internal influence on the direction of expansion.

There is a complementary theoretical approach in the literature; specifically the structure-conduct-performance framework (SCP) (Cavusgil and Zou, 1994; Ramsey, 2001). The SCP paradigm is rooted in the industrial organization theory; and this theory puts a focus on the whole industry and the market conditions a firm operates within, rather than the company itself. This paradigm, therefore, stresses that the conduct of a firm is determined by the characteristics of its external environment, which is represented by its industry characteristics and export markets environment (Fu et al., 2010; Raible, 2013). The logic is that the external environment imposes pressure to which the firm must adapt in order to survive and prosper (Collis, 1991), thereby defining the specific context and characteristics needed to improve export performance.

3.3: Measures of Export Performance

As Katsikeas et al. (2000) highlight, there are multiple ways of conceptualizing and operationalizing export performance. One approach is to view export performance in terms of its export effectiveness, and export efficiency. Export effectiveness is concerned with the degree to which exporters achieve their exporting goals and objectives (Brown and Laverick, 1994; Cameron, 1986; Shoham, 1998; Morgan et al., 2004). For example, a firm might evaluate itself according to whether export profit or export sales revenue objectives are achieved or whether a certain penetration level is achieved or exceeded (Cameron, 1986; Cameron and Whetten, 1983; Aaby and Slater, 1989; Holzmuller, Hartmut and Helmut, 1990; Leonidou, 1998; Zou, Taylor and Osland, 1998; Sousa, 2004; Alverez and Lopez, 2005; Rodriguez-Pose, Tselios, Winkler and Farole, 2013).

Export efficiency on the other hand refers to the comparison of outputs (e.g., revenues) to inputs (e.g., costs), and so includes traditional profit ratios, such as return on investment (ROI), and return on assets (ROA) (Shoham, 1998; Bernard and Jensen, 2004; Lages, 2000). Interestingly, according to Shoham (1998), the export effectiveness and efficiency constructs are not mutually exclusive but may be identical. For instance, a firm might have as a performance
objective, the goal of making a certain ROI for every dollar invested in their export operations, thereby, making an efficiency measure of performance (i.e. ROI) act as an effectiveness measure of performance.

Another perspective to the operationalization of export performance is to measure performance in terms of non-financial, and financial outcomes (Zou and Stan, 1998; Katsikeas et al., 2000; Sousa, 2004). Various studies have also categorized these different outcome measures in terms of the way the indicators are measured (i.e. whether the outcome is measured in an objective and subjective terms) (Lages, 2000; Sousa, 2004; Jalali, 2012). The indicators, which measure the absolute values or percentages of export performance, are called the objective measures and have been associated with the financial measures (such as export sales, profit, and market share). Meanwhile, the non-financial measures (such as export success, importance and satisfaction) are associated with the subjective measures (e.g., manager’s perception or attitudinal performance) (Evangelista, 1994; Katsikeas, Piercy, and Ionnidis, 1996; Zou and Stan, 1998; Sousa, 2004; Jalali, 2012).

The non-financial measures to export performance include market-related measures, product-related measures, and several miscellaneous measures. Market-related measures refer to the indicators such as the number of export country/markets; export market penetration, and contribution of exporting to market development. The number of export countries/markets are widely studied; however there is persisting debate on export market expansion suggesting that the number of foreign markets is not an end in itself but contingent on the specific company, product, market and marketing factors (Piercy, 1982). The product-related measures refer to the number of new products exported, the proportion of product groups exported and the contribution of exports to development. Although rarely employed, these measures are justified on the grounds that the product and its performance are influential to any export marketing strategy (Zou and Stan, 1998; Katsiteas et al., 2000). Most of the miscellaneous non-financial measures include the contribution of export to economies of scale and company reputation (Raven, McCullough, and Tansuhaj, 1994), the number of export transactions and the projection of export involvement (Diamantopoulos and Schlegelmilch, 1994).

Non-financial outcomes are potentially of interest to researchers, since they play key mediating roles in shaping financial outcomes. For instance, a firm’s degree of internationalization is partially a function of the number of country markets it operates in; This
means that firms operating in more country markets may find that they are less vulnerable to fluctuations in demand happening within individual markets, and so may be better able to ride out market shocks (Diamantopoulos and Schlegelmilch, 1994; Solberg, 2002, Sousa, 2004). Simultaneously, such firms may be better positioned to capitalize on growth opportunities arising in markets they already operate within. Accordingly, it would not be unusual for exporters to have as a formal strategic objective the expansion of their export operations into new markets, and as a result, market expansion goals might legitimately be translated as non-financial effective measure of export performance. The reliability and validity of the use of non-financial as subjective indicators for export performance measurement, have been supported by several empirical studies. For instance, “satisfaction” is a measure that has been frequently used in the exporting field for firms across many industries (Evangelista, 1994; Patterson, Cicic, and Shoham, 1997; Sholam, 1998). Also, Woodcock, Beamish, and Makino (1994) and Sousa (2004) confirm that the use of a non-financial measure is necessary in situations where managers may be unwilling or unable to provide objective financial data, or because of the difficulty in reconciling cross-national and cross-industrial differences in accounting practices, or due to variations in exchange rates, and financial reporting between home and host countries of export activities.

However, the export performance indicators of greatest interest and commonly used are the financial measures (Katsikeas et al., 2000; Lages, 2000). In contrast to non-financial indicators, Das (1994) and Evangelista (1994) argue that the financial indicators are usually used at the international level. These financial measures are grouped into three: the sales-related measures, the profit-related measures, and the market share-related measures (Sousa, 2004; Katsikeas et al., 2000).

The sales category is widely used to assess export performance and measures the absolute volume, intensity or growth of export sales at either the corporate or product level (Kaynak and Kuan, 1993; Shoham, 1996; Zou and Stan, 1998; Katsikeas et al., 2000). The most commonly used measure in this category (as well as among other financial categories) in the literature is the export sales intensity. Despite its wide usage, this indicator has been criticized, because it can be affected by factors other than better exporting operations and does not reflect the competitive dimensions of export success (Kirpalani and Balcome, 1987). Another disparity with this indicator is the fact that a firm having an inadequate export endeavours in a new product but
having a large foreign market might appear to be a superior performer to another firm with a large market share of a relatively small foreign market (McGuinness and Little, 1981). The second most widely used and practically useful indicator is export sales growth (Kaynak and Kuan, 1993; Shoham, 1996), but this is also criticized for overstating performance due to price escalation and market growth, or understate performance because of experience curve effects and deteriorating demand (Kirpalani and Balcome, 1987).

Secondly, the profit-related category consists of absolute measures of overall export profitability and relative measures such as export profit divided by total profit or by domestic market profit. Export profitability and growth are the most researched and often cited as the firm’s ultimate goal (Aaby and Slater, 1989; Shoham, 1996). Now export profit contribution (percentage of company profits due to exports) has received some empirical attention, although this measure suffers from the shortcomings similar to those of export sales intensity (Katsikeas et al., 2000).

Finally, the market-related measures indicate export market share and growth. These measures have been found promising and good indicators to measure export success. The reasons being that high market shares lead to scale and experience advantages to the cost side as well as provide more confidence in approaching customers (Madsen, 2008). Although these measures can indicate the firm’s competitive prowess rather than increased export business due to a growing market (Kirpalani and Balcome, 1987), they have been criticized on the ground that actual market share is often difficult to measure, especially among small companies operating in niche markets.

Ultimately, all profit-oriented businesses are seeking success in terms of their financial performance dimensions, and justifiably, financial export performance indicators receive most research attention. In terms of modeling determinants of export performance, financial performance indicators have been used ultimately as endogenous variables, with non-financial indicators playing important but subservient mediating roles. Financial performance indicators drive towards measuring the effectiveness or efficiency of activities, or both simultaneously, since the operational distinction between effectiveness and efficiency is often vague. Overall, given the merit and gaps in the discussed indicators and from the outlook of several studies, a blend of financial measures and non-financial measures for the export performance construct appear to lead to more accurate results (Shoham, 1998; Lages, 2000).
3.4: Determinants of Export Performance

Indeed, a firm’s survival and expansion, and the consequent economic growth of many countries, is strongly contingent on the better understanding of the determinants that influence or potentially can affect export performance. It is therefore very crucial to understand these driving factors in order to have competitive advantage in this rising global competition. Fortunately, remarkable efforts from Madsen (1987), Aaby and Slater (1989), Zou and Stan (1998), and more recently, Sousa, Martinez-Lopez and Coelho (2008) have reviewed and summarized the export performance literature to identify key variables that affect the export performance construct as it relates to the firm. Despite these efforts to synthesize the determinants of export performance, Sousa et al. (2008) in their study express similar concerns raised from previous reviews. This is the fact that the current literature on export performance is: (a) Fragmented and composed of numerous studies that are distinguished for adopting a variety of analytical techniques and methodological approaches; (b) explored substantial number of different determinants of export performance; and (c) inconsistent. This has resulted in report of different and often contradicting findings on the influence of the various determinants of the export performance. This has caused misunderstanding with regard to those constructs that significantly affect firm export performance. Consequently, this is hindering scholarly and practical advancement in the research field (Katsikeas et al., 2000). The lack of comprehensive theory base for explaining export performance also makes it difficult to integrate findings from different studies into a coherent body of knowledge (Aulakh, Kotabe and Teegen, 2000; Morgan, Kaleka, and Katsikeas, 2004).

Due to the multiplicity of factors/ independent variables that affect export performance of firms, this study discusses these determinants on the premise consistent with Zou and Stan (1998) and Sousa et al. (2008) classification of the determinants of export performance into internal and external factors. According to Zou and Stan (1998) and Sousa et al. (2008), this classification is theoretically justified as the two categories correspond to different theoretical bases. Specifically, internal determinants are justified by the resource-based theory, while the external determinants are supported by the industrial organization theory (Cavusgil and Zou, 1994; Zou and Stan, 1998; Sousa et al., 2008). This categorization is also consistent with the theoretical framework adopted from previous studies (Aaby and Slater, 1989; Da Rocha and Christensen, 1994; Zou and Stan, 1998). To provide a coherent discussion on the various determinants that influence export firm performance, these factors are grouped under five broad
categories according to the construct they attempt to measure (Sousa et al., 2008). The classifications are namely, Export Marketing Strategy (EMS), Firm Characteristics (FC), Management Characteristics (MC), Foreign Market Characteristics (FMC), and Domestic Market Characteristics (DMC). Whereas EMC, FC, and MC are internal independent factors, FMC and DMC are considered as the external independent factors. Zou and Stan’s (1998) further classify them into Internal-controllable factors (such as the EMSs and some MCs) and Internal- and External-uncontrollable factors (these include some MCs and the external factors- FMCs and DMCs).

3.4.1: Internal Factor- Export Marketing Strategy (EMS)

Among the determinants proposed to influence export performance, the most cited antecedents in literature has been factors related to firm’s export marketing strategy. According to Katsikeas et al. (2000), these are also called intervening variables as they serve as a bridge which links the firm’s skills and resources, environmental opportunities and managerial preferences. Morgan et al. (2004), assert that the underlying premise for a firm’s performance is determined primarily on two basic sets of antecedents. First are the structural characteristics of the firm that determine the competitive intensity the firm faces. Second is the firm’s capability to achieve and sustain positional advantages through the efficient execution of planned competitive strategy.

Some studied EMSs are product, pricing, distribution and promotion strategies, general export strategies, distribution channel relationships and type of channels, export innovation, risk taking and marketing research just to mention a few. Essentially, the elements of the marketing program (i.e., product, price, promotion and distribution strategies) have been explored largely (Albaum, Strandskov, and Duerr, 1998) and are key to superior export performance. As with most determinants of export performance, the results have been inconsistent and contradictory. For instance, some studies found positive associations between product quality (Dominguez and Sequeira, 1993; Louter, Ouwerkerk, and Bakker, 1991; Ryans, 1988), pricing strategy (Namiki 1994; Samiee and Anckar 1998; Styles and Ambler 1994), advertising and firm’s export performance (Amine and Cavusgil, 1986; Fraser and Hite, 1990; Styler and Amber, 1994). Conversely, other studies found that the extent of adaptation of the marketing mix variables (product, price, promotion and distribution) is not significantly associated with export performance (Cavusgil and Zou, 1994; O’Cass and Julian, 2003). This is argued on the premise
that depending on the industry, some firms may choose either the standardization strategy for better performance, while others may achieve better results following an adaptation strategy.

Also, the strategic orientation of the firm has been identified with a corresponding influence on the firm. Several researchers have captured this (e.g. Francis and Collins-Dodd, 2000; Lado, Martinez-Ros, and Valenzuela, 2004) either by the firm’s proactiveness or reactiveness. Proactiveness means that the firm takes the initiative to seek out for opportunities and in investigating alternative responses to the changing export environment. It is quite logical that, within the export context, a proactive orientation is positively associated with the export performance of the firm. Contrary to reactively motivated firms, proactive firms are more aware of internal and external conditions, thereby exhibiting informational advantages that might lead to higher performance levels (Lee and Yang, 1990).

Another determinant in this sub-category that has received much attention is marketing research and innovation. Several empirical studies show that marketing research is very important element and positively influences the firm’s activities; if it will succeed in a domestic and/or foreign market (e.g. Hart and Tzokas, 1999; Ling-yee, 2004; Yeoh, 2000). Knowledge, its acquisition and exploitation, has been declared as a key resource to create sustainable competitive advantages (Nahapiet and Ghoshal, 1998; Tsai and Ghoshal, 1998). For instance, Inkpen (1998) asserts that in this era of global competition, firms succeed not because they have superior control over scarce resource, but because they are able to learn and use this knowledge more efficiently than others (Larsson, Bengtsson, Henriksson and Sparks, 1998). On the contrary, a study by Walter and Samiee (1990), reported a negative relationship between market research and export profits. The relationship between innovation and export performance has been found to be positive and significant (Robertson and Chetty, 2000; Alvarez, 2004; Balabanis and Katsikeas, 2003). However, this relationship is not always significant when innovation is measured in terms of research and development (R and D) expenditure (Sterlacchini, 2001). For example, Lefebvre and Bourgault’s (1998) firm-level study for Canada and that of Lall and Kumar (1981) for India show that research and development intensity does not affect export performance. This is because R and D is simply a partial measure of technology and does not account for incremental improvements in products and processes. Further, the importance of R&D on export intensity differs across sectors and countries; hence, it may vary in results when innovation is measured in terms of the intensity of R&D expenditures.
The last but not least of the factors under this sub-category is the distribution channel relationship and channel types. According to Styles and Ambler (2000), and Ling-Yee and Ogunmokun (2001b) analyses, relational variables such as distribution channel relationship is proven to have positive impact on export performance. Also, Zou and Stan's (1998) reported in their study that while the effects of channel adaptation and channel type on export performance have mixed effects, distribution channel relationship, generally expressed as dealer/distributor support, motivation, and involvement emerges as key determinant of export sales, profits, and growth (Beamish et al., 1993; Cavusgil and Zou 1994; Madsen, 1989). In view of this, Sheth and Parvatiyar (1995) remarked that relationship marketing involves the creation of strong long-term relationships with selected customers, suppliers or other value-chain partners of a firm for mutual co-operation and mutual interdependence.

3.4.2: Internal Factor- Firm Characteristics (FC)

The second class of internal factors is firm characteristics. This has been widely researched and is acknowledged to be correlated with firm export performance (Beamish, Karavis, Goerzen, and Lane, 1999; Cavusgil, 1984; Leonidou, 1998; Sterlacchini, 2001; Duenas-Caparas, 2007; Iyer, 2010; Rodriguez-Pose, Tselios, Winkler and Farole, 2013). These are the factors Katsikeas et al. (2000) referred to as background variables and specifically, as organizational factors (such as the demographic aspects, operating elements, resource characteristics, and goals and objectives) of the exporting firm. Again, Zou and Stan (1998) considered these characteristics as the internal uncontrollable factors since they cannot be readily changed in the short-run but in the long run most of these factors can be changed. Indeed, for a firm to sustain competitive advantage, key assets and skills are necessary sources to make that possible (Day and Wensley 1988; Porter 1985). Some of these relevant assets and skills discussed include but not limited to firm capabilities and competencies, the size of the firm, the firm’s international experience, the firms ownership structure, the firm’s age, its market orientation, and the degree of internationalization or product/market diversification.

Firstly, the firm’s capabilities and competencies (e.g. strong market position, strong human resources and strong functional capabilities) surface as important determinants to export performance (Francis and Collins-Dodd, 2004; Prasad, Ramamurthy, and Naidu, 2001). Prasad et al. (2001) study for instance, reported that possession of competencies as such as product development skills, product quality, technical support/after-sales service, product line breadth,
cost/price (competitiveness), and customer relationship skills enable a firm to enjoy superior export performance; thus skills in product development and good customer relationships have positive effect on export performance. Also, strong human resources, and strong market position have significant effect on export performance (Duenas-Caparas, 2007; Aaby and Slater, 1989; Madsen, 1987). With knowledge as an essential and meaningful organizational asset, attention should also be on the fit that exists, or which can be obtained between specific export market opportunity and the firm’s profile of skills and resources for exporting, because these are likely predictors of export performance (Piercy et al., 1998).

A good number of studies have looked into the relationship between the firm’s size and its impact on export performance, and this independent variable has mixed effects. According to some researchers (Calof, 1994; Katsikeas et al., 1997; Prasad et al., 2001), the size of the firm has been used as surrogate indicator of resource availability (that is, the financial and physical resources at the firm’s disposal). Fundamentally, there are three factors based on these available resources leading to the expectations that the firm/company’s size is positively correlated to the firm’s behavior and performance in export markets (Katsikeas, Piercy and Ioannidis, 1996). These pertain to organizational resources, economies of scale, and the perception of risk in international activities (Katsikeas et al., 1996). Specifically, larger exporting firms are considered to possess more financial and human resources as well as production capacity, hence attain higher levels of economies of scale, and tend to perceive lower levels of risk about foreign markets and operations (Katsikeas et al., 1997; Bonaccorsi, 1992). Some studies empirically conclude that larger firms (Cavusgil and Naor, 1987; Christensen, Da Rocha, and Gertner, 1987; Culpan, 1989) are more likely to export or perform better. According to Kaynak and Kuan (1993), there is a positive relationship between firm size and export sales. Conversely, a negative relationship was found between firm size and export performance by some researchers (Cavusgil and Kirpalani, 1993; Cooper and Kleinschmidt, 1985; Das, 1994), while others found no significant relationship between the sizes of the firm and export performance (Contractor, Hsu and Kundu, 2005; Moen, 1999; Wolff and Pett, 2000). Many explanations have been made for the mixed results. These include reasons such as: a) The non-uniformly used measures (e.g., number of employees and/or total sales of firm) for firm size and the fact that the meaning of small, medium, and large firms is not universal to all countries (Baldauf, Cravens, and Wagner, 2000); b) the use of firms from different sectors or in part for the size variable by variables such
as product cycle maturity or industrial concentration (Contractor et al., 2005); and c) the fact that there is a non-linear relationship between firm size and export; because some large domestic firms may be oriented toward the domestic market and so capitalize on domestic monopoly for their gains (Wakelin, 1998).

Another key determinant is the firm’s international experience. The underpinning theoretical explanation for the relationship between exporting experience and export performance lies in the uncertainty that comes with export activities and basically how firms respond or cope with it (Erramilli, 1991). This uncertainty mainly stem from the lack of knowledge (i.e. objective) about foreign market, and subsequently, the level of knowledge acquired through experience from practical operations in these foreign markets (Forsgren and Johanson, 1992). With adequate experiential knowledge, firms can differentiate environmental conditions, recognize attractive markets opportunities, and adapt marketing strategies to meet the specific needs in those markets (Cavusgil and Zou, 1994). However, empirical studies show mixed results between export performance and international experience. Several studies found that a firm's export experience has a significant positive effect on export performance (Madsen, 1989; Dean Menguç, Myers, 2004; Lado et al., 2004), its degree of internationalization (Dominguez and Sequeira, 1993), and attitudes towards future exports (Gripsrud, 1990). Similarly, other studies report a negative relationship between international experiences and export performance (Cavusgil, 1984, Diamantopoulos and Inglis, 1988; Moon and Lee, 1990; Baldauf et al., 2000; Brouthers and Nakos, 2005).

Along the thoughts of international experience is the complimenting effect of market/product diversification. Diversification as a measure relating to both export markets and products have been used as indicators of export performance in some empirical studies (Katsikeas et al., 2000; Sousa et al., 2008). Intuitively, it is straightforward to argue that diversification offers more export opportunities and might, therefore, lead to increase in export intensity. Beamish et al. (1993) offered evidence that diversified product portfolio has a positive impact on export performance. Cooper and Kleinschmidt (1985) observed that high performance exporters tend to have diversified export markets. In Iyer’s (2010) study of the relationship between market diversification and export intensity for New Zealand firms, his report showed that, there is significant positive association as the more export market destination the easier for the firm to manage the export barriers hence the higher its export intensity.
A new key determinant of export performance that is now receiving empirical attention is the market orientation construct (Cadogan et al., 2002a). According to Narver and Slater (1990), market (or marketing) orientation is defined as the organizational culture that helps to create the most effective and efficient behaviours needed to provide superior value for buyers and eventually, a continuous superior performance for businesses. The importance of this determinant is explained by the fact that it helps to assess the ability of an organization to predict, react and capitalize on changes in its environment (Rose and Shoham, 2002). With this in mind, Cadogan et al. (2002a) defines export-market-oriented activity as: (a) The generation of market intelligence pertinent to the firm’s exporting operations; (b) the dissemination of this information to appropriate decision makers; and (c) the design and implementation of responses directed towards export customers, export competitors, and other extraneous export market factors which affect the firm and its ability to provide superior value for export customers. The rationale for such a relationship indicates that both market orientation and export market orientation are positively related to export performance of the firm (Cadogan et al., 2002a). Thus export-oriented firms benefit by increasing their market orientation, and this has been identified as a key driver of a firm’s competitive advantage (Thirkell and Dau, 1998).

A firm’s age is another widely researched determinant with conflicting relationship to export performance. As a firm matures, the probability to have accumulated knowledge reserve over its operations in a particular export market and/or build its capabilities provides it with leverage to compete in the world market (Duenas-Caparas, 2007). However, these core capabilities can become rigid, as older firms may not afford sudden drastic change in their production lines and concepts. Conversely, according to Kaynak and Kuan’s (1993), younger firms tend to have better profitability since they are more willing to adapt and become flexible, aggressive, and proactive in catering for the demands in the world market. For example, Duenas-Caparas (2007) found a positive relationship between the age of firms’ operation and their export performance. Another study found that a firm’s age sometimes showed a U-shape effect on export performance as it may hamper exporting activities up to a certain point after which it builds a positive impact on export operations (Rodríguez-Pose et al., 2013). In contrast to Ursic and Czinkota’s (1984) findings, Seifert and Ford (1989) found a positive relationship between firm age and export performance.
Furthermore, some studies have investigated firm ownership structure as a determinant for export performance. According to Duenas-Caparas (2007) and Rodríguez-Pose et al. (2013), foreign interest in a local firm or foreign affiliations of a firm and export activities are expected to have a positive relationship on export performance. This is mainly because of the fact that Multinational’s (MNE) have access to superior production, technology, and management know-how that the local firm stands to benefit. Further, MNEs have sophisticated international networks that facilitate the exporting process. This was empirically tested and proven to have a positive relationship (van Dijk, 2002; Duenas-Caparas, 2007; Chen, Wilson and Otsuki, 2006; Rodríguez-Pose et al., 2013).

3.4.3: Internal Factor- Managerial Characteristics (MC)

The third major group of determinants is managerial characteristics. Major variations in export activity can be explained to a significant extent by managerial characteristics (Cavusgil, 1984; Zou and Stan, 1998; Leonidou et al., 1998; Lages, 2000; Katsikeas et al. 2000). The link between managers’ attitudes and perception towards exporting and firm performance need not to be undervalued (Axinn, 1988). Some of the factors that are of concern include management commitment/support, educational background, innovative and professional/international experience, managers’ perceived export advantages and managers’ perceived export barriers (Zou and Stan, 1998; Katsikeas et al., 2000; Sousa et al., 2008).

Among the managerial factors discussed in previous studies, management commitment/support is identified to be the most influential factor for a firm’s export success (Cavusgil, 1984; Evangelista, 1994; Zou and Stan, 1998; Sousa et al., 2008). Empirically, Beamish, Craig and McLellan’s (1993) studies of manager’s commitment for Canadian and U.K firms show a strong evidence linking commitments of managers and export success. The rationale for this view is that, when mangers are committed, they carefully plan the entry of the firms into the export market and ensure to allocate sufficient managerial and financial resources (Cavusgil and Zou, 1994; O’Cass and Julian, 2003). Eventually, uncertainty is reduced and better marketing strategy is implemented effectively, and this leads to better performance (Naidu and Prasad, 1994; Styler and Ambler, 2000).

In relation to educational background, innovativeness, and professional experience, researchers in this area of study report that the training of managers in international business or better-educated managers with good command/ knowledge of foreign languages, and extensive
experience are more successful in exporting (Brooks and Rosson, 1982; Da Rocha et al., 1990; Leonidou, 1998; De Luz, 1993; Dean et al., 2000). In Kammath, Rosson, Patton and Brooks’ (1987) paper, they reported that the skills of managers among Canadian exporters are key factor in terms of export performance. Both Koh’s (1991) study of American exporters and Kaynak and Kuan’s (1993) review of Taiwanese exporters present similar results.

Further, the influence of management’s international experience on export performance has mixed results. For instance, Zou and Stan (1998) and Lages and Montgomery (2005) study revealed a positive relationship between export experiences and export performance. Das (1994) stated that the level of foreign experience influences both exports intensity and sales growth. But Contractor et al. (2005) found no significant relationship between management’s international experience and export performance.

Lastly, management attitudes towards exporting are usually associated with the perception of the number of barriers to exporting and the accompanying returns on their investment. According to Donthu and Kim (1993), companies that perceive fewer risks and barriers to exporting usually have a positive attitude towards it, and as a consequence, is reflected in their export performance. Many empirical studies in the 1980s (Bilkey, 1982; Gomez-Mejia, 1988) and in the 1990s (Cavusgil and Zou, 1994; Donthu and Kim, 1993) have confirmed a positive relationship. Axinn, Noordewei and Sinkula’s (1996) investigation is one of the few studies, which found a negative relation between managerial attitudes and export performance.

**External Factors**

The sieging and fast growing export environment is made up of external-uncontrollable factors that provide numerous possible opportunities as well as threats to firms for their export activities. These are factors that management cannot overlook or underplay but need to strategize and apply all possible resources and effort, in order to the advantage of their businesses. Accordingly, the external factors discussed are divided into foreign market characteristics and domestic market characteristics with industry characteristics inclusive (Sousa et al., 2008).

### 3.4.4: External Factor- Foreign Market Characteristics

Among the foreign market characteristics, factors such as government regulations, export market competitiveness and barriers as well as cultural similarity and local business conventions
have received various study efforts and found to influence export performance (Milanzi, 2012; Sousa et al., 2008; Erramilli and Rao, 1993; Styles and Amber, 1994).

The legal and political environment of an export market is the most cited factor influencing the firm’s export performance. This involves all the interventions foreign governments set in the markets which eventually regulate a firm’s capacity and performance. This may take the form of imposed exchange rate controls that impact firms’ reinvestment, financing and repatriation decisions (Beamish et al., 1993; Cavusil and Zou, 1994). Furthermore, the existence of trade barriers is another factor of important significant effect on the firm’s export performance. Several studies show the influence of different trade barriers on export activities/performance between developed and developing countries, as well as among developed countries (Dean et al., 2000; O’Cass and Julian, 2003; Chen, et al., 2006; Henson and Jaffee, 2008; Milanzi, 2012). Overall, the political and legal structures in a foreign country are expected to have significant effect on export activities and overall performance of the firm.

According to Sousa et al.’s (2008) investigations, cultural similarity is mentioned to be another determinant of export performance. In literature, there is an implicit assumption that it is positively related to export performance (Lee, 1998, Sholam et al., 1995). This assumption lies with the theory that, similarities are easier to manage by the firm than dissimilarities, hence firms with similar markets stand more advantage to succeed. The findings of Lado et al. (2004) report that culturally similar markets reduce the perceived risk of failure and provide incentives to firms with limited exposure to foreign markets to start trading in that area. Moreover, the ease of obtaining and interpreting information on foreign market conditions decreases with cultural dissimilar markets (Boyacigiller, 1990). Despite the above findings, Baklauf et al. (2000) posits that cultural differences have no significant effect on export performance of the firm. To explain this, Zou and Stan (1998) and Sousa and Bradley (2006), asserted that the socio-cultural dimensions are difficult to define clearly and control as it differs among countries, hence the scale to measure the constructs is a challenge as well as having a consistent conceptualization for the variable.

Nonetheless, along the cultural and legal/political factors, market competitiveness has also been found to be an important determinant of export performance. From McGahan and Porter (1997) and Scherer and Ross (1990) studies, this factors are embedded in the structural/institutional forces that determine the competitive intensity in a market. They posit that
this factor have a strong impact on firm performance. However, mixed results are obtained from various studies. For example, when comparing export to developed and developing countries, Sriram and Manu (1995) found that firms that export to developing countries have a better performance than those that export to developed countries. They argue that this exist because of less competition in developing countries. Empirically, Beamish et al. (1993) study of Canadian companies, revealed a positive relationship between exporting to Less Developed Countries (LDCs) and export profit, and the same was found for British exporters. O’Cass and Julian (2003) also claimed that the lack of market competitiveness has a positive contribution to the export performance of the firm, but Morgan et al. (2004) found that a competitively intense market is not significantly associated with export performance. In a contrast argument, Kaynak and Kuan (1993) posit that high performers must export their products to industrialized markets/countries due to the existence of more favorable instructional conditions in those countries, as this will influence their export performance positively. Again, Sousa et al. (2008) reported that another reason firms will perform better in more competitive markets is that it prevents firms from being excessively relaxed as this is highly possible with markets which are easier to operate in and less competitive.

Individual components such as market attractiveness, environmental hostility, customer exposure, and economic similarity summed up to influence the degree of market competitiveness. But these factors have been empirically analyzed individually. Cavusgil and Zou’s (1994) study on export market attractiveness (that is economic development and demand potential) found an indirect effect on export performance, while Kaynak and Kuan (1993) reported a negative relationship. On the contrary, Zou and Stan’s (1998) reported that export market attractiveness have a positive impact on export performance. Furthermore, Balabanis and Katsikeas (2003) research suggest a positive influence of non-hostile environments on export performance, and also a positive effect from markets that are economically similar (Balabanis and Katsikeas, 2003; Brouthers and Xu, 2002). Accessibility to distribution channels and the degree of familiarity and exposure of customers to export products also appear to have a positive effect on the export performance of the firm.
3.4.5: External Factor-Domestic Market Characteristics

The final category refers to the domestic market characteristics. Main issues discussed from previous studies include the influences of export assistance, environmental hostility; domestic market attractiveness and national export policies.

As stated by Lages (2000), politico-legal issues in domestic market, such as changes in export policies, and the lack of or non-existence of governmental agencies to support export activities are key determinants to export performance. For example, Katsikeas et al. (1996) found a positive relationship between national export policies and extent of export performance.

Similar to the effects in foreign markets, when firms face a benign domestic environment it promotes its business operations and indirectly affects its export intensity (Robertson and Chetty, 2000). Kaynak’s (1992) investigation of Canadian firms indicated that the region where a firm is situated is extremely important to their export performance. According to their report, a difference is noticed based on the type of products exported (i.e., industrial versus consumer goods), the principal export products (i.e., advanced technology versus less sophisticated), and finally the type of end-users. Also, researches indicate that the existence of programs sponsored by government and non-governmental agencies designed to assist firms’ export activities contribute positively to the export performance of the firm (Lages and Montgomery, 2005; Alvarez, 2004; Gencturk and Kotabbe, 2001).

It is noticeable that the type of competition faced by a firm in the domestic market also affects its export performance. While Madsen’s (1989) survey reported a negative influence of domestic market attractiveness on export sales, Cooper and Kleinschmidt’s (1985) findings revealed that domestic market attractiveness (i.e., domestic market potential and market growth) influences export intensity. The level of competition a firm faces in the domestic market is largely influenced by the sector/industry the firm operates within (Iyer, 2010). Clougherty and Zang (2008) summarized two conflicting viewpoints on the effect of competition. On the one hand, greater industry concentration (low competition) allows firms to garner scale of economies, which can be critical while competing in the international market place. On the other hand, it has been observed that concentration provides little incentives to improve performance and to identify new markets or indulge in product diversification. Zhao and Zou (2002) found that the more a firm acts in a concentrated sector, the less the firm will be prone to improve its export performance. Surveying the evidence of the effects of competition on export intensity,
Morgan (1999) concluded that the results vary across studies. If an industry/sector as a whole is characterized by high export intensity, it possibly reflects the competitive advantage of the sector in the international market. Arguably, therefore, the export orientation of the sector could be a determinant of firm level export intensity. Naidu and Prasad (1994) noted that firms in export intensive sectors are more likely to learn to become more regular exporters (Iyer, 2010).

Industry characteristics do affect firms within the domestic market context. To paint a better picture of these characteristics, many empirical studies have investigated some of the variables and discussed their effects in the exporting context (Cavusgil and Zou, 1994; Holzmuller and Kasper, 1991; Holzmuller and Stottinger, 1996; Das, 1994; Naidu 1994). Some of the variables include the industry’s stability, level of competition, industry’s technological intensity or manufacturing complexity, predictable changes, risk level and a number of new competitors (Das, 1994, Zou and Stan, 1998). The manufacturing complexity or technological intensity of the industry which is most discussed, refers to the level of technical know-how involved with products produced, and is found to have a positive influence on export performance (Cavusgil and Zou, 1994; Holzmuller and Kasper, 1991; Holzmuller and Stottinger, 1996). Holzmuller and Kasper’s (1991) study specifically found that the higher the manufacturing complexity of Australian firms, the better their export performance. But another investigation (Cavusgil and Kirpalani, 1993) found mixed findings when analyzing the impact of technological intensity on export performance.

3.5: Conclusions

This chapter explains the measures and determinants of export performance in the export performance literature. Using both internal and external factors to define the outcome of export performance of firms, a holistic picture of the antecedents of firms export activities is presented. However, it is evident from the literature that the determinants of export performance is fragmented and diversified. Also, the theoretical framework that helps in the development of the conceptual framework is discussed, this is the RBV of the firm. The RBV of the firm emphasises that resources are central to understanding the firm’s export performance given that the firms respond to the export environment differently. This leads to the next chapter where graphically, the relationship between some of the discussed determinants and the firm’s export performance are discussed.
Chapter 4: Conceptual Framework

This chapter develops a conceptual model that provides a framework to understand better the export performance of agri-food exporting firms: in the context of food safety regulations and standards. The conceptual model is used to specify the hypotheses, which will be tested empirically. The conceptual model also lays a foundation for the empirical framework in terms of the variables to be included in the analysis.

4.1: Conceptual Model

The activities of the firm are very dynamic and a process full of identical or diffuse stages and practices that explain the antecedents of its export performance. The available literature on export performance explicitly identifies two set of factors (i.e. internal and external factors) that determine the impact on firm’s export activities, and consequently, its overall export performance. Aside the various export market challenges (e.g. price competitiveness, transport cost, market competition etc.) firms contend with, an additional weight and demand is placed on them through the food safety requirements set in the various export markets.

The highlight and key contribution of this study to the literature on export performance is introducing the construct “Food Safety Challenges” as a latent variable. Management attitude towards export activities is connected with the perception of a number of barriers to exporting and the accompanying returns on their investment. This construct thus reflects the perception among management and how much of a challenge food safety regulations (and private standards) of importing countries pose for a firm’s export efforts/performance.

In the absence of a widely accepted, coherent and comprehensive theoretical framework for the analysis of export performance at firm level, this study presents two analyses with two different conceptual models. The first model focuses on the determinants of the food safety challenge construct, and the second model measures its impact on export performance. These two models will be presented after introducing the new construct of Food Safety Challenges and discussing its relations to existing literature and its measurement.

4.2: Food Safety Challenges Construct

Increase in international trade has made food choices diverse for consumers, but this privilege presents with it the likelihood of new food safety risks, thus triggering for food control measures. This control measures is achieved through set food safety regulations and standards which aim to
control food supply chains. According to Josling et al. (2004) and (Henson and Humphrey, 2010), the proliferation of these food safety standards, and the associated systems of food control and inspections, potentially pose challenges to agri-food trade. These challenges come in diverse forms; in some cases they stop trade from taking place entirely, and in others result in the seizure of consignments or a ban of specific food products (Buzby and Roberts, 2011; Baylis et al., 2011). Therefore, in the context of this study, food safety challenges is used as an index representing the various challenges firms face as they comply with various food safety regulations and standards in their export markets. Hence, this study argues that this construct represents one of the perceived barriers that could impede export operations by firms and thus its export performance. Some of these challenges include regulations on maximum pesticide/drug residue levels in food products, microbiological pathogens such as E. coli, Salmonella sp., and GMOs. The resulting reduction or increase in their export performance is tied to cost-raising effects as represented by factors such as product redesigning, complete implementation of specific process or product standards, and building administrative systems (Wilson and Otsuki, 2001; Chen et al., 2006).

It is particularly important to include this construct in the analysis of agri-food export performance at firm level because despite the barrier posed to trade, the change in export performance for a particular firm is contingent on the resources the firm possesses and/or controls in order to manage these challenges; thus helps to understand the resource position and capabilities of the firm. Also, it allows to determine the degree to which this construct impact the export performance of agri-food exporting firms, as it invariably shapes the home industry where the firm operates, and also affects the external resources the firm needs to access facilitate export activities. Again, with the little evidence from previous studies (see for example, Wilson and Otsuki, 2001; Mitchell, 2003; World Bank, 2005; Chen et al., 2006; Masakure et al., 2009, 2011) showing that food safety regulations and standards are a challenge to firm export performance, it provides the platform to understand the efforts from firms towards upholding their reputational image or integrity in terms of their compliance to food safety regulations and standards.

This construct is operationalized through various food safety requirements and other associated food safety systems and practices. Specifically, it includes regulations and standards governing microbiological pathogens, pesticide and veterinary drug residue levels, food allergens, genetically modified organisms (GMOs); and food safety management systems and
practices such as implementing HACCP, good manufacturing practices (GMP), good agricultural practices (GAP), traceability controls, bioterrorism notification requirements, product testing requirements, and process registration requirements. Refer to chapter 5 where it is described in detail how construct was operationalized empirically.

4.3: Food Safety Challenge Model

Having looked at the theoretical base and importance of food safety challenges in the analysis of agri-food export performance at firm level, this section focuses on the determinants of food safety challenge itself. As shown in Figure 4.1 below. From the Figure 4.1, internal and external factors are employed as determinants of food safety challenge. The internal factors used in this study deviate from two out of the three broad categorizations (i.e. Export Marketing Strategy (EMS), Firm Characteristics (FC) and Managerial Characteristics (MC)) presented in chapter 3; by specifically adopting some indicators from the firm characteristics classification and combining the EMS and MC into the food safety capacity construct. For instance, export innovation and general export strategies under the EMS classification, as well as educational background from the MC are captured in the food safety capacity construct. In the case of external factors, the constructs strictness of food safety requirements, and level of food safety risk represent some level of legal and political environment in which the firm operates (i.e. this falls under the Foreign Market Characteristics (FMC)) whiles access to external food safety resources is under the auspices of influence of various export assistances that help firms function properly (i.e. the Domestic Market Characteristics (DMC) category).

This model therefore explains the relationship between food safety challenges as it relates to different firms, based on their firm characteristics, food safety capacity, and strictness of food safety requirements, level of food safety risk, and its access to external food safety resources. Conceptualization and literature review for each latent construct as well as the relational linkages in the proposed model are presented below.
4.3.1: Firm Characteristics

On the foundation of the RBV theory of the firm as explained in the export performance model (below), firm characteristics are adopted as additional variables that may be relevant to explain the scope at which food safety challenge may impact a firm. Thus, factors such as the firm age, firm size, firm ownership structure, and firm export experience/international experience are used for firm characteristics.

Firstly, even though firm age has been established as a control variable, its relation with export is first of all ambiguous and this could be ambiguous with food safety challenge as well (Chen et al., 2006). For instance, older firms might be more experienced with international trade, while new firms may use relatively modern technology to increase their productivity and product quality. But on the other hand, in the light of the knowledge acquired over a period of time in
export related activities, it is also expected that, a firm would have the basic if not adequate level of exposure to the food safety regulations and standards within that export market, there by indirectly lowering the probability of food safety requirements being a major challenge. Hence, the hypothesis is that:

**H\textsubscript{1a}: A firm’s age has a negative relationship with the level of food safety challenges faced.**

This study intuitively and by introspection argue that, as a firm’s ownership structure opens it up to various superior resources through some form of foreign affiliation or foreign interest in its export activities, which can boost its export performance (Duenas-Caparas, 2007; Chen et al., 2006; Rodríguez-Pose et al., 2013), it likewise may affect how the firm mitigates or succumbs to food safety challenges. With foreign interest at a firm’s disposal it can be inferred that it should be previewed or acquainted to food safety requirements more easily within their specific export markets and to take the necessary steps to curtail its impact. Even so this does not necessarily guarantee a win over food safety challenge. Nevertheless, this study hypothesize that:

**H\textsubscript{1b}: Foreign ownership has an inverse relationship with the level of food safety challenges faced.**

Again, with reference to the export performance literature which shows that export experience or international experience allows a firm to gain customer loyalty and enlarge its social network (Lado et al., 2004), this study assumes that it may have a spill effect on how the firm responds to food safety challenges. Thus with much international experience at a firm’s disposal this study posits that it is much easier to tone down the effects/challenges to which food safety requirements become an issue. This therefore leads to the hypothesis that:

**H\textsubscript{1c}: Higher export experience reduces the food safety challenges a firm faces.**

Lastly, firm size is used as a surrogate indicator of the firm’s resource base in previous studies (see for example Calof, 1994; Katsikeas et al., 1997; Prasad et al., 2001; Dhanaraj and Beamish, 2003). This means that firm size may correlate with export performance positively or negatively, and this can indirectly show its relationship with food safety challenge as well. The assumption here is that firm size as a measure of a firm’s resource base can help define its relationship with food safety challenge. Since larger firms are generally regarded as more capable of bearing the large investments and high risks associated with exporting (Bernard and Wagner 1997, Aitken et al. 1997, Roberts and Tybout 1997), it can be expected to have a negative relationship with food safety challenge all things being equal. Nevertheless, with the
dispersed outcome on firm size with its export performance, this study posits that the relationship between firm size and food safety challenge cannot be determined *apriori*.

### 4.3.2: Food Safety Capacity

It is emphatic and evident that food safety regulations and standards shape the export activities in export markets. These standards obligate firms to meet additional requirements that may come in the form of possessing specific resources (such as appropriate certification, labeling, equipment, etc.) and/or change some practices or synchronize with new ones. From the model above, the firm’s food safety capacity construct is the conversion factor and/or link that define the extent to which the firm’s access to both internal and external resources have been translated to impact on its overall performance. Thus, the assumption that in the long run food safety capacity show how food safety challenge is suppressed by the firm. This food safety capacity latent construct is also indirectly affected by the firm’s characteristics as it synchronizes with the internal resources accessible to the firm. As an example, a few studies showed that adequate knowledge owned by managers regarding the needs of customers in relations to food products supplied will positively affect the firm’s export intensity and profit (Piercy *et al*., 1998; Sousa *et al*., 2008). The instruments adopted to measure the food safety capacity of the firm in this study include the internal food safety resources; the food safety systems implemented within the firm, and the firm’s certification to food safety standards.

The food safety standards literature shows that informational problems affect the firm’s ability to export (Chen *et al*., 2006). Therefore, Alvarez and Crespi (2003) and Alvarez (2004) conclude that exporting firm’s awareness of trade measures and technical requirements, including the need to certify to various food standards influences the firm’s capacity to handle food safety standards. Masakure *et al*.* (2011) showed in their study that the level of awareness of quality management meta-standards had positive impact on the certification intensity of firms in Pakistan. Also in Chen *et al*.*’s (2006) work, they posit that building exporters’ capacity in meeting standards will help firms diversify their export markets and improve the stability of their sales given the uncertainty in international markets. This construct is very crucial to this study to help explain the export performance of the firm as it responds to the food safety requirements in export markets. Therefore, the following propositions are made:

**H2a:** The greater the level of internal food safety resources of the firm, the lower the food safety challenges faced.
\( H_{2b} \): The implementation of food safety systems by a firm reduces the food safety challenges it faces.

\( H_{2c} \): Certification to food safety standards reduces the food safety challenges a firm faces.

4.3.3: Level of Food Safety Risk Requirements

No doubt food safety issues are becoming increasingly important in the face of the high demand for safe food by consumers. This provides for food producers within their borders and outside of their borders the responsibility to supply safe food. These food safety requirements emerge from the activities of the export market as well as the host country. Thus, the food safety environment embraces all governmental and private sector (customers’ demands inclusive) regulations and standards relating to labeling, packaging, meeting traceability requirements, and various food safety certification (Otsuki et al., 2001; Henson and Humphrey, 2010). These food safety regulations and standards evolve differently around the world, as countries respond to food safety crises and prepare for perceived exposure to emerging food safety risks distinctly (World Bank, 2005). That said the response of a particular industry to food risk tolerance determines the stringency of the food safety requirements set for firms to fulfill (Mitchell, 2003). This food risk tolerance level is specifically aggravated depending on the type of food sector (either being the meat sector, fruits and vegetables sector, etc.) in question. This is more evident through the spill-over effects on firms as food safety regulations and standards become defaulted by a single firm’s activities to a particular export market (Lindsay, 1997; Henson and Caswell, 1999; Mitchell, 2003). Again, this perceived food safety risk determines or reveals the resources and effort firms are willing to invest into their product and process activities that eventually reflect on their overall export performance. Thus, fosters the hypotheses that:

\( H_3 \): There is a positive relationship between the level of food safety risks inherent in a firm’s products and the food safety challenges faced by the firm.

4.3.4: Strictness of Food Safety Requirements

Now, food safety regulations and standards set to govern the production and processing of safe food is not limited to specific industries only, but can also be influenced by the food safety concerns from a host market environment either because of certain food characteristics (for example in organic foods, GMOs), the kinds of customers or various consumer concerns. According to Mitchell (2003), Buzby (2003), and Buzby and Roberts (2011), the extent to which
consumers’ demand safe food influences the level of government interventions, which are set through food safety regulations and standards to provide their needs and that of society at large. This is severely reflecting in the various private standards set against food safety matters (Henson and Humphrey, 2010; Henson, 2008) and more so to curtail the many food safety hazard incidences which have occurred and yet to occur (Buzby and Roberts, 2011).

Furthermore, branding is a marketing strategy adopted by firms, in response to changes in demographic structure, consumer incomes, and tastes and preferences. This effort differentiates their products in the market and can ultimately win a reputation for their supplied products. According to Jolly (1987), branding results in high technical cost, but also postulated that it has the potential to find firms a market niche to about 10-15 percent as the market and food-systems change. This comes with it a great responsibility on the firms that supply such products. It means firms must embrace all evolving food safety regulations and standards that are critical to enhance the safety of the food products they supply, sustain their reputation, and derive and repeat sales (Mitchell, 2003). Any deviation from these necessary standard can cost the firms immensely either through a loss of sales and equity or a permanent shut down of their production of such food products (Buzby et al., 2001, Thomsen and McKenzie, 2001; Henson and Northen, 1998). These incidences will eventually result in stricter food safety requirements in most cases, thereby, have supply implications on export firms, as well as affect major food service businesses. The proposition therefore is:

**H4:** There is positive relationship between the strictness of food safety requirements faced by the firm and the food safety challenges it faces.

### 4.3.5: Access to External Food Safety Resources

The labeled construct, external resources (food safety specific) embrace the various resources that emanate and/or deemed as necessities for the firm’s productivity. Empirically, there are resources that are readily available for the firm’s use because they are part of its internal resource reserve (Dhanaraj and Beamish, 2003; Purchase, 2004; Pinho and Martins, 2010; Milanzi, 2012). This study posits that the external environment (which comprises of the specific industry and home market in which the firm is established and operates) also provides some level of resources, which can buffet the internal resources available to the firm.

It is therefore worthwhile to mention that, there is a significant impact from the external environment on the firm’s export activities, and this is expressed through the kind of external
resource opportunities the firm can and/or is able to access in order to curtail the enormous effects food safety regulations exude on its export activities. For example, managers/employees skills or knowledge could result from the international experiences over the years but again, training received from a consultant expertise services can add to their knowledge thereby filling any knowledge deficits, and eventually help improve their export activities. Samiee and Walters (2002) and Shaw and Darroch (2004) reported that a firm’s access to requisite knowledge of export markets and available services from expertise positively impacted export performance of the firm. Therefore, the variables adopted in this study as external resources (food safety) index include access to consultant expertise services, level of assistance to exporters and governmental support/incentives (in the form of inspection process conduciveness, third party certification agencies, and laboratory services), and food safety training services as well as auditing processes. Some of these resources have been empirically tested and proven to affect firm’s export performance. This suggests that the higher the level of resources available to the firm, the less of challenge food safety requirements to the firm, hence the greater the export performance the firm can yield. This provokes the hypothesis (H5), which is:

**H5:** The greater the access to external food safety resources, the lesser the food safety challenges faced by a firm.

### 4.4: Conceptual Model for Export Performance

After looking at the determinants of food safety challenges, the next conceptual model stage addresses the determinants of export performance. As shown in the Figure 4.2, the model focuses on the impact of food safety challenges on the export performance of firms after controlling for other internal and external factors. In the context of this study, export performance is measured as change over five years in the total export sales of the firm’s operations, not for a particular country. Hence, the changes in export performance may be due to gaining new market access, expanding in established export markets, losing business in, and in extreme cases dropping out of established export markets.

Consistent with literature, this model uses the two groups of factors (i.e. the internal and external factors) that determine firm’s export performance, but with some level of deviation from the explanations in the literature review in chapter 3. Given in the Figure 4.2 below as internal factors are firms’ characteristics, and access to various resources. This choices of internal factors deviate with respect to the conventional variables, such as, (for example, variables such as
management expertise/support, education, market research, general export strategies, and marketing program), listed under the Export Market Strategy and Managerial Characteristics classifications, as some cannot easily be measured and others can be tied to some firm characteristics. Nevertheless, most of these variables are implicitly captured in the access to resources construct, as they function as mediating variables that serve the purpose of a form of resource needed in a firm for its operations. They also complement the variables chosen for firm characteristics, which are termed as background variables of the firm (see Katsikeas et al., 2000).

A second deviation in the internal factors chosen for this second model is the food safety capacity construct (represented in the first model). Even though similar to the access to resources construct, this construct is made up of resources that the firm uses specifically to address food safety requirements in their export markets, whereas access to resources is made up of generic resources needed for the general proper functioning of the firm.

In line with Tesfom and Lutz (2006), the external factors adopted are associated to the nature of the home-market in which the firm conducts its local activities, as well as the foreign market environment where the firm performs its export activities. Although food safety challenges can be influenced by internal and external factors, these relations are not explicitly modelled, because the first model has done so. Conceptualization and literature review for each latent construct as well as the relational linkages in the proposed model are presented below.

**Figure 4.2: Model 2 - Firm Export Performance**
4.4.1: Export performance

Export performance, a widely studied construct, refers to the outcomes of a firm's export activities (Katsikeas et al., 2000 and Shoham, 1998) although conceptual and operational definitions vary in the literature (Aaby and Slater, 1989; Madsen, 1987; Shoham, 1998). Adopting the arguments by the RBV (Barney, 1991) and SCP theory (Bain, 1951, 1956), this study incorporates some variables internal and external to the firm. The internal factors that influence export performance include product and firm characteristics, while the external factors are industry and market characteristics (Cavusgil and Zou, 1994, Leonidou et al., 2002; Sousa et al., 2008). In this study, firm characteristics (such as firm age, firm size, ownership structure, etc.) and the firm’s access to resources (such as appropriately skilled labour, technology orientation, storage and production capacity, etc.), are acting as the firm's internal factors (Duenas-Caparas, 2007), while market factors (e.g. transport cost, market competitiveness, etc.) stand for the external characteristics (Chen et al., 2006; Iyer, 2010; Milanzi, 2012). An extension of the market factors is the introduction of food safety challenges (i.e. various food safety requirements) (Chen et al., 2006), which is separated in order to first avoid the overshadowing effects that other market variables may have on export performance, and second to ascertain whether this construct directly impacts export performance.

4.4.2: Firm Characteristics

Theoretical development in the RBV of the firm points to the fact that firm characteristics serve specifically as organizational and human resources base of the firm (Purchase, 2004). Therefore, the factors employed in this study to explain the firm’s characteristics include firm age, firm size, firm ownership structure, firm export experience or international experience, and the training given to employees. On the basis of prior literature, these listed factors are expatiated and given to various hypotheses to suggest its influence on the firm’s export performance, but the foundational hypothesis signifying the impact of these factors is given that:

H₆: All things being equal, the following firm characteristics impact the export performance of the firm:

- Firm age,
- Firm ownership structure,
- Firm export experience or international experience, and
- Training given to employees,
• Firm size.

First and foremost, firm age has a conflicting relationship to export performance but still serves as an important antecedent to superior export performance in the literature. The argument is that as a firm matures, there is a higher probability for it to accumulate knowledge reserve in its operations in a particular export market and this builds its capability and the leverage to compete in the world markets (Duenas-Caparas, 2007). Hence, the hypothesis is that:

\[ H_{6a}: \text{A firm's age has a positive impact on its export performance.} \]

The firm's ownership structure seems to open it to various external and internal resources. Empirical studies show that foreign interest in a local firm and/or foreign affiliations provide the firm with superior production, technology, and management know-how, and this impacts the firm export performance positively (Duenas-Caparas, 2007; Chen et al., 2006; Rodríguez-Pose et al., 2013). In response to these facts, it is expected that foreign-owned and/or affiliated firms would have a relatively greater and positive relationship on their export performance than would be for a locally owned firm. This leads to the hypothesis:

\[ H_{6b}: \text{Foreign ownership has a positive impact on a firm's export performance.} \]

Again, the export literature show that the international experiences of firms help to bridge its knowledge gap with respect to activities in export market, while it improves its social network and opportunity to meet customer needs (Lado et al., 2004). Some studies have proved that the export experience of firms impacts export performance positively, increase the degree of internationalization as well as build positive attitude to future expect market (Gripsrud, 1990; Dominguez and Sequeira, 1993; Lado et al., 2004). In view of this, this study argues that a firm with greater export experience is more likely to experience higher export performance. This therefore leads to the hypothesis that:

\[ H_{6c}: \text{The greater a firm's export experience, the greater its export performance.} \]

Training of employees either in the form of on-job training or needed training prior to job commencement cannot be overemphasized with regards to the effectiveness and efficiency a company needs to survive competition. According to Duenas-Caparas (2007), training of workforce is a proxy measure of technological capability and have a positive relationship with export performance. This becomes evident as skill development workshops and distinct trainings enhance learning and accumulate additional skills that can improve productivity and consequently influences the firm’s export performance. So the level of employee training or a
lack of it should have a positive or negative correlation to the firm’s export performance. Thus, with a thoroughly invested effort towards the training of a firm’s workforce, this study posits the hypothesis that:

**H$_{6d}$**: Employee training positively impacts the firm’s export performance.

Finally, the size of the firm is seen as an indicator of the managerial, physical and financial resources available in the firm, which provides firms with appropriate resources and opportunities to be involved in export activities, as well as improve their export performance (Calof, 1994; Katsikeas *et al.*, 1997; Prasad *et al.*, 2001). In spite of this, there is also mixed results when it comes to the size of the firm and its export performance. Larger firms are generally regarded as more capable of bearing the large investments and high risks associated with exporting (Bernard and Wagner 1997, Aitken *et al*. 1997, Roberts and Tybout 1997). However, some researchers found negative or no relationship between firm size and exports (Cavusgil and Kirpalani, 1993; Das, 1994; Wolff and Pett, 2000; Contractor *et al.*, 2005).

**H$_{6e}$**: Larger firms have better export performance than their smaller counterparts.

### 4.4.3: Firm-Level Access to Resources

The exporting literature explicitly has addressed many resource issues with a comprehensive classification from several studies (Purchase, 2004; Jalali, 2012). Following therefore from the RBV, some empirical studies use simple classifications such as tangible and intangible resources (Michalisin *et al.*, 1997; Zou and Stan, 1998). Tangible resources have physical properties and would include resources categorized as physical capital resources. These include various types of property, plant, equipment, and other physical technologies. The intangible resources lack physical properties and would include much of the resources in the categories of human capital resources (e.g., know-how, experiences, judgment, etc.), organizational capital resources (e.g., social relationships, organizational systems, etc.) (Hall 1992, 1993), and technological resources (Andersen and Kheam, 1998). However, physical, and tangible resources are not necessarily rare resources because they are often purchasable on the open market (Michalisin *et al.*, 1997). Thus, intangible resources receive more attention from researchers, as they are difficult to imitate (Hall, 1993; Michalisin *et al.*, 1997).

In view of Michalisin *et al*.’s (1997) classification of resources into tangible and intangible resources, this study’s firm resources' category is a combination of classifications in the above-mentioned studies. For instance, the physical resources used in this study include its
access to raw materials, proprietary process, and equipment. Though some of the physical (tangible) resources may be imitated (Schroeder et al., 2002), a firm can maintain its competitive advantage as it continuously develop and improve its operations (Barney, 1991). Thus, superior export performance is linked to advantages in physical resources (Piercy et al., 1998).

Also, some of the human capital resources employed include training of employees, management expertise, human knowledge, and skills. RBV suggests that human knowledge and skills are the most important resources to many businesses (Wang and Oslen, 2002). Human resources in this study focuses on managers and employees, with more emphasis on the managers since the availability of educated and experienced individuals (especially decision-makers with wide variety of skills and networks) are regarded as key factors influencing business survival and development (Bjerke, 2000; Westhead et al., 2001).

Organizational resources such as access to export-oriented information to export market, awareness of export market opportunities, and distribution capacity among others were used. Also, the financial resource base of the firm is used as a proxy for the size of the firm (Dhanaraj and Beamish, 2003) hence, the firm’s access to credit and financial capitals were included. Moreover, adequate financial resources are positively associated with high level of performance (Piercy et al., 1998).

Lastly but not least, the level of technological resources has significant impact on the export operational activities of the firm. Resources such as process-related knowledge for required product characteristics, and packaging as well as research and development intensity affect the technological competence of the firm, resulting in better export performance. A conglomeration of these various resources and its availability and usage in any firm places it on the pedestal to be able to meet any challenge in its export activities, hence the expectation that a good resource base of the firm should give a less probability of adverse effect of food safety challenges. This leads to the following proposition.

**H7: The greater a firm’s access to resources, the greater in its export performance.**

4.4.4: Market Factors

As discussed earlier in previous chapters, exogenous barriers emanate outside the firm’s environment, primarily due to the activities of the other agents such as customers, suppliers, competitors, and governments (Milanzi, 2012). These barriers either potentially inhibit or escalate the export activities of the firm, as they arise from either the host market and/or the
home market (Pinho and Martins, 2010). For instance, the prevailing legal and political structures, market competitiveness, and set government regulations have been found to determine the competitive intensity in a market, which affects the firm’s export performance directly (Scherer and Ross, 1990; McGahan and Porter, 1997; O’Cass and Julian, 2003; Chen et al., 2006; Milanzi, 2012). Again, market interactions that surrounds food safety result in the flow of effects, in that these interactions unavoidably birth food safety regulations and standards needed to provide the minimum optimal level of food safety required by customers, while these requirements also regulate prices and the level of competition among suppliers (Mitchell, 2003; World Bank, 2005). Relying on the extant studies on export performance, this study argues that the firm’s good export performance is dependent on overcoming and/or barricading the extent to which these barriers affects their activities.

This study adopts variables such as market competition, price competitiveness, access to and/or cost of market distribution channel, transport cost, customs and other border formalities, exchange rate volatility, duties, import quotas or other trade restriction, and subsidies paid to specific market suppliers of certain products among many others as the external determinants to the firm’s export performance (Leonidou, 2004; Julian & Ahmed, 2005; Chen et al., 2006; Sterlacchini 2001; Herath et al., 2007; Otsuki et al., 2001; Milanzi, 2012; Impullitti et al. 2013). These studies argued that, there is significant correlation between the traditional market factors and export performance. Therefore, this proposition is made:

**H₈: Market factors negatively impacts a firm’s export performance.**

### 4.4.5 Food Safety Challenge

With reference to the preceding discussion in section 4.2, this study hypotheses that:

**H₉: A firm’s export performance is negatively impacted by the scale of food safety challenges it faces.**

### 4.5: Conclusions

The conceptual model explained above and the proposed linkages leads to the empirical analyses explained in the next chapter. It hangs mostly on the RBV of the firm with much emphasis on the firm’s access or possession of internal and external resources which are either specific to food safety implementation and/or control systems, or generally, the resources which are needed for the overall effective running of the firm’s daily business. The internal and external factors create
the web that influences the firm’s export activities. But in this study, the main focus lies on the food safety challenges within the external factors which are beyond the control of firms. In the same vein, one of the major focuses of this study is on the construct food safety capacity; as this mediating construct defines the extent to which the firm utilizes its resource base in order to improve its export performance. With this in mind, the chapter that follow spells out the various items that measure the main constructs stipulated in the models under discussion.
Chapter 5: Empirical Framework

This chapter specifies the empirical models and estimation procedures used for the data analysis. The following section describes how the variables used in the analysis were measured. Each of the two models, (i.e. food safety challenge index and export performance) is summarized separately in tables 5.1 and 5.2, which also show the expected sign of the independent variables’ coefficients as the direction of its impact on the dependent variable. This is followed with a summary section of the survey development and data collection. The third section gives the empirical models and procedures for estimating the determinants of food safety challenge as well as the export performance of the firm. This chapter concludes with a summary of the entail chapter and links it to the results chapter.

5.1: Measurement of variables

Tables 5.1 and 5.2 below presents the operationalization of the dependent and independent variables used in the analysis along with their expected signs.

5.1.1: Food Safety Challenge Model

The dependent variable represented in this study is the food safety challenge index (FSIndex) shown in Table 5.1 below. There is no universally accepted measure of food safety challenges though there are many itemized requirements in literature which points to food safety treats or concerns. In this study, this is defined as the various challenges firms face complying with food safety regulations and standards. To measure this index, respondents were asked to rate how challenging various food safety requirements were to their export activities in their respective export markets. Eighteen items were used base on literature review (see for example Caswell et al., 1998; Josling et al., 2004; GATT SPS, 1994; World Bank, 2004, 2005; Chen et al., 2006). The items included food safety regulations and standards on pesticide residues, heavy metals, GMOs, food or feed additives, food allergens, mycotoxins, veterinary drug residues; as well as food safety management systems and practices such implementing HACCP, good manufacturing practices (GMP), good agricultural practices (GAP), traceability controls, bioterrorism notification requirements, product testing requirement, and process registration requirements. Respondents were required to rate the degree of challenge for each on item on a five-point Likert
scale, where one signifies “very minor” and five is “very major”. Refer to Table 6.2 in chapter 6 where these items are explained.

Table 5.1: Variable names, Measurement and Expected sign for Food Safety Challenge Model

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable Name</th>
<th>Measurement</th>
<th>Expected Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Safety Challenge</td>
<td>FSIndex</td>
<td>Mean score of 18 item scale measured on a 5 point Likert scale: 1= Very minor to 5= Very major</td>
<td></td>
</tr>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>Size</td>
<td>Total sales in millions of Canadian dollars</td>
<td>+/-</td>
</tr>
<tr>
<td>Firm age</td>
<td>Age</td>
<td>Number of years since start-up</td>
<td>-</td>
</tr>
<tr>
<td>Firm Ownership</td>
<td>Ownership</td>
<td>Locally owned (1=yes; 0= otherwise)</td>
<td>-</td>
</tr>
<tr>
<td>Firm export experience</td>
<td>Exptexp</td>
<td>Number of years exporting</td>
<td>-</td>
</tr>
<tr>
<td>Level of food safety risk</td>
<td>FSRisk</td>
<td>Measured on a 5 point Likert scale: 1= Very low to 5= Very high</td>
<td>+</td>
</tr>
<tr>
<td>Strictness of food safety</td>
<td>FSStrict</td>
<td>Measured on a 5 point Likert scale: 1= Much Less strict to 5= Much more strict</td>
<td>+</td>
</tr>
<tr>
<td>Access to external Food Safety Resources</td>
<td>FSExt_Res</td>
<td>Mean score of 5 item scale measured on a 5 point Likert scale: 1= Very difficult to 5= Difficult</td>
<td>-</td>
</tr>
<tr>
<td>Food Safety Capacity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal food safety resources</td>
<td>FSInt_Res</td>
<td>Mean score of 8 item scale measured on 5 point Likert scale: 1= Very strong to 5= Very weak</td>
<td>-</td>
</tr>
<tr>
<td>Food safety systems implemented within the firm</td>
<td>SysImp</td>
<td>1=yes, 0=otherwise</td>
<td>-</td>
</tr>
<tr>
<td>Firm certification to various food safety standards</td>
<td>Cert</td>
<td>1=yes, 0=otherwise</td>
<td>-</td>
</tr>
</tbody>
</table>

Various variables are adopted from the literature as potential determinants of a firm’s perceived intensity of food safety challenge. Representing firm characteristics, five measurable variables were used; this includes firm size, firm age, firm ownership and firm export experience. There is no universally accepted measure for capturing **firm size (Size)**, and several size indicators have been suggested in the general literature. According to Katsikeas et al. (2000), the commonly used criteria for measuring firm size are the number of employees and/or total sales volume. In this study, the total sales volume is used; this choice is on the premise that firm size depicts the organizational resources, the economies of scale, as well as the firm’s level of risk about international activities (Katsikeas et al., 1996). Though mixed results have been reported, this
study expects a positive relationship between the size of the firm (especially with larger firms) and its export performance (Duenas-Caparas, 2007; Sterlacchini, 2001). However, the relationship between food safety challenge and firm size is ambiguous. **Firm age (Age)** is measured as the duration between the time of observation and the starting year of commercial production. This variable has a controversial and conflicting relationship to export performance; older firms might be more experienced while newer firms may use relatively modern technology to increase productivity and product quality. As discussed in Chapter 4, this study expects that with maturity and mastery in the same or close operations of export, firm age should render food safety as a minor challenge, and possibly have a positive relationship on the firm’s export performance. **Firm ownership (Ownership)** is captured as a dummy, with a firm locally owned taking on a value of one, and foreign ownership or affiliation taking the value of zero. Due to the access to foreign markets and international cultural knowledge resources that may be open to the firm with foreign affiliation, the expectation is that firm ownership and food safety challenge will be negatively related and a positive relationship with its export performance. **Firm’s export experience (Exptexp)** is captured by a length dimension, which is the intensity of the firm’s exporting experience. Thus, the length is operationalized as the number of years a firm has been engaged in exporting activities. This study expects that within an accumulated experience over time, there would be a negative relationship between firm’s export performance and food safety challenges, which should impact export performance positively.

To include a factor that captures the level of experience with domestic food safety requirements into perspective with export requirements. Therefore, the introduction of the variable “**food safety strictness**”\(^{22}\). Respondents were asked to rate the strictness of the food safety requirements in Canada compared to what is in their export markets on a five-point Likert-scale, where one is “much less strict” and five is “much more strict”. Furthermore, the variable “**food safety risk level** (FSRisk)” is included as a complement to food safety strictness. This is to specifically measure how firms gauge the risk control levels in their enterprises and their judgment of the potential food safety risk associated with the products they export. By and large, this study assumes that the risk level may be influenced by the type of subsector (for example beverage subsector, milk and dairy subsector, or fruits and vegetables subsector) the firm

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\(^{22}\) Strictness level is defined as the intensity of regulations set, and the compliance enforcement which differentiates different industries and products produced.
operates in. This is also measured on a five-point Likert-scale, where one is “very low” to five as “very high”. For the “food safety risk level” and “food safety strictness” indices, the expectations are that they will have positive relationship with food safety challenge. Thus as the potential risk and the food safety strictness increase, then the food safety challenge the firms face increase too.

Firm’s access to external food safety resources (FSExt_Res) construct is a derived index from five items, which include food safety consultants, laboratory testing, food safety training, food safety auditing, and food safety certification. These variables are chosen to answer the question on how easy firms find it to access these services or supports as a form of external resource, and they were measured on a five-point Likert scale, where one stands for “very difficult” and five is “very easy”. The implication being that as a firm is able to access and/or are using these resources, it should enhance their overall export performance as they overcome any barriers due to food safety regulations and standards.

The food safety capacity construct is measured in three dimensions; which are the “internal food safety resources” (FSInt_Res), “food safety systems implemented within the firm” (SysImp), and the “firm’s certification to various food safety standards” (Cert). Internal food safety resources index is captured using eight items; these are degree to which food safety controls are documented, degree to which you can trace back the origin of the raw materials used, degree to which food safety controls are HACCP-based, degree to which you keep comprehensive food safety records, ability to control food safety effectively in your operations, degree to which can trace forward where the products you sell end up, ability to upgrade your food safety controls on an ongoing basis, and ability to train your workforce. These items are chosen to answer the strength of these resources to the firm’s operations, and they were measured on a five-point Likert-scale, where one stands for “very weak” and five is “very strong”. Also, the latent variable “food safety systems implemented” within the firm is adopted to represent the firm’s implementation of various food safety management-based systems. This variable is represented as a dummy which takes on a value of one if any systems is implemented and zero if otherwise. As a complement to the systems implemented, firm’s certification (especially to third party food safety standards) to various food safety standards was the last of the variables to represent the food safety capacity of the firm. Survey respondents were to indicate if they were certified to any third party food safety standards. Again, this is represented as a dummy with the value of one if they have received any certification and zero if they have no
kind of certification. The expectation on these food safety capacity dimensions is that they will have a negative relationship with the food safety challenges firms encounter in their export activities.

### 5.1.2: Firm Export performance

Table 5.2 displays the dependent and independent variables used in the analysis of export performance, along with the expected signs.

**Table 5.2: Variable names, Measurement and Expected sign for Export Performance Model**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable Name</th>
<th>Measurement</th>
<th>Expected Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export sales growth</td>
<td>ExpSal</td>
<td>Y=1(if Increased), 0=otherwise</td>
<td></td>
</tr>
<tr>
<td>Number of export markets</td>
<td>Numexp</td>
<td>Y=1(more than one market), 0=otherwise</td>
<td></td>
</tr>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>Size</td>
<td>Total sales in millions of Canadian dollars</td>
<td>+</td>
</tr>
<tr>
<td>Firm age</td>
<td>Age</td>
<td>Number of years since start-up</td>
<td>+</td>
</tr>
<tr>
<td>Firm Ownership</td>
<td>Ownership</td>
<td>Locally owned (1=yes; 0= otherwise)</td>
<td>+</td>
</tr>
<tr>
<td>Firm export experience</td>
<td>Exptexp</td>
<td>Number of years exporting</td>
<td>+</td>
</tr>
<tr>
<td>Training of employees:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Management &amp; Administration</td>
<td>Man_Adm</td>
<td>1= yes, 0= otherwise</td>
<td>+</td>
</tr>
<tr>
<td>-Production &amp; Technical</td>
<td>Prod_Tech</td>
<td>1= yes, 0= otherwise</td>
<td>+</td>
</tr>
<tr>
<td><strong>Firm Access to Resources</strong></td>
<td>AccRes</td>
<td>Mean score of 18 item scale measured on a 5 point Likert scale: 1= Very weak to 5= Very strong</td>
<td>+</td>
</tr>
<tr>
<td><strong>Market factors</strong></td>
<td>Mktfact</td>
<td>Mean score of 10 item scale measured on a 5 point Likert scale: 1= Very weak to 5= Very strong</td>
<td>-</td>
</tr>
<tr>
<td><strong>Food Safety Challenge</strong></td>
<td>FSIndex</td>
<td>Mean score of 18 item scale measured on a 5 point Likert scale: 1= Very minor to 5= Very major</td>
<td>-</td>
</tr>
</tbody>
</table>

As discussed in chapter 3, export performance is gauged on both financial and non-financial parameters. According to Sholam (1998), the use of two or more indicators to measure export performance helps provide some interesting perspectives on export performance, and makes up for absolute financial performance data, which may not be easy to obtain from firms due to
confidentiality reasons. Again, Sholam (1998) and Sousa (2004) argue that the approach of using several measures help to grasp a broader result than the use of single indicator. Therefore, in this study, export performance is measured using two indicators as dependent variables. From the financial perspective, export sales growth is used, while for the non-financial measure, a market-related indicator, the number of export markets is adopted. Each of these measurement indicators has been cited in the export literature with many researchers arguing for the use of one indicator over the other for many reasons.

Even though Marandu’s (2008) argue that managers are more inclined to provide data related to export sales than data related to the profits of the firm, Export sales growth\(^{23}\) (ExpSal) is measured as a binary variable, with firms that indicated increase in their sales growth taking the value of one and zero if otherwise. The choice of this variable over others like export intensity was first and foremost due to data availability, and the fact that this variable is often chosen to complement the export sales intensity measure, such that while the sales ratio measure may be static and represent conditions per time, the growth indicator helps to see the changes in the sales performance over a period of time (Zou and Stan, 1998). Secondly, while export intensity as a performance measure serves to draw policy implications for promoting exports, it is less useful for drawing normative implications for managers of firms; because a high intensity indicates that exports was high relative to domestic sales; this may not turn necessarily into higher profits or better image for the firm (Dhanaraj and Beamish, 2003). Invariably, the export sales growth indicator has a direct and positive significant relationship with the degree of internationalization all things being equal.

The second indicator, which is the number of export markets (Numexp) served by the firm, is a subjective performance measure (Sousa, 2004), and one that has been seldomly researched. This is also measured as a binary variable, where one stands for firms that serve one export market and zero if they serve two or more markets. The exporting literature has dealt with market expansion (Lee and Yang, 1990; Cooper and Kleinschmidt, 1985) using export diversity, and the indicator used to capture this diversity is the number of country-markets served (Dhanaraj and Beamish, 2003). Consequently, the empirical findings in the international business

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\(^{23}\) This indicator was originally captured by asking respondents to indicate whether they saw an increase, no change or decrease in their export sales growth over the past five years. Data distribution and econometric analysis problems, this variable ended up as a binary outcome.
literature point to a positive relationship between the degree of internationalization of the firm and its export performance (Delios and Beamish, 1999; McDougall and Oviatt, 1996; Dhanaraj and Beamish, 2003). This is so because firms operating in more overseas markets are to a large extent, able to ride out the full market shock the effects of an individual market will exert on the firm in case of any vulnerabilities (Diamantopoulos and Schlegelmilch, 1994; Solberg, 2002). Similarly, such firms may also be able to identify wide array of opportunities from the markets in which they operate. Nonetheless, the debate on export market expansion suggest that the number of export foreign markets is not an end in itself but also contingent on many factors such as the specific company, product, market, and marketing factors (Piercy, 1982; Katsikeas et al., 2000).

From Table 5.2, the explanatory variables include firm characteristics, firm’s access to resources, market factors and finally, food safety challenge index. Firm characteristics such as firm size, age, ownership structure, export experience and training to employees were used; their measurement is explained in the food safety challenge model except to training to employees.

Training of employees is used as a proxy for knowledge acquisition that affect the employees’ intellectual capability, as knowledge is considered to be a valuable asset to export success and performance (Haahti et al., 2005; O’Cass and Julian, 2003). Training of employees is represented by two dummy variables; first one is training for managerial or administrative workforce which takes one if received training and zero if otherwise. The second is training given to production or technical workers with a value of one for training given and zero for otherwise. The expectation is that training received may affect employees’ intellectual capability, and subsequently have a positive impact on their activities as well as the overall export performance of the firm.

The construct, firm’s accesses to resources (AccRes), represent the internal and external resources that make the resource tank to the firm. This is represented by eighteen items which are present in the literature (Julian & Ahmed, 2005; Chen et al, 2006; Pinho and Martin 2010; Milanzi, 2012). The items are enterprise’s production and/or processing capacity, ability to access raw materials, enterprise's storage and distribution capacity, ability to access equipment, access to information on export market opportunities, access to warehousing facilities, ability to...

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24 This variable was left out of the food safety model because it was captured as an item under internal food safety construct. This variable considered a more generic training that employees receive, this may include or exclude food safety issues depending on the firm’s objectives and time of training.
access working capital, technological orientation/know-how, overall management expertise, firm's export market research & development/ research and development intensity, ability to access appropriately skilled labour, acquisition of information on customer/consumer demands, ability to access investment funds, ability to access export financing, ability to access export insurance, level of assistance provided to exporters in Canada, and level of governmental incentives/support. Respondents are asked in the survey to rate the strength of each item in their firm on a five-point Likert scale, where one represents “very weak” and five represents “very strong”. The expectation is that firm access to resources would lead to a positive impact on its export performance.

**Exogenous pressures (Mktfact)**, including pressures (such as overall performance of the economy, cost of production, level of taxation in Canada, etc.) from the home market and external conditions (such as exchange rate volatility, market competition, cost of market distributional channel, etc.) relating to export market. These have been identified as important drivers of a firm’s export performance in the literature (Leonidou, 2004; Julian & Ahmed, 2005; Sterlacchini 2001; Herath et al., 2007; Milanzi, 2012; Impullitti et al., 2013). Ten items named as market factors were combined to measure this index; this includes level of market competitiveness, transport cost, ability to be price competitive, exchange rate volatility, subsidies paid to specific market suppliers of the product, overall performance of the economy, lack of government incentives, access to and/or cost of market distribution channels, duties, import quotas or other trade restrictions, and customs and other border formalities; refer to Table 6.11 in chapter 6 for further discussion. To capture the impact of these exogenous factor, survey respondents are asked to indicate how challenging these items were to their export activities using a five-point Likert scale ranging from “very minor” as one to “very major” as five. I expect that this index would overall have a negative relationship on the export performance of firms as suggested by other studies (see for example McGahan and Porter, 1997; Scherer and Ross, 1990, Sousa, 2004; Sousa et al., 2008).

After discussing the exogenous factors of firm export performance, the construct **food safety Challenge** (FSIndex) was included in the export performance model as an independent variable. Again, this latent variable helps to understand the degree to which various food safety requirements pose as challenge to firms in their export markets. These challenges relate to firms which are already exporting to a market. I assume that this variable may be static and/or dynamic
to individual firms. It may be static such that food safety challenges may arise and may require a firm to deal with within a very short span of time (maybe over a week, months or a year), thus impact the export performance for that span of time. Likewise, food safety challenges may linger for some particular products or industries depending on the riskiness of the agri-food products or incidents in the past. However, firms may rise to food safety challenges over time through the requisite control systems. Hence, food safety challenges may serve as a catalyst or barrier to a firm’s export performance. In this study, I expect that as food safety challenges escalate in export markets, the firms export performance would decrease.

5.2: Survey Design and Elicitation

In order to empirically test the models for this study, a structured survey questionnaire was the main instrument for data collection. The survey was administered through an online data collecting medium. The following steps were integral to the data collection. First, the survey was directed specifically to agri-food exporting manufacturers across Canada who exported their produce either as a primary, semi-finished or manufactured/finished products to various export markets. Second, both qualitative and quantitative data were collected, and addressed to major decision makers in charge of export activities in the various agri-food producing firms. This was to ensure a level of accurate information though information biases is inevitable with these key informants.

The survey was designed with reference to past survey samples. The major source was the Annual Survey of Manufacturers, questionnaire and reporting guide (Statistics Canada, 2004), which relates to the economy and is familiar in terminologies for manufacturing firms in Canada. Secondly, ideas from World Bank survey samples were referred to (World Bank, 2004), as well as the survey used to understand the evidence of factors affecting the incidence and intensity of standard certification for exporting firms in Pakistan (Masakure et al., 2011). The various latent constructs and measuring variables employed in this study were closely solicited based on literature reviews on RBV of the firm, food safety regulations and various

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25 This was categorized into three: first as a primary processor of raw agricultural products; second is supplying of semi-prepared food products for use in further processing, and third manufacturing of food products ready for human consumption (Statistics Canada, 2004).
26 This included key informants such as the Firm’s General manager, Presidents and Vice Presidents, Export managers, and Marketing Officers, Director for Sales, Quality Assurance Officers and/or combinations of any (Katsikeas et al., 2000; Sousa, 2004, Sousa et al., 2008)
measurements, and the determinants of export performance (Statistics Canada, 2004; World Bank, 2004; Chen et al, 2006; Herath et al., 2007; Pinho and Martins, 2010; Masakure et al., 2011).

The survey was divided into four sections to understand the various activities of the firm. The focus of the first section was to collect general demographic information on firm (such as the year of establishment, its ownership structure, and the number of employees at the firm) as well as the main activity it undertakes. The subsector in which the firm belonged was based on the food product that served as the major proportion of their annual sales, therefore, the survey were sent to firms in different subsectors\(^{27}\) (under NAIC 311 for Manufacturing Industry). Section 2 followed with questions on the export activities of the enterprise such as the number of export markets involved in their export activities, the number of years’ experience in their exporting ventures, the proportion of products exported, and their main customers for the agri-food products exported. The third section sought to know the level of food safety awareness as well as the various food safety standards implemented in the agri-food operations of firms. In the last section, respondents were asked the main challenges they encountered in their exporting activities due to food safety standards and regulations, and various market parameters other than food safety standards. This section concluded by asking the various external and internal resources that the firm could easily access or actually possessed in order to curtail the effects of these challenges.

5.3: Data Collection

After piloting (n=35) and subsequent revision, the survey was finally sent out to a database of agri-food exporters\(^{28}\) which had been compiled from internet resources and served as a sample frame. A total of 960 firms were contacted. The final dataset included observations for 181 firms with a response rate of 18.9 percent. After removing firms with too many missing values (55 firms), 126 firm usable data remained for analysis, representing a useable response rate of 13.1 percent.

\(^{27}\) These subsectors were 13 with different major activities. This includes Beverages, Cereal and cereal products, confectionery and sugar products, milk and dairy products, fats and oils, animal feed, fish and fishery products, food and feed products, food and feed additives, fruit and vegetable and products, Herbs and spices, meat and poultry and products, nuts, nut products and edible seeds and other processed foods. This categorization was derived from NAIC 311 (Industry Canada, 2014)

\(^{28}\) Specifically, a list of agri-food exporters provided by the Agri-food Export Group, Quebec-Canada.
5.3.1: Summary of responses

The main agri-food activity of the exporting firms were captured in three categories based on the proportions of the annual sales. The first are firms whose primary activity is processing of raw agricultural products (e.g. flour milling, animal slaughter, oilseed processing); second group was firms that supply semi-prepared food products for use in further processing (e.g. flour mixes, fruit desert fillings); and the last group are firms that manufacture food products ready for human consumption (e.g. breakfast cereal, frozen dinners, salad dressing etc.). Out of the 126 exporting firms, more than half (59%) are directly involved in manufacturing foods, 23% are into primary processing and 18% supply semi-finished goods (Figure 5.1).

Figure 5.1: Main Agri-food Activities of Exporting firms

The Figure 5.2 shows the main product subsectors in which the various exporting firms operate based on the proportion of their annual sales. In descending order, the dataset shows that most firms are actively in the other processed food category (30.2%), about 13% are involved in the fruits and vegetables products, then milk and dairy products (8.7%), and 7.9% are mainly into Meat and poultry products, Fish and fishery products, Confectionery and sugar products, and Cereals and cereal products, respectively and the others.
Almost 40% of firms have a total sales of $15 million to less than $25 million, 21% have total sales of $25 million and above, and the remainder (39%) accrued total sales less than $15 million. The ownership structure of the firms in the dataset shows that 94% of firms (119) are locally owned without any foreign affiliation while about 6% (7) have some level of foreign or overseas affiliation (Table 5.3). Firms have an average age of 28 years since the start-up of operation and more than half of them have been engaged in export activities for six or more years\textsuperscript{29}.

\textsuperscript{29} The export experience was coded as 1= less than a year; 2= 1 year; 3=2 year; 4= 3 to 5 years; 5=6 to 10 years and 6= more than 10 years. Reporting by the quartiles, at 25 quartiles showed 4 (i.e. 3 to 5 years); at 50 quartiles, it showed 5 (i.e. 6 to 10 years of export experience) and at 75 quartiles, it showed 6 (i.e. more than ten years of experience). The median was 5 too.
Respondents were asked whether they currently (base year being 2013) export agri-food products to certain markets such as the U.S., E.U., China /Hong Kong, Japan, Mexico, Central and South America, and Russia. In the Figure 5.3, approximately 35% of these firms (i.e. 44 firms) export to one of these markets, 34% of them (i.e. 43 firms) export to two markets, and finally 31% (i.e. is 39 firms) export to three or more markets.
Figure 5.3: Number of Markets Firms Export their Products

Figure 5.4 shows the percentage of firms that export to specific individual markets. It shows that 81.7% of all the firms observed export their products to the US market. This affirms the fact that US stands as the number one importing country of Canada agri-food products (FCC, 2013). The second largest market for exports in this sample was the EU (49.2%), whiles China, Japan, Central and South America, Mexico, and Russia follow in the descending order of 32.5%, 19.8%, 12.7%, and 8.7% respectively. Overall, 42% of the firms export to both US and EU markets whiles approximately 39% of firms export to any of the other markets.
5.4: Analytical methods

The aim of this section is to develop an analytical structure that is used to test the hypotheses on the determinants of food safety challenge, and how food safety challenges impact a firm’s export performance. To achieve this aim, this section specifies the empirical models and procedures.

5.4.1: Analyzing the Characteristics of Exporting firms

The variables employed in both the food safety challenge model as well as export performance are analyzed in two ways. The first segment involves calculating the descriptive statistics (means and standard deviations) for each variable and construct. This is followed with a scale reliability analysis for all the multi-item scales in both models.

In terms of reliability, these multi-item scale measures (such as food safety challenge index, firm access to resources, etc.) may be much more useful if it transpires that they are applicable in a variety of economic setting. Thus, the reliability test shows the internal consistency of the measures that make the scale. As suggested by Nunnally (1967), the Cronbach alpha reliability coefficient is the standard acceptable level measure for reliability. The threshold for acceptable reliability is when the Cronbach alpha exceeds 0.7 (Nunnally, 1978); although, *ceteris paribus*, the value will generally increase for factors with more variables, and decrease for factors with fewer variables.
5.4.2: Model Specification for Food Safety Challenge

The aim of the regression analysis is to determine which factors impact the extent of food safety challenge to agri-food exporters. Based on the conceptual framework, the food safety challenge is a function of the following: firm characteristics; food safety risk of exported products; strictness of food safety standards between countries, the firm’s access to external food safety resources; and the food safety capacity of the firm.

Hence the regression is specified in the form of the following linear model:

\[ FSIndex = \beta_0 + \beta_1 \text{Size} + \beta_2 \text{Age} + \beta_3 \text{Ownership} + \beta_4 \text{Exptexp} + \beta_5 \text{FSRisk} + \beta_6 \text{FSStrict} + \beta_7 \text{FSExt_Res} + \beta_8 \text{FSInt_Res} + \beta_9 \text{SysImp} + \beta_{10} \text{Cert} + \varepsilon_i \]

Where:

\( FSIndex \) represents the mean score of food safety challenges;
\( \beta_1 - \beta_{10} \) are coefficients associated with the explanatory variables
\( \text{Size} \) is total sales in millions of Canadian dollars;
\( \text{Age} \) is number of years since start-up of firm;
\( \text{Ownership} \) is binary variable where locally owned is 1= if yes; 0= otherwise;
\( \text{Exptexp} \) is number of years involved in exporting;
\( \text{FSRisk} \) is level of food safety risk;
\( \text{FSStrict} \) is level of food safety strictness;
\( \text{FSExt_Res} \) is a vector firm’s access to external food safety resources;
\( \text{FSInt_Res} \) is a vector firm’s food safety resource base;
\( \text{SysImp} \) is a binary variable that represents whether a firm has food safety systems implemented or not;
\( \text{Cert} \) is a binary variable that represents whether a firm is certificated to any of various food safety standards or not, and
\( \varepsilon_i \) is the error term.

5.4.3: Model Specification for Export Performance

A single model is specified for the two response variables measuring export performance. These two response variables are sales growth and number of export markets served, with both as binary response variables. In order to evaluate the effect of the different variables that influence the probability of a firm experiencing sales growth and probability to serve one or more export
markets, a probit model is used. The derivation of the empirical model is based on Wooldridge (2009).

Before the probit model was executed, alternative approaches such as structural equation modelling and the instrumental variable approach had been considered but were not followed up further due to time reasons.

The probit model assumes that while we only observe the presence and absence of sales growth and number of export market served, there is a latent, unobserved underlying variable $D_i^*$; therefore,

The underlying latent model is as follows:

$$
Y_i = \begin{cases} 
1, & D_i^* > 0 \\
0, & D_i^* \leq 0
\end{cases}
$$

(1)

$$
D_i^* = \beta_k X_{ik} + \varepsilon_i
$$

(2)

Where:

$Y_i = 1$ is the observed outcome for the $i^{th}$ firm if it experienced increased sales growth and exports to one market;

$Y_i = 0$ is the observed outcome for the $i^{th}$ firm if otherwise;

$D^*$ is the latent dependent variable;

$X_{ik}$ is the $k \times n$ vector of explanatory variables for the $i^{th}$ firm;

$\beta_k$ is the $k \times 1$ vector of coefficients associated with $X_{ik}$; and

$\varepsilon_i$ is the error term of the $i^{th}$ firm that is assumed to be normally distributed with mean of zero and variance of one $[\varepsilon_i \sim N(0,1)]$.

The probit model is constructed as follows:

$$
\Pr (Y_i = 1 | X_i) = \Phi(\beta_0 + \beta_1 \text{Size} + \beta_2 \text{Age} + \beta_3 \text{Ownership} + \beta_4 \text{Exptexp} + \beta_5 \text{Man_Adm} + \beta_6 \text{Prod_Tech} + \beta_7 \text{AccRes} + \beta_8 \text{Mktfact} + \beta_9 \text{FSIndex})
$$

Where:

$\Pr (Y_i = 1 | X_i)$ = is the probability that an event occurred given the explanatory variables ($X_i$);

$Y_i = 1$ equals 1 if a firm experienced increased sales growth or exports to more than one market, and 0 otherwise;

$X_i$ is a vector of explanatory variables included in the analysis;

$\Phi(.)$ is a standard normal cumulative distribution function (CDF);
\( \beta_1 - \beta_9 \) is coefficients associated with the explanatory variables;

Fch is a vector of firm characteristics; this includes:

Size is annual sales of agri-food exports;

Age is number of years since start-up of firm;

Ownership is binary variable where locally owned is 1= if yes; 0= otherwise;

Exptexp is number of years involved in exporting;

Man_Adm is binary variable where training is 1= if yes; 0= otherwise;

Prod_Tech is binary variable where training is 1= if yes; 0= otherwise;

AccRes represents a composite of firm resources;

Mktfact represents a vector of market factors;

FSIndex represents a vector food safety standards;

\( Z = x' \beta \), is the standard normal variable, i.e., \( Z \sim N(0, \sigma^2) \).

The standard normal cumulative distribution function (CDF) \( \Phi \) take the form

\[
\Phi(z) = \int_{-\infty}^{\infty} \phi(v) \, dv
= \int_{-\infty}^{z} \phi(v) \, dv
\]

Where:

\( \phi(v) \) is the standard normal density\(^{30}\);

\( \phi(z) \) is explicitly written as:

\[
\phi(z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z} e^{-u^2/2} \, du
\]

Estimation of Marginal Effects

Marginal effects were calculated at the mean value\(^{31}\). Because continuous variables and dummy variables are included in the analysis, the interest is to interpret the marginal effects for both variables. Therefore for the continuous variables, the marginal effect of \( X_i \):

\[
\frac{\partial P(Y_i = 1|X)}{\partial X_i} = \Phi'(x' \beta) \beta_i, \text{ where } \phi(z) = \frac{d\Phi}{dz}(z)
\]

\(^{30}\) Briefly, if a variable \( X \) follows the normal distribution with mean \( \mu \) and variance \( \sigma^2 \), its density function is:

\[
f(X) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-(X-\mu)^2/2\sigma^2}
\]

\(^{31}\) The marginal effect were calculated by the STATA command “margins, dydx(*) at means”
The marginal effect can be interpreted as the change in the probability of sales growth or number of export market being served due to a unit change in the independent variable $x_i$, holding constant all other independent variables at their mean values.

For dummy variables, the marginal effect $X_j$ was calculated as:

$$
\Phi (\beta_0 + \beta_1 X_2 + \cdots + \beta_{j-2} X_{j-1} + \beta_{j-1} X_j + \cdots + \beta_{k-1} X_k) - \Phi (\beta_0 + \beta_1 X_2 + \cdots + \\
\beta_{j-2} X_{j-1} + \beta_{j} X_{j+1} + \cdots + \beta_{k-1} X_k)
$$

(6)

This effect can be interpreted as the change in the probability of sales growth or number of export market being served due to a change from 1 to 0 in $X_j$, holding all other independent variables constant.

**5.5: Summary**

This chapter specifies the empirical models, the measurement of variables and the procedures for analyzing the determinants of food safety challenge and firm’s export performance. These specifications facilitate the testing of the hypotheses specified in the conceptual framework. Finally, the chapter gives a description of the data collected and used, with a summary of the responses from the dataset. This chapter further sets the foundations for a more detailed analysis of the variables used in the models. The next chapter presents and discusses in details the results from the analysis, specific to the two models.
Chapter 6: Results and Discussion

In this chapter, the results are presented and discussed. The chapter is divided into three sections: descriptive statistics and scale reliability test; the regression analysis of the determinants of food safety challenge index; and the probit model analysis for the firm’s export performance.

6.1: Descriptive Statistics of Variables in the models

6.1.1: Food Safety Challenge Model

Table 6.1 presents the descriptive statistics of the variables used in the food safety challenge model. The descriptive explanation as well as the scale reliability test is discussed in the order of the variables as shown in Table 6.1.

Table 6.1: Descriptive Statistics for model variables (n=126)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable Name</th>
<th>Description</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Safety Challenge</td>
<td>FSIindex</td>
<td>Mean score</td>
<td>2.386</td>
<td>0.526</td>
</tr>
<tr>
<td><strong>Independent variable</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size by sales</td>
<td>Size</td>
<td>&lt;$15million</td>
<td>0.397</td>
<td>0.491</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$15million</td>
<td>0.397</td>
<td>0.491</td>
</tr>
<tr>
<td></td>
<td></td>
<td>to &lt;$25million</td>
<td>0.206</td>
<td>0.406</td>
</tr>
<tr>
<td>Firm age</td>
<td>Age</td>
<td>Number of years since start-up</td>
<td>27.714</td>
<td>20.817</td>
</tr>
<tr>
<td>Firm Ownership</td>
<td>Ownership</td>
<td>Locally owned (1=yes; 0=otherwise)</td>
<td>0.944</td>
<td>0.229</td>
</tr>
<tr>
<td>Firm export experience</td>
<td>Exptexp</td>
<td>Number of years involved in exporting</td>
<td>5.873</td>
<td>1.283</td>
</tr>
<tr>
<td>Level of food safety risk</td>
<td>FSRisk</td>
<td>Very low</td>
<td>0.167</td>
<td>0.310</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low</td>
<td>0.262</td>
<td>0.441</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Neither low nor high</td>
<td>0.246</td>
<td>0.432</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High</td>
<td>0.325</td>
<td>0.470</td>
</tr>
<tr>
<td>Strictness of food safety compared to Canada</td>
<td>FSStrict</td>
<td>Less strict</td>
<td>0.381</td>
<td>0.495</td>
</tr>
<tr>
<td></td>
<td></td>
<td>About same</td>
<td>0.365</td>
<td>0.483</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More strict</td>
<td>0.254</td>
<td>0.437</td>
</tr>
<tr>
<td>Access to External Resources</td>
<td>FSExt_Res</td>
<td>Mean score</td>
<td>3.514</td>
<td>0.853</td>
</tr>
<tr>
<td>Food Safety Capacity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal food safety resources</td>
<td>FSInt_Res</td>
<td>Mean score</td>
<td>3.992</td>
<td>0.630</td>
</tr>
<tr>
<td>Food safety systems implemented within the firm</td>
<td>SysImp</td>
<td>1=yes for at least one, 0=otherwise</td>
<td>0.770</td>
<td>0.423</td>
</tr>
<tr>
<td>Firm certification to various food safety standards</td>
<td>Cert</td>
<td>1=yes for at least one, 0=otherwise</td>
<td>0.452</td>
<td>0.500</td>
</tr>
</tbody>
</table>

Notes: *Variables are the reference category
With the food safety challenge index, respondents reported the challenges faced complying with food safety requirements in their export markets on a five-point scale from very strong (5) to very minor (1). Table 6.2 shows the ranking order (by mean score) of each food safety challenge item. From the scale used, higher value responses mean that the respective requirement is more of a challenge to the firm’s export activities. In descending order, the first five items that measure this index shows that on average veterinary drug residues is the most challenging item (mean score 2.94), and pesticide residues is the least challenging (mean score 1.85). I did not test for statistical differences between the items because they all enter into one summated scale.

Table 6.2: Ranking of the food safety challenge index by means scores

<table>
<thead>
<tr>
<th>Food Safety Challenge Item</th>
<th>Mean score</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary drug residues</td>
<td>2.94</td>
<td>0.603</td>
</tr>
<tr>
<td>Mycotoxins</td>
<td>2.83</td>
<td>0.678</td>
</tr>
<tr>
<td>Food allergens</td>
<td>2.72</td>
<td>0.918</td>
</tr>
<tr>
<td>Food or feed additives</td>
<td>2.56</td>
<td>0.925</td>
</tr>
<tr>
<td>Packaging materials</td>
<td>2.48</td>
<td>0.874</td>
</tr>
<tr>
<td>Process registration requirements</td>
<td>2.48</td>
<td>0.883</td>
</tr>
<tr>
<td>Facility registration requirements</td>
<td>2.41</td>
<td>0.966</td>
</tr>
<tr>
<td>Traceability</td>
<td>2.4</td>
<td>0.965</td>
</tr>
<tr>
<td>Application of good agricultural practice (GAP)</td>
<td>2.4</td>
<td>0.997</td>
</tr>
<tr>
<td>Facility inspection requirements</td>
<td>2.38</td>
<td>0.928</td>
</tr>
<tr>
<td>Product testing requirements</td>
<td>2.34</td>
<td>1.060</td>
</tr>
<tr>
<td>Implementation of HACCP</td>
<td>2.33</td>
<td>1.058</td>
</tr>
<tr>
<td>Bioterrorism notification requirements</td>
<td>2.23</td>
<td>0.914</td>
</tr>
<tr>
<td>Microbiological pathogens</td>
<td>2.21</td>
<td>0.974</td>
</tr>
<tr>
<td>Heavy metals</td>
<td>2.18</td>
<td>0.852</td>
</tr>
<tr>
<td>GMOs</td>
<td>2.1</td>
<td>0.898</td>
</tr>
<tr>
<td>Application of good manufacturing practice (GMP)</td>
<td>2.08</td>
<td>1.040</td>
</tr>
<tr>
<td>Pesticide residues</td>
<td>1.85</td>
<td>0.849</td>
</tr>
</tbody>
</table>

Notes: The question which generated this responses was, “How challenging do you find it to comply with the following food safety requirements in the markets you export to?” This construct was measured on a five point Likert scale with 1 as “very minor” to 5 “very major”. The ascending order of the mean scores show the level of how major or minor the individual food safety items pose as challenge to the firm’s export performance. The mean scores are in ascending order because the Likert scale order of distribution was concentrated between very minor to major, with minor taking on the highest frequency across all the items.
The ‘level of food safety risk’ construct gives the understanding of how firms gauge the potential food safety risk associated with the products they export. Table 6.1 shows that about 17% of firms consider the level of risk associated with the agri-food products they export as being “very low”, about 26% say their products are low in risk level, while 25% responded that the their products are neither high or low in risk level, and finally, 33% state that their agri-food products exported have high food safety risk associated to them.

Approximately 38% of firms responded that they considered the food safety requirements in their home market less strict to than those in their export markets, while 25% saw it the other way round, and 37% said they did not see any difference in the strictness of the food safety requirements in their home markets and what prevails in their export markets.

Further, the multi-item constructs, firms’ access to external food safety resources and internal food safety resources entered the regression models as the mean of the scores across the number of items that represented each construct. The result of the reliability analysis through Cronbach’s alpha is represented in Table 6.3 (see appendix). The scale values for both constructs, firms’ access to external food safety resources and internal food safety resources exceeded 0.7 (i.e. 0.908, 0.904 respectively), the threshold for acceptable reliability (Nunnally, 1978; Jalali, 2012).

On firms’ access to external food safety resources and/or services construct, respondents on an average reported that they generally found it relatively easy to access external food safety services, as indicated by a mean score of 3.51 (Table 6.1). The order of scale for this construct pointed to the fact that higher value responses correspond to an easier access to external food safety resources, even though, the results cannot prove any statistically significant difference for the ease of access to any items. However, the Table 6.4 presents the ranking of the mean scores for the ease at which firms access these various services. In descending order, firms find it easier to access food safety laboratory testing services (mean score 3.92), followed by food safety certification services (mean score 3.75), followed by food safety auditing services (mean score 3.48), then accessing food safety consultants (mean score 3.27), and finally food safety training (mean score 3.15). Firm’s access to services such as consultancy and training on food safety matters are lowest on the ranking ladder.

---

This is based on the assumption that higher food safety compliance challenge translates into higher food safety risk.
Table 6.4: Ranking of Firm’s ease of access to various external food safety resources

<table>
<thead>
<tr>
<th>External food safety resource items</th>
<th>Mean scores</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food safety Laboratory testing</td>
<td>3.92</td>
<td>0.943</td>
</tr>
<tr>
<td>Food safety certification</td>
<td>3.75</td>
<td>0.954</td>
</tr>
<tr>
<td>Food safety auditing</td>
<td>3.48</td>
<td>1.056</td>
</tr>
<tr>
<td>Food safety consultants</td>
<td>3.27</td>
<td>0.983</td>
</tr>
<tr>
<td>Food safety training</td>
<td>3.15</td>
<td>1.044</td>
</tr>
</tbody>
</table>

Notes: Respondent were asked in the survey to rate how easy they find it to access the following external food safety services and/or resources. This construct was measured on a five point Likert scale with 1 as “very difficult” to 5 “very easy”.

The internal food safety resource base of the respondent firms is shown in the Table 6.5. Inferring from the mean score (3.99) for the construct (Table 6.1), it shows that respondents on average rate that they have a strong internal food safety resources for their export activities. The result in Table 6.5 cannot prove any statistically significant difference the strength of any one resource item from another. However, across the sample as a whole, firms on an average have a stronger internal resource base for the degree at which their food safety controls are documented (mean score 4.28), while the least strength is the ability to train their workforce (3.55).

Table 6.5: Ranking of Firm’s internal food safety resource base by mean scores

<table>
<thead>
<tr>
<th>Internal food safety resource item</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree to which your food safety controls are documented</td>
<td>4.28</td>
<td>0.836</td>
</tr>
<tr>
<td>Degree to which you can trace back the origin of the raw materials you use</td>
<td>4.26</td>
<td>0.841</td>
</tr>
<tr>
<td>Degree to which food safety controls are HACCP-based</td>
<td>4.24</td>
<td>0.907</td>
</tr>
<tr>
<td>Degree to which you keep comprehensive food safety records</td>
<td>4.15</td>
<td>0.811</td>
</tr>
<tr>
<td>Ability to control food safety effectively in your operations</td>
<td>4.06</td>
<td>0.807</td>
</tr>
<tr>
<td>Degree to which you can trace forward where the products you sell end up</td>
<td>3.75</td>
<td>0.848</td>
</tr>
<tr>
<td>Ability to upgrade your food safety controls on an ongoing basis</td>
<td>3.65</td>
<td>0.752</td>
</tr>
<tr>
<td>Ability to train your workforce</td>
<td>3.55</td>
<td>0.7</td>
</tr>
</tbody>
</table>

Notes: The survey question was, “How would you rate each of the following in your enterprise?” This construct was measured on a five point Likert scale with 1 as “very weak” to 5 “very strong”.

Table 6.1 shows that 77% of exporting firms have implemented a form of food safety system or safety practice while 23% had not. These includes food safety practices and control.
systems such as HACCP, good manufacturing practices (GMP), good agricultural practices (GAP), good distribution practices (GDP) and good trade practices (GTP). Figure 6.7 shows specifically that 61% of firms in the dataset have HACCP control system in place, about 68% have implemented GMP only, 12.7% have implemented GAP only while 4% and 1.6% of firms have GDP and GTP respectively.

**Figure 6.1: Distribution of Individual Food safety Systems Implemented by Firms**

As a complement to the systems implemented, firm’s certification to third party and other food safety standards was the last of the variables to represent the food safety capacity of the firm. From the dataset (Table 6.1), approximately 45% of firms (57) acknowledged to have such certification in place while more than half of firms in the dataset responded no form of certification. This might reflect that some of the firms in this dataset are going about the export activities just fine without the need for certification to a third party certification. Also, I would assume that the main export activity of the firm may dictate whether one or more of this kind of certification is needed, for instance, the certification requirements for a firm into the exports of raw agri-food products may be different for one that export semi-prepared food products as well as one that exports manufactured food products ready for human consumption. Figure 6.2 explores further the types of certification firms had. These include standards such as CanadaGAP, GlobalGAP and USDA GAP, to private standards such as McDonald’s Supplier Quality Management System (MSQMS), Loblaws Private label Suppliers. In the Figure, most
firms have certification in the order: Safe Quality Food (SQF) 2000 (about 16% of firms (i.e. 20 firms), then British Retailer Consortium (BRC) Global Standard for Food Safety (about 14% of firms (i.e. 17), followed by CanadaGAP (about 6% of firms (i.e. 7), and others such as Ontario Advantage HACCP/Plus (3.2%), Food Safety System Certification (FSSC) 22000 (1.6%), GlobalGAP (1.60), Ecocert (2.4%) and Pro-Cert Organic (2.4%).

Figure 6.2: Percentage of Firms’ Certification to various Third Party Food Safety Standards

6.1.2 Export performance model
The characteristics of the exporting firms is shown in the Table 6.6 below, however the description on variables such as firm size, age, export ownership, and export experience are not reported because they have already been reported (see chapter 5 on summary of responses).

From the 126 usable responses used in the analysis, about 61% of firms experienced increased sales growth in the last five years, while about 39% did not experience any increase (Table

---

33 This was originally a qualitative categorical variable with responses for decreased, no change and increased sales growth. Due to low response distribution, and much importantly, a statistical analysis for a multinomial logit (in Stata with using the Small-Hsiao test command: mlogtest, smhsiao, see Table 6.8a in appendix) which proved that the test for Independence of Irrelevant Alternatives (IIA) was violated (see Freese and Long, 2000); this suggested that another analytical approach was necessary for this categorical outcome. Again, from the statistical analysis in Stata (using the Wald test command: mlogtest, combine), it was suggestive that the outcome 1 for decrease and 2 for no change could be collapsed into one alternative outcome (see Table 6.8b in appendix). This dependent
6.6). Of the various export markets these firm served, approximately 35% export to only one export market while 65% export to two or more markets (Table 6.6).

Table 6.6: Descriptive Statistics for model variables \((n=126)\)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable Name</th>
<th>Description</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Export sales growth</td>
<td>ExpSal</td>
<td>(Y=1) (if Increased), 0=otherwise</td>
<td>0.611</td>
<td>0.489</td>
</tr>
<tr>
<td>Number of export markets</td>
<td>Numexp</td>
<td>(Y=1) (two or more market), 0=otherwise</td>
<td>0.651</td>
<td>0.478</td>
</tr>
<tr>
<td>Independent variable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size by sales</td>
<td>Size</td>
<td>(&lt;$15) million, $15) million to (&lt;$25) million, ($\geq$25) million</td>
<td>0.397</td>
<td>0.491</td>
</tr>
<tr>
<td>Firm age</td>
<td>Age</td>
<td>Number of years since start-up</td>
<td>27.714</td>
<td>20.817</td>
</tr>
<tr>
<td>Firm Ownership</td>
<td>Ownership</td>
<td>Locally owned (1=yes; 0=otherwise)</td>
<td>0.944</td>
<td>0.229</td>
</tr>
<tr>
<td>Firm export experience</td>
<td>Exptexp</td>
<td>Number of years involved in exporting</td>
<td>5.873</td>
<td>1.283</td>
</tr>
<tr>
<td>Training of employees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Management &amp; Administration</td>
<td>Man_Adm</td>
<td>1= yes, 0= otherwise</td>
<td>0.769</td>
<td>0.423</td>
</tr>
<tr>
<td>- Production &amp; Technical</td>
<td>Prod_Tech</td>
<td>1= yes, 0= otherwise</td>
<td>0.690</td>
<td>0.464</td>
</tr>
<tr>
<td>Firm Access to Resources</td>
<td>AccRes</td>
<td>Mean score</td>
<td>3.097</td>
<td>0.676</td>
</tr>
<tr>
<td>Market factors</td>
<td>Mktfact</td>
<td>Mean score</td>
<td>2.825</td>
<td>0.693</td>
</tr>
<tr>
<td>Food Safety Challenge</td>
<td>FSIndex</td>
<td>Mean score</td>
<td>2.386</td>
<td>0.526</td>
</tr>
</tbody>
</table>

In terms of general training given to employees within the firm, Table 6.6 shows that about 77% of the managerial and administrative employees and 69% of the employees in the production and technical services received some form of formal and/or on-job training in 2013.

Again, the multi-item constructs such as firm access to resources, market factors, and food safety challenge index entered the regression models as the mean of the scores across the number of items that represented each construct. Also, the level at which these various constructs were reflected in terms of their mean scores are ranked and presented in Tables 6.10-6.11. This was preceded with a reliability analysis through Cronbach’s alpha. As shown in the Table 6.9 (see appendix), all the scale values for the various constructs, firm access to resources, market

variable ended up with the binary response outcome which is presented in the analysis. The original average distribution for the Sales growth outcome is presented in Table 6.7, see appendix for details)
factors, and food safety challenge index, exceeded 0.7 (i.e. 0.969, 0.823, and 0.88 respectively), the threshold for acceptable reliability (Nunnally, 1978; Jalali, 2012).

First, a firm’s possession and/or access to general resources for the functionality of their operations was captured using 18 items and the results is seen in Table 6.10. The ranking in the table by no way suggests a clear strength or weakness in the resources possessed by the firms, because this average score is across firms which are heterogeneous in their export activities and what resources are important to their export activities is not captured by my analysis. Also, inspecting the average scores across the items, there is no significant difference between these scores, hence no strength or weakness in the resources these firms possess. However, respondents, on average rated their access or possession of various resources as being neither strong nor weak, just satisfactory, as indicated by a mean score of 3.09 across the 18 items. Also, on the bases of the five-point scale used from 1 as “very weak” to 5 “very strong”, the expectation was that higher response value means a stronger possession of a particular item, hence the descending order of the mean scores for the various items (Table 6.10). On an average, respondents rated the enterprise’s production and/or processing capacity (mean score of 3.5) as the strongest resource possession whiles the least was access to information on export market opportunities. Comparing export specific (i.e the last five items in the table) and general resources, access to export specific ones were rated more difficult to access.
<table>
<thead>
<tr>
<th>Firm Resource Items</th>
<th>Mean score</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enterprise's production and/or processing capacity</td>
<td>3.25</td>
<td>0.787</td>
</tr>
<tr>
<td>Ability to access raw materials</td>
<td>3.19</td>
<td>0.827</td>
</tr>
<tr>
<td>Enterprise's storage and distribution capacity</td>
<td>3.18</td>
<td>0.814</td>
</tr>
<tr>
<td>Ability to access equipment</td>
<td>3.16</td>
<td>0.814</td>
</tr>
<tr>
<td>Access to warehousing facilities</td>
<td>3.14</td>
<td>0.846</td>
</tr>
<tr>
<td>Ability to access working capital</td>
<td>3.13</td>
<td>0.794</td>
</tr>
<tr>
<td>Technological orientation/know-how</td>
<td>3.13</td>
<td>0.833</td>
</tr>
<tr>
<td>Overall management expertise and/or international experience</td>
<td>3.12</td>
<td>0.864</td>
</tr>
<tr>
<td>Access to consultants</td>
<td>3.11</td>
<td>0.851</td>
</tr>
<tr>
<td>Firm's export market research &amp; development/ research and development intensity</td>
<td>3.1</td>
<td>0.814</td>
</tr>
<tr>
<td>Ability to access investment funds</td>
<td>3.1</td>
<td>0.843</td>
</tr>
<tr>
<td>Ability to access appropriately skilled labour</td>
<td>3.05</td>
<td>0.838</td>
</tr>
<tr>
<td>Obtaining/acquisition of information on customer/consumer demands</td>
<td>3.05</td>
<td>0.838</td>
</tr>
<tr>
<td>Ability to access export financing</td>
<td>3.05</td>
<td>0.828</td>
</tr>
<tr>
<td>Ability to access export insurance</td>
<td>3.03</td>
<td>0.867</td>
</tr>
<tr>
<td>Level of assistance provided to exporters in Canada</td>
<td>3.01</td>
<td>0.825</td>
</tr>
<tr>
<td>Level of governmental incentives/support</td>
<td>3.01</td>
<td>0.863</td>
</tr>
<tr>
<td>Access to information on export market opportunities</td>
<td>2.95</td>
<td>0.866</td>
</tr>
</tbody>
</table>

Notes: Respondent were asked the question: How would you rate each of the following in your enterprise? This construct was measured originally on a five point Likert scale with 1 as “very weak” to 5 “very strong”. The final distribution scale was on a three Likert scale with 1 as “very weak” to “very strong”. The descending order of the mean score shows the rate of strength among the resources.

Table 6.11 reports the degree to which various market factors are challenging on a five-point Likert scale from 1 as “very weak” to 5 “very strong”. Thus, it is most challenging for firms to be price competitive (mean score 3.04), followed by access to and/or cost of market distribution channels (mean score 2.97), and transportation costs (mean score 2.97) and the other items follow accordingly.
Table 6.11: Ranking of various market factors as challenges by mean score

<table>
<thead>
<tr>
<th>Market factors</th>
<th>Mean</th>
<th>Std. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to be price competitive</td>
<td>3.04</td>
<td>1.162</td>
</tr>
<tr>
<td>Access to and/or cost of market distribution channels</td>
<td>3.00</td>
<td>1.187</td>
</tr>
<tr>
<td>Transport costs</td>
<td>2.97</td>
<td>1.117</td>
</tr>
<tr>
<td>Subsidies paid to specific market suppliers of the product</td>
<td>2.88</td>
<td>1.07</td>
</tr>
<tr>
<td>Overall performance of the economy</td>
<td>2.87</td>
<td>1.083</td>
</tr>
<tr>
<td>Lack of government incentives</td>
<td>2.83</td>
<td>1.041</td>
</tr>
<tr>
<td>Exchange rate volatility</td>
<td>2.77</td>
<td>1.272</td>
</tr>
<tr>
<td>Duties, import quotas or other trade restrictions</td>
<td>2.74</td>
<td>1.082</td>
</tr>
<tr>
<td>Level of market competition</td>
<td>2.7</td>
<td>1.105</td>
</tr>
<tr>
<td>Customs and other border formalities</td>
<td>2.46</td>
<td>1.025</td>
</tr>
</tbody>
</table>

Notes: The survey question was: How challenging do you find each of the following in terms of your ability to export agri-food products successfully? This construct was measured on a five point Likert scale with 1 as “very weak” to 5 “very strong”. The descending order of the mean scores show how challenging the various items are to the firms’ export activities.

6.2: Determinants of Food Safety Challenge

Ordinary Least Square (OLS) regression was used analyze which determinants factors are significantly related to the food safety challenge index, as displayed in Table 6.12. Preliminary statistical testing (e.g. regarding multicollinearity) as well as some post estimation diagnostics (e.g. model specification link test) were carried out to ensure compliance with regression assumptions. First, multicollinearity refers to the situation where independent variables are highly intercorrelated (Maddala, 2001). When independent variables are highly intercorrelated, it becomes difficult to disentangle the separate effects of each independent variable on the dependent variable. According to (Greene, 2008), symptoms of multicollinearity include: (1) small changes in the data set producing wide swings in the parameter estimates; (2) coefficients may have very high standard errors and low significance levels even though they are jointly significant; (3) coefficients may have the “wrong” sign or implausible magnitudes. The most appropriate test for multicollinearity is the variance inflation factor (VIF); the factor by which the variance of a parameter estimate increases because of collinearity of a variable with other independent variables in a model (Heij et al., 2004). The multicollinearity test is shown in the Table 6.13 (see appendix). The VIF scores ranged between 1.22 and 3.60, indicating no concern for multicollinearity.
Also, model specification link test\textsuperscript{34} and a regression specification error test (RESET)\textsuperscript{35} were run. The results in Table 6.14a and Table 6.14b (see appendix) show that the OLS regression model is specified correctly and has no omitted variables respectively. In spite of this results, Wooldridge (2009) posits that RESET has “no power to detecting omitted variables in a model but only a functional form test, and nothing more. Notwithstanding, the diagnostic results affirm a good model specification, therefore the results of OLS are discussed.

Of the 14 variables used in this model, food safety challenge was explained by internal food safety resources, implemented food safety systems within the firm, the strictness of food safety requirements and the level of food safety risk. As indicated in Table 6.13, these variables explained 38.5\% of the total variance in the food safety challenge index with a statistically significant overall fit.

For the firm characteristics employed within this model, the coefficients on age, ownership, and export experience and firm size were not significant at 10 percent level, therefore, the corresponding proposed hypotheses 1(a) - 1(d) are rejected.

The coefficient on level of food safety risk for the “low” and “high” indicators were both negative and statistically insignificant at 10 percent level compared to responses in “very low” base category. However, the coefficient on the “neither low nor high” category was negative and statistically significant at 10 percent level. It is observed that overall, all three indicators are in the same direction, in that as the perceived risk associated with the products firms supply, the food safety challenges they face in their export markets go down.

\textsuperscript{34} There are a couple of methods to detect specification errors, \textit{linktest} and \textit{ovtest}. The \textit{linktest} command performs a model specification link test for single-equation models. \textit{linktest} is based on the idea that if a regression is properly specified, one should not be able to find any additional independent variables that are significant except by chance. \textit{linktest} therefore creates two new variables, the variable of prediction, \_hat, and the variable of squared prediction, \_hatsq. The model is then refit using these two variables as predictors. \_hat should be significant since it is the predicted value. On the otherhand, \_hatsq shouldn't, because if our model is specified correctly, the squared predictions should not have much explanatory power. That is we wouldn't expect \_hatsq to be a significant predictor if our model is specified correctly. So we will be looking at the p-value for \_hatsq (Chen \textit{et al}, 2003).

\textsuperscript{35} The \textit{ovtest} command performs another test of regression model specification. It performs a regression specification error test (RESET) for omitted variables. The idea behind \textit{ovtest} is very similar to \textit{linktest}. It also creates new variables based on the predictors and refits the model using those new variables to see if any of them would be significant (Chen \textit{et al}, 2003)
Table 6.12: OLS Results for the Determinants of Food Safety Challenge Model

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Coefficient</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$15 million to &lt;$25 million</td>
<td>0.1256</td>
<td>1.45b</td>
</tr>
<tr>
<td>$≥$25 million</td>
<td>0.1020</td>
<td>0.88b</td>
</tr>
<tr>
<td>Firm age</td>
<td>-0.0010</td>
<td>-0.51b</td>
</tr>
<tr>
<td>Ownership</td>
<td>0.2147</td>
<td>1.20b</td>
</tr>
<tr>
<td>Export experience</td>
<td>0.0181</td>
<td>0.56b</td>
</tr>
<tr>
<td>Food safety risk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-0.1359</td>
<td>-1.11b</td>
</tr>
<tr>
<td>Neither low nor high</td>
<td>-0.2065</td>
<td>-1.72*</td>
</tr>
<tr>
<td>High</td>
<td>-0.1308</td>
<td>-1.13b</td>
</tr>
<tr>
<td>Strictness of food safety</td>
<td></td>
<td></td>
</tr>
<tr>
<td>About same</td>
<td>-0.0406</td>
<td>-0.45b</td>
</tr>
<tr>
<td>More strict</td>
<td>-0.2629</td>
<td>-2.51**</td>
</tr>
<tr>
<td>External food safety resources</td>
<td>-0.0647</td>
<td>-0.96b</td>
</tr>
<tr>
<td>Internal food safety resources</td>
<td>-0.3367</td>
<td>-3.03***</td>
</tr>
<tr>
<td>Implemented System</td>
<td>-0.3156</td>
<td>-2.66***</td>
</tr>
<tr>
<td>Certification to standard</td>
<td>0.0653</td>
<td>0.58b</td>
</tr>
<tr>
<td>Constant</td>
<td>4.0297</td>
<td>8.54***</td>
</tr>
</tbody>
</table>

**Model Statistics**

- R-squared: 0.4536
- Adjusted R-squared: 0.3847
- F-statistics (14,111): 6.58***
- Number of observation: 126

Notes: ***, ** and * indicate significance at 1, 5 and 10% levels, respectively; t-value (statistics) are calculated based on robust standard errors; b stands for not significant at 5% significance level.

Specifically, firms that consider their agri-food products as neither having a low nor high risk attachment would have food safety challenges decrease by far compared to firms that consider their agri-food products as being very low in risk level. I will assume that for riskier products, there might be more awareness or support within the home/export market, for which firms may have market knowledge of and use to their advantage. Also, firms that have been producing and selling these products are most likely exposed to higher customer requirements and food safety regulations, and may give their best efforts to meet these requirements. I will argue that product liability is a much bigger pressure and cost that may confront firms producing riskier products, thus firms may take the necessary measures to prevent any cost sanctions from happening and/or lose customer confidence due to recalls. This is highlighted by other studies (see for example, Mitchell, 2003; Lumpkin, 2003; Chen et al., 2006). Hypothesis 7 proposed a positive
relationship between the level of food safety risks and the food safety challenges faced by the firm, all other variables fixed. The regression results show that the level of food safety risk perception of firms has some relationship with the food safety challenges they face, hence, partially supports hypothesis 3.

The coefficient on strictness of food safety requirements for the “about same” indicator was negative but not statistically significant at 10 percent level, while the coefficient for the “more strict” indicator was negative and statistically significant at five percent level. Generally, this suggest that firms perception of the strictness of the food safety requirements in their home market help prepare them to face the food safety requirements in their export markets, and consequently, face lesser challenges. Specifically, this result suggest that relative to firms that consider/perceive the legal food safety regulations and standards in their home market as less strict compared to what prevails in their export market, firms that regard these standards as stricter than that of their foreign markets will experience decrease in the level to which food safety challenges become an issue to their export activities. This result could be tied to the fact that the market orientation within the home market sets a foundation to either spur or mar the export market orientation for firms; therefore, with the variation existing in different food sectors in terms of the products and processes of production, I would expect that there will be variation in the required food safety regulations and standards and associated control systems, as well as their enforcement procedures. Also, I would assume on the bases of the 2010 Food Safety Performance Ranking study (see Charlebois and MacKay, 2010), that Canada may be one of the best-performing countries in terms of its governance on food safety, in order to ensure that safe, high-quality agriculture and agri-food products are produced and exported. Thus, with the necessary food safety requirement enforced, implicitly, firms may give full regards to the food safety system within their home market, thereby experience fewer/less severe food safety challenges in their export markets. Overall, the result supports the Hypothesis 4.

The coefficient on firm’s access to external food safety resources was negative as expected, indicating that these resources also reduce the food safety challenges firm may face in

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36The report shows that Canada has an overall superior grade among the top-tier countries in the world, and specifically has the number one overall governance and recall procedure in place. The Governance and Recalls category looked at the effectiveness of domestic regulations and governance related to food safety. For example, the existence of risk-management plans, and the level of clarity of food recall programs. Other metric used in the study were Consumer Affair, Biosecurity, and Traceability and Recalls (see Charlebois and MacKay, 2010)
their export markets but was statistically insignificant at 10% significance level. Therefore, the proposed hypothesis 5 is not supported.

Internal food safety resources was negatively correlated with food safety challenge index, at a statistical significance of one percent level. The summated scale corresponding to this construct varies between one and five, thus a point increase in this scale would decrease food safety challenges by 0.34 points. Presumably, more resources mean ease in operations, and less cost of compliance. It is well-recognized that, firm resources influence their degree of internationalization (Dharanaj and Beamish, 2003), and consequently determine their export performance outcomes. But there are indeed resources (for example putting in place effective traceability systems) which specifically help the firm resolve food safety challenges. These internal resources are the internal controllable assets of the firm, and the RBV argues that as firms administratively choose and optimize these resources, it makes it possible to find the optimal product-market activities (Wernerfelt, 1984; Penrose, 1959; Dhanaraj and Beamish, 2003). Thus, the hypothesis 2(a) is supported from the results.

Furthermore, the coefficient on implemented system was negative and statistically significant at one percent level. This suggests that as firms implement any form of food safety systems/practices (e.g. GMP, HACCP and GAP) pertaining to their production procedures, they face fewer food safety challenges. Specifically, the result show that as they increase the food safety systems implemented within the firm from 0 to 1, they stand to achieve some level of decrease in the food safety challenges they face. Thus, internationally recognised systems facilitate trade, and this is highlighted by other studies (Herath et al., 2007; Raballand and Aldaz-Carroll, 2007; Masakure et al., 2011). This results was tested by the Hypothesis 2(b) whether the implementation of food safety systems by a firm reduced the food safety challenges it faces, all other variables fixed. With the statistical significance level, it can be concluded that implementation of food safety systems by a firm, lowers the food safety challenges faced in its export activities.

Last but not the least, firm’s certification to food safety standards was statistically insignificant at 10 percent significance level. This was contrary to my expectation, but given that the internal food safety resources and implemented system constructs (which are variables measuring the firm’s capacity constructs) showed a strong statistical influence on food safety challenges, I would assume that the residual impact of certification is small; moreover,
implemented systems may be adequate for some firms to promote their export activities and may not need any extra certification. The result shows that the proposed Hypothesis 2(c) is not supported, all things being equal.

6.3: Modelling Export Performance

This sub-section explains the results from modelling export performance mainly looking at whether food safety challenge index and/or other variables decrease or increase the probability of a firm experiencing increased sales growth in its export activities, and secondly the probability of a firm exporting to one export market or more than one export market. It begins with the sales growth model, followed by the number of export markets model. Also, the proposed hypotheses tests for export performance decisions are undertaken. All the discussions are based on the probit regression results presented in Tables 6.15 and 6.18. The results are discussed independently, then a comparison of the two models of export performance is discussed.

Again, preliminary statistical testing (e.g. regarding multicollinearity), as well as some post estimation diagnostics (e.g. model specification link test) were carried out. The multicollinearity test is shown in the Table 6.16 (see appendix). The VIF scores in this model ranged between 1.20 and 2.60, indicating no concern for multicollinearity. Secondly, omitting of relevant variables from a regression model leads to biased parameter estimates and makes the standard error of the estimates smaller (Maddala, 2001; Heij et al., 2004). Biasing of the parameter estimates may result into misleading regression results. It is therefore, necessary to ensure that relevant variables are not omitted from any regression, unless the resulting bias due to its omission is small compared to the gain in efficiency (Heij et al., 2004). Empirical literature on export performance shows that apart from market factors that are barriers, a more direct impact comes from the industry/sector structure in which the firm competes (Cavusgil and Zou, 1994; Tesfom and Lutz, 2006). The industry size, industry concentration, and the degree of the export orientation (Iyer, 2010) were possible industry variables, however, these were missing in the dataset used, and thus create potential problem of omitted variables. But for lack of data, it was difficult to test the impact of the omission of these variables. However, a model specification link test (see Tables 6.17a and 6.17b in appendix) shows that the regression model is specified correctly.
6.3.1: Export Performance measured through Sales Growth

The probit regression results for the probability of an increased sales growth for firms are presented in Table 6.15. Marginal effect are presented for each construct and variables used in the analysis. Technically, it explains the changes in the probability of export sales growth in the past five years, due to a unit change in the independent variables, holding constant all other independent variables at their mean values; but for the reasons that some of my constructs are measured as summated scales and has no intuitive bearing on what happens in reality, the marginal effects are used as consistency test of the whole estimations, as the signs and significance levels do not change.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Coefficient estimates</th>
<th>Marginal probabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size by sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$15 million to &lt;$25 million</td>
<td>0.4542(1.63)</td>
<td>0.1752(1.65)</td>
</tr>
<tr>
<td>$\geq$25 million</td>
<td>0.6679*(1.84)</td>
<td>0.2480*(1.97)</td>
</tr>
<tr>
<td>AGE</td>
<td>0.0006(0.1)</td>
<td>0.0002(0.1)</td>
</tr>
<tr>
<td>Ownership</td>
<td>0.0027(0.1)</td>
<td>0.0010(0.1)</td>
</tr>
<tr>
<td>Export experience</td>
<td>0.01870.18</td>
<td>0.0071(0.18)</td>
</tr>
<tr>
<td>Training of employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management/Administrators</td>
<td>-0.0314(-0.09)</td>
<td>-0.0119(-0.09)</td>
</tr>
<tr>
<td>Production/Technical</td>
<td>0.0825(0.28)</td>
<td>0.0313(0.28)</td>
</tr>
<tr>
<td>Access to resources</td>
<td>-0.5179**(-1.90)</td>
<td>-0.1965**(-1.91)</td>
</tr>
<tr>
<td>Market factors</td>
<td>0.5062*(1.81)</td>
<td>0.1920*(1.81)</td>
</tr>
<tr>
<td>Food safety challenge index</td>
<td>-0.7493*(-2.09)</td>
<td>-0.2842**(-2.09)</td>
</tr>
<tr>
<td>Constant</td>
<td>1.7987(1.05)</td>
<td></td>
</tr>
</tbody>
</table>

Model Statistics

Wald chi-squared (10df) 18.75**
Percent Correctly Predicted 0.683
Pseudo R-squared 0.111
Log pseudo-likelihood -74.823
Number of observation 126

Notes: ***, ** and * indicate significance at 1, 5 and 10% levels, respectively; t-statistics (in parentheses) are calculated based on robust standard errors; df is degree of freedom; Predicted probabilities are evaluated at sample means. The dependant variable is Sales growth (1= increased growth, 0 if otherwise).

The Wald chi-square statistic, testing the null hypothesis that all regressors are jointly zero, is statistically significant at 5 percent significance level, hence the null hypothesis is rejected. In
addition, 68 percent\textsuperscript{37} of the observation was correctly predicted, and the pseudo R-squared was 0.111. These diagnostic statistics suggest that the estimated model provided an overall adequate fit of the data. Put differently, all 10 variables included in the sales growth export performance model were jointly able to explain the differing outcomes for firms’ export performance.

Sales growth was positively correlated to firm size. Specifically, the coefficient on firms with total agri-food sales of $25 million and more was positive and statistically significant at 10 percent level while firms with total sales of $15 million and less than $25 million was not significant at 10 percent level; both in comparison with firms that earn less than $15 million. The marginal effect affirm the sign and significance level; thus, suggest that relative to firms with total sales less than $15 million, there is higher probability for firms with total sales greater than $25 million to have experienced increased sales growth in the past five years. In the framework of this study, this sales brackets can be grouped as small, medium and large-sized firms, as suggested by other researchers (Calof, 1994; Katsikeas \textit{et al.}, 1997; Prasad \textit{et al.}, 2001). The size of the firm has been used as surrogate indicator of resource availability (that is, the financial and physical resources at the firm’s disposal), and specifically, larger exporting firms are considered to possess more financial and human resources as well as production capacity, hence attain higher levels of economies of scale, and tend to perceive lower levels of risk about foreign markets and operations (Katsikeas \textit{et al}, 1997; Bonaccorsi, 1992). Hence, in the context of this study, larger firms have a higher probability of having experienced export sales growth in the past five years, thus supporting hypothesis 6(e).

Age and ownership structure of the firm were not significant at the 10 percent level. Also, export experience and training given to employees were not significant at 10 percent level. This suggest that for firms to have probably increased in their sales growth, it was not dependent on how young or old the firm was, or its export experience, whether it was locally or foreign-owned as well as the level of training given to its employees. The results suggest that these firm characteristics do not significantly influence the probability of increasing sales growth, therefore hypotheses 6(a) - 6(d) are not supported.

The coefficient for firm’s access to various resources has an unexpected negative sign and significantly influenced the probability of a firm’s ability to increase its export performance.

\textsuperscript{37} Masakure \textit{et al.} (2011) model correctly predicted 63 percent of their observations and was adequate fit for their model given that the data used was from a survey.
at 5 percent significance level, thus contradicting hypothesis 7. Possible explanations may be these. First, this index was made of various resource items which were generic, but with very few specific to export activities; so I assume that using a principal component analysis to determine the dimensionality of the construct, may have helped to see how those resources specific to export activities impact the firm’s sales growth, hence I consider this as current limitation of my study. Also, I assume that this result may be due to the priorities of firm, in that some resources if not all might be directed to the operational activities in the domestic market (if any) rather than their export market, or to other activities (such as market research, improving their marketing programs) that firms may find important to their overall objective, which may not necessarily be towards export performance; thus, despite the resources firms may have, the choice of different uses (possibly as changes in demand for particular products, and/or changes in technology that call for production on a large scale than before evolve) of these resources over time is determined by administrative decision, and may lead to a positive or negative overall outcome.

The coefficient on the market factors variable was positive and statistically significant at the 10 percent significance level. This is consistent with the significance level and sign of the marginal probability, therefore, this result implies that firms were more likely to have increased in their sales growth, despite the challenges they faced in their export markets. This is excluding the challenges of food safety requirements. Again, this was contrary to a priori expectations. An explanation could be that, some of the items included in this index may overall act as a catalyst rather than a barrier/challenge to the export activities of the firm. For example, I would assume on the bases of Sousa *et al.* (2008) study, that firms may perform better in more competitive markets, because it prevents firms from being relaxed, as this could be possible with markets which are easier to operate in and less competitive. Kaynak and Kuan (1993) found that though market factor challenges (i.e. the items that measured this construct) be escalating in some markets than others, due to the existence of more favorable institutional and information conditions in some industrialized markets/countries, firms could experience positive export performance. Also, I would assume that ambitious exporting firms may want to hold an image or specific brand names, and asuch, may put in their best efforts to achieve such goals irrespective of the challenges that may prevail in such markets. In summary, the results suggest that an
increase in challenges from market factors with all other variables constant, there is higher probability for firms to have experienced export sales growth, thus contradicting hypothesis 8.

With food safety challenge index, the coefficient was negative as expected and statistically significant at five percent level. Emphasized by the marginal effect, this result shows that as the intensity level of the stated food safety challenges increased, the likelihood of firms expanding in their export sales in the last five years goes down. Since this index measured firm’s perception of how various food safety requirements affect their export sales growth, I would assume that over time firms that did not expand in their exports perceived these challenges to be high, while firms with growth overcame the challenges. Another argument related to the eventual non-growth expand in the sales could base on Mitchell (2003) and Calvin (2003) study; the argument is that when firms have less or faulted reputation in their agri-food products due to non-compliance to food safety regulations and standard, consumer confidence reduces and this could directly influence their purchase of a product, thus, reduce if not totally abort the sales of the exported products in question. Overall, this construct shows the biggest marginal effect, thus a big drive on sales growth. The reported results supports the hypothesis 9.

6.3.2: Number of export markets

Table 6.18 shows the firm’s export performance as measured by number of export markets. The Wald chi-square statistic, testing the null hypothesis that all regressors are jointly zero, is strongly rejected at one percent level of significance. In addition, 71 percent of the observation was correctly predicted, and the pseudo R-squared was 0.157. These diagnostic statistics suggest that the estimated model provided an overall good fit of the data. This implies that all 10 variables included in the number of export markets model were jointly able to explain the differences for firms’ export performance.

The number of export market was positively correlated to firm size. Specifically, the coefficient on firms with total agri-food sales of $25 million and more was positive and statistically significant at 10 percent level, while firms with total sales of $15 million and less than $25 million was not significant at 10 percent level; both in comparison with firms that earn less than $15 million. The marginal effect support the sign and significance level; thus, suggest that relative to firms with total sales less than $15 million, there is higher probability for firms with total sales greater than $25 million to operate in two or more export markets, holding all other variables constant.
This means that firms with larger sales bracket may explore more export markets. With adequate financial resources available in the firm, firms look for opportunities of expansion and also acquire other physical and technological resources to increase their export operations with the ultimate aim of meeting the needs of customers in other export markets. This is highlighted by other studies (see for example, Dhanaraj and Beamish, 2003). Also, Masakure et al. (2011) argue relative to firms with low sales, firms with larger sales are able to bear the cost of adopting various market expansion strategies at different stages of their operation, which eventually contribute to their overall ability to explore more export markets. In summary, the result show that larger firms (again on the bases that, the size of the firm is used as surrogate indicator of resource availability, see for example Katsikeas et al., 1997) are more likely to serve more than on export market, thus, supports the hypothesis 1(e).

Firm age, ownership structure and export experience were statistically insignificant at the 10 percent level. This suggest that the probability for firms to operate in one or more markets is
not dependent on how young or old the firm is, its export experience, or whether it is locally or foreign-owned. Therefore, hypotheses 6(a) - 6(c) are not confirmed.

Also, the coefficient for training given to production/technical employees within a firm was positive and statistically significant at one percent level, while the coefficient on training for manager/administrative employees was not significant at 10 percent level. The sign and statistical significance level are consistent with the marginal effect for training of production/technical employees, therefore, relative to the training given to managerial/administrative employees in a firm, training of production/technical employees is more likely to help firms serve in more export market. In all production firms, the production/technical employees are at the frontlines and in direct contact with the operations, and consequently, their efforts affect the final products the firms export. The reason for this result could be that with the requisite training provided to these employees, their knowledge and technological efficiency is enhanced, and augmenting with effective and efficient practice it makes it possible to meet the necessary product requirements in several markets. From this result, it can be concluded that an increase in the training given to production/technical employees, all other variables held constant, is important to explain the number of export markets firm serve, thus partially support hypothesis 6(d).

Further, the coefficient for access to resources has an unexpected negative sign, although statistically insignificant at 10 percent level. Therefore, the hypothesis 8 is not supported.

Market factors negatively and significantly influenced the number of export markets at one percent significance level. The marginal effect is highly significant, and shows that as the challenges from these market factors increase, a firm is less likely to serve/operate in two or more export market, all other things equal. A possible reason could be that, as a firm faces these challenges within an export market, it may find it hard enough to survive, therefore have less or no resources available to expand into other markets; thus, the firm may want to maintain its current market share, and improve it resource allocation efficiency. Also, given that firms have no prior experience in new and potential export markets, coupled with the many uncertainties associated with export activities, firms may want to specialize and improve their activities within a market they are relatively more comfortable with, so they may improve their comparative and/or competitive advantage. Other studies have highlighted that overall, the relationship between the pressures or challenges from export market and the firms export performance may
reflect the existence of economies of scales, the level of risk preference, the access to a portfolio of external resources, the organizational structure and/or export market orientation of the firm (Donthu and Kim, 1993; Cadogan et al., 2002a; Masakure et al., 2009). The results support the hypothesis 8.

Food safety challenge index was positive and statistically significant at five percent significance level. The marginal effect specifically shows that as food safety challenges increase, the likelihood for firms to serve more than one market increase. This shows that food safety challenges is a function of the number of export markets a firm is operating in. Other studies have highlighted that perceived risk and risk tolerance towards food safety issues differ across countries and in effect differentiate the food safety regulations and standards in these export markets (Mitchell, 2003). I would therefore assume that the food safety challenges firms would have to face increases with every additional market they enter. This result is contradicting to the hypothesis 9.

6.3.3: Comparison of the two dependant variable for export performance

When comparing the two models with different dependant variables, it first has to be pointed out that the two dependent variables measure two different time periods; with the firm’s sales growth being measured in the last five years, while the number of export markets that firms serve is measured in the most recent (i.e. 2013). This give room for potential endogeneity problem (further discussed in chapter 7). For example, over time I would assume that the number of export market could be an explanatory variable to the sales growth of firms; therefore, this is major limitation to the study. Also, the two dependent variables are different in nature. The export sales growth variable can be seen as a continuous variable that can happen in all markets but getting into a new market is a discrete step in reflecting food safety challenges. A firm operating in two markets might have very different food safety requirements to deal with alongside other factors such language barriers and difference in legal frameworks. Also, both variable did not measure individual specific export markets, thus the general export activities in the firm’s scope of operation for the sales growth variable and the number of export market captured the export regions for Canadian food exports. However, some of the findings from using the two models are these;

All things equal, with the same variables employed to explain export performance, the sales growth model correctly predicted 68 percent of the observation in export performance,
whiles the number of export markets predicted 71 percent; thus though there is no statistical test to assert the importance of one model from the other, just observing by the magnitudes, the number of market’s model predicts export performance better than sales growth indicator. Also, it provides a better fit statistics.

It is also observed that (i.e. by the significance levels), sales growth was significantly influenced by firm’s access to resources and food safety challenges whiles firm size and market factor show mild influences. For the number of export market indicator, market factors and training of production/technical employees show very high influence, followed by food safety challenges and lastly, firm size. Before I compare the significant influences from summated scales, it must be noted that all the summated scales used in the model were well above 0.7, the threshold for acceptable reliability for the Cronbach alpha. Therefore, the scale instrument demonstrated reliability by satisfying the statistical criteria, and this evidence show that the constructs in this study have high level of internal consistency and are reliable.

Both analyses show that food safety challenges is an important variable to explain export performance of agri-food exporting firms irrespective of dependent variable. However, the coefficient on food safety challenge index was negatively correlated to the probability of firm’s sales growth whilst positive to the number of export markets. Also, comparing the impact by the marginal effects, it shows a bigger impact on the sales growth variable than on the number of export markets variable, all things being constant; whilst it’s the second highest of effect on the number of export markets. I would argue that the difference in signs support that fact that dependent variables are different in nature and they measure two distinct dimensions of export performance. I may also argue that challenges might not be clear because it is a function of the number of export markets the firm is operating, thus it may get more complicated as a firm a firm moves into new markets.

Further, both models point out that the external environment in which the firm operates has a significant influence on the firm’s export performance; but this influence is high on the firm’s probability to expand its export activities to more markets and relatively minimal with the sales growth variable. Also, the signs on market factors was opposite in direction in both models, with a positive relationship with sales growth and a negative with the number of export markets. But the degree of impact is relatively minimal with the sales growth variable whiles it strongly affects the number of export markets variable. This negative sign may also support the fact that,
the uncertainties with entering into new export market and/or expanding to more markets are not clear and may be quite challenging depending on the export market. On the other hand, I will argue that the positive sign may point out that despite the challenges in an export market, firms may not need expansion in order to experience increase in their sales growth.

The resources of the firm (set on the RBV of the firm) which was posited as central to this study, showed an inverse relationship with sales growth and no significant relationship on the number of export markets firms, thus, emphasize the complexity in measuring export performance of firms.

Finally, among the firm characteristics used, only the coefficient on firm size (with large sales of $25 million and more) was positive in both models though its statistical significance is not high; training given to production employees was strongly correlated to number of export markets and has no significant relationship with the sales growth variable. However, it shows that larger firms are more likely to explore more than one export markets and more likely to have export sales expansion, all other things equal.
Chapter 7: Conclusion and Recommendation

This final chapter summarises the findings of this study. Policy implications, limitations of the study, and direction for future research are also discussed.

7.1: Summary and Findings

The purpose of this study was to assess the impact of food safety requirements on the performance of Canadian agri-food exporters. The first objective was to identify the factors that drive the food safety challenges firms face in their export markets, and the second objective was to measure the impact of these food safety challenges on firm’s export performance. Using firm-level survey collected from agri-food exporters, and drawing from the resource-based theory of the firm, the conceptual framework of this study was developed. On the premise of this theory, two models were used in this study to arrive at the mentioned objectives. The first model focused on the determinants of food safety challenges as a function of the firm’s characteristics, its access to external food safety resources, the strictness of food safety requirements, the level of food safety risk and lastly, and its food safety capacity. The second model measured the export performance of firms using two indicators; sales growth and number of export markets. This model was established as a function of the firm’s characteristics and resource base, some market factors, and food safety challenge index. The hypotheses in this study were tested using; a) the results of the OLS linear regression for the determinants of food safety challenge, and b) the results from the probit models for export performance.

Of the 14 variables used in this model, food safety challenge was explained by internal food safety resources, implemented food safety systems within the firm, the strictness of food safety requirements and the level of food safety risk.

First, the OLS regression results showed that the most important drivers of food safety challenges are the internal food safety resources and the implemented food safety systems within the firm. Irrespective of all the riskiness associated with exported food products as well as the strictness of food safety requirements, a firm’s ability to withstand these pressures and food safety challenges in general is centered on the prior investments in its food safety capacity at the firm level. Presumably, more resources mean ease in operations, and less cost of compliance. Even though firm’s access to external food safety resources did not show any significant association to the food safety challenges firms faced, the sign however, showed that as firms get
easy access to these external resources, they stand to benefit, because the food safety challenges they face will go down.

Secondly, an interesting result is the outcome on how firms perceived the strictness of food safety requirements. In the literature, it is often argued that strict regulations can impede trade and overall affect/erode firm’s competitiveness, but my results suggest the more strict firms perceive these regulations within their home markets, the better they are able to comply in challenging markets. Also, the challenges food safety pose to firms in their export markets can also be related to the level of perceived risk associated to the food products they export. Even though the result show that this perceived riskiness marginally impacts the food safety challenges they face, it differentiates firms, in that firms that give a moderate concern relative to those who give minimal attention stand to face lower food safety challenges.

Furthermore, the OLS results show that there was no significant association between the firm’s characteristics (i.e. firm size, age, ownership structure and export experience) and the food safety challenges it actually faces in its export activities.

This leads to the impact food safety challenges have on the export performance of firms. Both analyses show that food safety challenges are important to explain export performance of agri-food exporting firms irrespective of dependent variable. Specifically, the coefficient on food safety challenge index was negatively correlated to the probability of firm’s to have experienced sales growth in the past five years, and shows a positive relationship to the number of export markets variable. Also, comparing the impact by the marginal effects, the results show a bigger impact on the sales growth variable than on the number of export markets variable, all things being constant. Thus, generally, the result shows that food safety challenges significantly impacts firm’s export performance.

Also, there was statistical evidence that the pressures from market factors play an important role in determining the export performance of firms. The market factors construct showed a positive but weak relationship on the firm’s probability sales growth. Similarly, there was a strong inverse relationship between market factors and the number of export markets the firm is able to serve. The results showed that firms are less likely to export two or more export market. The outcomes on the challenges firms face due to market factors were contrary to a priori expectation.
Firm’s access to resources was important to this study, but showed different results for the two dependent variables. The general rating for the items that measure this construct show that the resources accessed and/or possessed within the firms are great and adequate to impact their firm’s activities. However, for the sales growth measure of export performance, firm access to resources was negative and statistically significant whilst in the number of export market model, though the relationship between firms’ access to resources and export performance was positive, and supports the importance of resources to the firm’s activities, it has no significant bearing on the probability that firm would major its activities in one or more market. Both results in the dependent variables were contrary to my a priori expectation.

Further, firm characteristics such as firm age, ownership structure and export experience showed no statistical significance with export performance. Neither the sales growth nor number of export markets model results showed any statistical significance of these factors influencing the export performance firm. Nevertheless, the signs the age of the firm, its ownership structure and export experience showed the likelihood of firms experiencing increased sales growth. In the number of export market model, the age indicator showed that firms are less likely to serve two or more export markets whilst the firm’s ownership structure and export experience showed that firms are more likely to serve more than one export market. Even though training given to employees (either managerial/administrative employees or production/technical employees) had no significant association to likelihood that a firm experiences increased sales growth, training given to production/technical employees was positive and significantly influenced the probability that firm’s will serve two or more export serves.

Finally, the coefficient on firm size (i.e. firms with large sales of $25 million and more) was positive in both models though its impact was marginal.

7.2: Policy Implications
The findings of this study have some relevance to policies aimed at improving the export performance of agri-food exporters. There was indeed strong evidence that food safety challenges matter and they are one of the key drivers of export performance. Food safety challenges are influenced by prior investments in the food safety capacity (HACCP, etc.) of the exporting firm. Thus efforts to reduce challenges faced by firms must focus on these!

First, the internal food safety resources showed strong impact to lower the food safety challenges firms faced in their export activities. This implies that as firm’s control or possess
these resources, they are at a better position to curb the impact of food safety challenges on their export performance. Among the items rated, it was observed that on average the firm’s ability to upgrade their food safety control on an ongoing basis, as well their ability to train their workforce were least on the ranking. Though these were not tested individually, the ranking show that there is room for improvement for these internal food safety resources. This requires that government, sector organizations, and stakeholders look to provide pragmatic directives and initiatives that help firms to sustain these resources and/or upgrade when necessary. Specific areas of policy intervention could include the provision of easy access to training facilities and materials at affordable prices, as well as initiating export financing policies that help firms to access funds at moderate interest rates for the purpose of upgrading their food safety control systems. Further, general training to production/technical employees showed that firm have higher probability to diversify. Thus, avenues to improve the capacity of firms to enable easy access to personnel or programs jeered towards exports could be beneficial. Specifically relating to the external food safety resources, this construct showed no significant impact on food safety challenge response variable, however, it showed a negative relationship. This implies that, government strategies and/or stakeholders’ supports can target providing food safety consultancy services for these exporting firms. This may enhance the training firms give to their employees, thus improve their overall export outcomes.

Secondly, with the evidence that as firms implement various food safety system and/or control practices, it reduced the food safety challenge they faced; it is imperative that firm managers and policy holders ensure these systems are in place and functioning properly. Again, this could be easily adopted or implemented depending on the cost of acquisition and maintenance, thus some firms may have such financial capacity and others may not. For instance, Herath et al (2007) explained that if scale of economies were sufficient, without external pressures or rewards, smaller- and medium-sized firms were unlikely to adopt food safety enhancement systems. This is mainly because of the cost of implementation and maintenance. Therefore, first, a country wide mandatory firm-level survey can be initiated under the auspices of CFIA to systematically investigate and get an outlook of the cost of implementing and maintaining food safety assurance systems across different firm sizes. Also, governmental and various organizational stakeholders can support through various funding opportunities at low interest rates for exporting firms to implement these standards. This is all in
the efforts to spur firms to implement these food safety systems for an eventual positive increase in their overall export performance.

Finally, it was evident that firms’ judgement on the strictness of food safety requirements as well as the food safety risk they attached to their exported products, determined the impact of food safety challenge on their export activities. This allows for necessary policy intervention such as periodic evaluation through market research of the prevailing food safety regulations within the home market, how firms are responding to them and the overall impact on their export orientation. The research outcome may help to enforce the necessary sanctions in the face of default, or enact or upgrade standards and procedures to meet new risk that may evolve. This may ensure that firms continually comply with these regulation and expedient ramifications made as and when necessary, all within the objective that firm’s hold in high esteem what they produce to export and how they do that.

7.3 Limitations of the Study and Suggestions for Future research

Despite the success of this study in implementing the objectives and testing the hypotheses, it is worth noting some limitations. These limitations also serve as indicators of future research directions.

The first major limitation of this study has to do with the number of survey responses and the data used in the analyses. The number of survey responses that was used for analysis was very small compared to the total number of participants contacted. This makes the sample size not representative of the population of Canadian agri-food exporters. Also, there were omitted variables which may, in addition to the variables considered in the study, explain the export performance of agri-food exporters as well as the determinants of the food safety challenge. Including these omitted variables may improve the explanatory power of the model estimated. It may also direct the choice of estimation techniques such as the instrumental variable approach and/or structural equation modelling (SEM). These omitted variables though not limited to these examples include sector/industry factors such as industry size, industry concentration, and degree of export orientation, as well as others like the products exported and food subsector within which the firm operated. Also, sufficient data information to capture export intensity and sales growth as continuous variables were missing while some of the items that made up the multi-item constructs were quite ambiguous (for example, the items for market factors, that is, whether it measured the pressures in the export market or the home market of the exporting firm). For
future research, the overall survey responses difficulty may be reduced by using promotional
draws for a gift or something to serve as an incentive. Also, avenues through farm show booths
can be explored to allow for direct contact with perspective respondents or direct interview
appointments to exporting firms could be another option, though this could be subjected to huge
financial commitment and time constraints.

Secondly, it is proposed that future studies should thoroughly revise the structure of the
survey to capture all important variables. Specifically, questions that capture export intensity and
sales growth as continuous variable should be included in the survey. This can include data on
other variables such as industry size, industry concentration, degree of export orientation, and
products exported, and used as independent variables in the export performance model. With
adequate sample size and scale of measurement for the dependent variables, an integrated model
can be achieved and explored using the SEM approach. This approach would allow for multiple
dependent variables and help investigate the direct and indirect effects among the various latent
constructs and observed variables. Also, with appropriate instrument variables, the two-stage
least square approach can be solicited to solve for endogeneity problems.

Further, some of the multi-item scale constructs could have been reduced in their
dimensionality using principal component analysis in order to see their impact more clearly (for
example, the firm access to resources). Suggestion is that a scale reduction technique (such
principal component analysis (PCA) can be used for multi-item scales and the resultant factor
scores used in separate regression analysis. Summated scales can then be calculated for the
various components realised from the PCA and further used in another regression analyses. The
results can then be compared. Also, a Wilcoxon sign rank test could be used to test the difference
between multi-item scales, if necessary.

Another limitation of the study was the non-integrated nature of the model. For example,
in Figure 4.2, the interaction between firm access to general resources, market factors and food
safety challenges were assumed to be captured in the Figure 4.1, but this may have had direct or
indirect influence on food safety challenges. Although, multiple regression analysis can
accommodate multiple dependent variables, they are limited in how the relations between those
variables are specified, and thus integrating the two separate models would be good. This makes
room to have a parsimonious model with multiple regression analysis taking place at the same
time. With the several latent constructs and observed variables used in this study, an integrated
model would help compare and contrast the causal relations among the variables and also help investigate the direct and indirect effects among the various latent constructs and observed variables. Therefore, future studies may consider an integrated model and use of a multivariate analysis technique; the structural equation modeling (SEM), which allows for systematic comparisons among path coefficients of multiple groups (see Calantone et al., 1996, Mullen, 1995).

Lastly, a key limitation to this study is the problem of endogeneity. One of the OLS assumption is that errors are uncorrelated with the independent variables in a model (Greene, 2008). Endogeneity may arise from measurement error, omitted variables or simultaneous causality (Wooldridge, 2009; Bascle, 2008; Fingleton and Le Gallo, 2008). It was observed that the dependent variables measured different time periods, and this makes room for the problem of endogeneity (due to measurement error and simultaneous causality), because there would be variation in some of the variables over time while some variables could reflect/capture the effects of other variables over time. For example, the food safety challenge index in the export performance model could be endogenous as a result of omitted variables and for reason that it could be a function of the number of export markets a firm served. Endogeneity bias is not a simple violation to deal with, and it has serious consequences for regression estimates.

There are two main ways of dealing with endogeneity in OLS estimation: Ad hoc solutions; and Instrumental Variable (IV) estimation. Under the ad hoc solutions, if an explanatory variable is potentially endogenous, it is intuitively appealing to look for a proxy that does not suffer from the same problem (Fair, 1970; Zohoori and Sativz, 1997; Nikolaev and van Lent, 2005). The use of proxy is very simple to implement, requires limited data and is intuitively appealing. However, interpretation becomes a little more difficult since the variable in the regression is only a proxy for the variable we have interest in. There may also loss of precision in some cases. Also, there is no way of gauging empirically how serious the endogeneity problem is, and whether the proxy is adequate to deal with it. The best way to deal with endogeneity concerns is through the instrumental variables (IV) techniques (Wooldridge, 2009; Heij et al., 2004; Bascle, 2008). The most common IV estimator is Two Stage Least Squares (TSLS). In order for IV estimation to be successful, it is based on the assumption that the instrumental variable chosen should only be strongly correlated with the potentially endogenous regressor but not with the error term. Secondly, the instrument chosen should as well influence only the
dependent variable through the potentially endogenous regressor. This consist of two stages: the first stage is where you regress the endogenous variable on the chosen instrumental variable, all under the assumptions of OLS, and this create a new variable (that is, fitted values) if the estimation is successful. In the second stage, the model-estimated values from stage one are then used in place of the actual values of the endogenous variable to compute an OLS model for the response variable of interest. IV estimation is intuitively appealing, rigorous and transparent, and is amenability to empirical testing. The most difficult part lies in the selection of appropriate instruments though I assume that a variable such as food subsector within which the firm operates could likely be used for food safety challenges.
References


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-------------------------------------- “The impacts of private food safety standards on the food chain and on public standard-setting processes.” ALINORM 09/32/9D-Part II (Rome: Codex Alimentarius).


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Appendix

Table 6.3: Scale Reliability Results

<table>
<thead>
<tr>
<th>Latent Constructs</th>
<th>Number of items</th>
<th>Cronbach alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access to external food safety resources</td>
<td>5</td>
<td>0.908</td>
</tr>
<tr>
<td>Internal food safety resources</td>
<td>8</td>
<td>0.904</td>
</tr>
</tbody>
</table>

Table 6.7: Descriptive Statistics for Sales Growth Dependent Variable

<table>
<thead>
<tr>
<th>Changes in Sales Growth</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased</td>
<td>11</td>
<td>.316</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>No change</td>
<td>.28</td>
<td>.450</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Increased</td>
<td>.61</td>
<td>.489</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: Due to low frequency for the decreased and no change responses for the sales growth dependent variable, the variable was introduced as a binary outcome with 1 if there was increased sales growth and 0 if otherwise, hence the decrease (outcome 1) and no change (outcome 2) outcomes was collapsed.

Table 6.8a: Results from Small-Hsiao test of Independence of Irrelevant Alternatives (IIA) Assumption

<table>
<thead>
<tr>
<th>Omitted</th>
<th>lnL(full)</th>
<th>lnL(omit)</th>
<th>chi2</th>
<th>df</th>
<th>P&gt;chi2</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-40.371</td>
<td>-13.2</td>
<td>54.34</td>
<td>11</td>
<td>0.000</td>
<td>against</td>
</tr>
<tr>
<td>3</td>
<td>-10.395</td>
<td>0</td>
<td>20.79</td>
<td>11</td>
<td>0.036</td>
<td>for</td>
</tr>
<tr>
<td>2</td>
<td>-21.796</td>
<td>-9.336</td>
<td>24.921</td>
<td>11</td>
<td>0.009</td>
<td>against</td>
</tr>
</tbody>
</table>

NB: The IIA in the multinomial logit assumes that the odds for any pair of outcomes are determined without reference to the other outcomes that might be available. The Small-Hsiao test based on the p-value shows that we fail to reject the null hypothesis for the category 3 (i.e. increased outcome responses) but not reject for the categories 1 (i.e. decreased responses) and 2 (no change responses).

Table 6.8b: Results from Wald test for Combining Alternatives

<table>
<thead>
<tr>
<th>Alternatives</th>
<th>tested</th>
<th>chi2</th>
<th>df</th>
<th>P&gt;chi2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-</td>
<td>3</td>
<td>8.869</td>
<td>10</td>
<td>0.545</td>
</tr>
<tr>
<td>1-</td>
<td>2</td>
<td>13.57</td>
<td>10</td>
<td>0.194</td>
</tr>
<tr>
<td>3-</td>
<td>2</td>
<td>24.016</td>
<td>11</td>
<td>0.013</td>
</tr>
</tbody>
</table>

NB: The Wald test allows for the test whether the independent variables differentiate pairs of outcome. The results shows that collapsing alternative 1 (which is the decreased outcome) and 3 (which is the increased outcome) is possible as well as the outcomes 1 and 2 (which is the no change outcome) but we cannot collapse outcomes 3 and 2.
Table 6.9: Scale Reliability Results

<table>
<thead>
<tr>
<th>Latent Constructs</th>
<th>Number of items</th>
<th>Cronbach alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm access to resources</td>
<td>18</td>
<td>0.969</td>
</tr>
<tr>
<td>Market factors</td>
<td>10</td>
<td>0.823</td>
</tr>
<tr>
<td>Food safety challenge index</td>
<td>18</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Table 6.13: Multicollinearity test for Food safety Challenge Model

<table>
<thead>
<tr>
<th>Variable name</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td></td>
</tr>
<tr>
<td>$15million to &lt;$25million</td>
<td>1.33</td>
</tr>
<tr>
<td>≥$25million</td>
<td>1.63</td>
</tr>
<tr>
<td>Firm age</td>
<td>1.23</td>
</tr>
<tr>
<td>Ownership</td>
<td>1.23</td>
</tr>
<tr>
<td>Export experience</td>
<td>1.28</td>
</tr>
<tr>
<td>Food safety risk</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>2.15</td>
</tr>
<tr>
<td>Neither low nor high</td>
<td>1.99</td>
</tr>
<tr>
<td>High</td>
<td>2.18</td>
</tr>
<tr>
<td>Strictness of food safety</td>
<td></td>
</tr>
<tr>
<td>About same</td>
<td>1.41</td>
</tr>
<tr>
<td>More strict</td>
<td>1.54</td>
</tr>
<tr>
<td>External food safety resources</td>
<td>2.44</td>
</tr>
<tr>
<td>Internal food safety resources</td>
<td>3.59</td>
</tr>
<tr>
<td>Implement standard</td>
<td>1.84</td>
</tr>
<tr>
<td>Certification to standard</td>
<td>2.36</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.87</td>
</tr>
</tbody>
</table>

Note: Variance Inflation Factor (VIF) was used in testing for multicollinearity. Large VIF values (i.e. above 10) denote high multicollinearity, though a common cut-off threshold for VIF values is value above 5.3 (Hair, Black, Babin, Anderson, & Tatham, 2005). VIF scores in this model ranged between 1.20 and 2.60 (see Table 6.14) indicating no concern for multicollinearity.

Table 6.14a: Results of Model Specification Link Test for Food Safety Challenge Index

<table>
<thead>
<tr>
<th>Food Safety Challenge Index</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t</th>
<th>P&gt;t</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>_hat</td>
<td>0.4344</td>
<td>1.2153</td>
<td>0.36</td>
<td>0.721</td>
<td>-1.9713 to 2.8401</td>
</tr>
<tr>
<td>_hatsq</td>
<td>0.1155</td>
<td>0.2474</td>
<td>0.47</td>
<td>0.641</td>
<td>-0.3741 to 0.6052</td>
</tr>
<tr>
<td>Constant</td>
<td>0.6776</td>
<td>1.4705</td>
<td>0.46</td>
<td>0.646</td>
<td>-2.2332 to 3.5884</td>
</tr>
</tbody>
</table>
Notes: A model specification error can occur when one or more relevant variables are omitted from the model or one or more irrelevant variables are included in the model. If relevant variables are omitted from the model, the common variance they share with included variables may be wrongly attributed to those variables, and the error term is inflated. On the other hand, if irrelevant variables are included in the model, the common variance they share with included variables may be wrongly attributed to them. Model specification errors can substantially affect the estimate of regression coefficients. Therefore, a specification link test is performed to ascertain whether adequate variables are included in the model to explain the variance in the dependent variable. This was tested using the \texttt{linktest} command in Stata. It is expected that \texttt{hatsq} would not be a significant predictor if the model is specified correctly. So we will be looking at the p-value for \texttt{hatsq}. From the results, it can concluded that the independent variables have a good relationship and link function with the dependent variable. This means \texttt{linktest} has failed to reject the assumption that the model is correctly specified.

**Table 6.14b: Results of the Regression Specification Error Test**

<table>
<thead>
<tr>
<th>Ramsey RESET test using powers of the fitted values of food safety challenge index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ho: model has no omitted variables</td>
</tr>
<tr>
<td>$F(3, 108) = 1.18$</td>
</tr>
<tr>
<td>$Prob &gt; F = 0.3204$</td>
</tr>
</tbody>
</table>

Notes: The idea behind \texttt{ovtest} is very similar to \texttt{linktest}. It also creates new variables based on the predictors and refits the model using those new variables to see if any of them would be significant. The p-value is insignificant which means that the null hypothesis can be rejected (i.e. OLS model has no omitted variables).

**Table 6.16: Multicollinearity test for Export performance Model**

<table>
<thead>
<tr>
<th>Variable name</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size by sales</td>
<td></td>
</tr>
<tr>
<td>$&gt;$15million to &lt;25million</td>
<td>1.32</td>
</tr>
<tr>
<td>$\geq$25million</td>
<td>1.46</td>
</tr>
<tr>
<td>AGE</td>
<td>1.21</td>
</tr>
<tr>
<td>Ownership</td>
<td>1.22</td>
</tr>
<tr>
<td>Export experience</td>
<td>1.27</td>
</tr>
<tr>
<td>Training of employees</td>
<td></td>
</tr>
<tr>
<td>Management/Administrators</td>
<td>1.34</td>
</tr>
<tr>
<td>Production/Technical</td>
<td>1.30</td>
</tr>
<tr>
<td>Access to resources</td>
<td>2.24</td>
</tr>
<tr>
<td>Market factors</td>
<td>2.59</td>
</tr>
<tr>
<td>Food safety challenge index</td>
<td>2.22</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.62</td>
</tr>
</tbody>
</table>
Table 6.17a: Results of Model Specification Link Test for Sales Growth

<table>
<thead>
<tr>
<th>Sales growth</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t</th>
<th>P&gt;t</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>_hat</td>
<td>1.1177</td>
<td>0.3362</td>
<td>3.32</td>
<td>0.001</td>
<td>0.4588 - 1.7766</td>
</tr>
<tr>
<td>_hatsq</td>
<td>-0.2067</td>
<td>0.3883</td>
<td>-0.53</td>
<td>0.594</td>
<td>-0.9677 - 0.5542</td>
</tr>
<tr>
<td>_cons</td>
<td>0.0322</td>
<td>0.1490</td>
<td>0.22</td>
<td>0.829</td>
<td>-0.2598 - 0.3242</td>
</tr>
</tbody>
</table>

Notes: This was tested using the `linktest` command in Stata. It is expected that _hatsq would not be a significant predictor if our model is specified correctly. So we will be looking at the p-value for _hatsq. From the results, it can be concluded that the independent variables have a good relationship and link function with the dependent variable. This means `linktest` has failed to reject the assumption that the model is correctly specified.

Table 6.17b: Results of Model Specification Link Test for Number of Export Market

<table>
<thead>
<tr>
<th>Number of Export Market</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>t</th>
<th>P&gt;t</th>
<th>[95% Conf. Interval]</th>
</tr>
</thead>
<tbody>
<tr>
<td>_hat</td>
<td>1.0223</td>
<td>0.2778</td>
<td>3.68</td>
<td>0.000</td>
<td>0.4779 - 1.5668</td>
</tr>
<tr>
<td>_hatsq</td>
<td>0.0352</td>
<td>0.2653</td>
<td>0.13</td>
<td>0.894</td>
<td>-0.4848 - 0.5553</td>
</tr>
<tr>
<td>_cons</td>
<td>-0.0079</td>
<td>0.1580</td>
<td>-0.05</td>
<td>0.960</td>
<td>-0.3176 - 0.3018</td>
</tr>
</tbody>
</table>

Notes: This was tested using the `linktest` command in Stata. It is expected that _hatsq would not be a significant predictor if our model is specified correctly. So we will be looking at the p-value for _hatsq. From the results, it can be concluded that the independent variables have a good relationship and link function with the dependent variable. This means `linktest` has failed to reject the assumption that the model is correctly specified.