



Food safety standards adoption and its impact on firms' export performance: A systematic literature review

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ABSTRACT

Success of the 2030 Agenda is dependent on food safety as human development is not possible without universal access to safe food. Along with increasing trade, food safety has become a vital component of our sustainable future. Consequently, agro-food firms are under pressure to implement food safety standards (FSS) to reduce food borne illnesses, achieve Sustainable Development Goals (SDGs), improve competitive advantage and gain access to foreign markets. Compliance with FSS can be challenging but a prerequisite to export in foreign markets. Therefore, the study aims to map out the currently available research concerning factors that influence FSS implementation at firm level and the impact of FSS on firms' export performance. We performed a systematic literature review covering 117 studies centered around four key themes: enablers, motives, barriers influencing FSS implementation at firm level, and impact of FSS on export performance. We also propose a conceptual framework to explain the relationships among various factors, FSS adoption, and export performance. The paper provides the first comprehensive review of factors influencing FSS implementation at firm level as well as the impact of FSS on export performance.

1. Introduction

Providing food security and food safety is a fundamental economic activity of any society and an essential foundation for sustainable development (Qian et al., 2012; Price, 2020). Food safety is essential to achieve several Sustainable Development Goals (SDG) such as No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), and Responsible Consumption and Production (SDG 12) (Do et al., 2019; Kumar and Giri, 2021). Food safety involves all practices used to deliver safe food and ensure consumer health; hence, governments, businesses, and societies have placed great emphasis on ensuring firms follow food safety compliance (Escanciano and Santos-Vijande, 2014; Bar and Zheng, 2019). Concisely, to achieve SDGs, meet high-end consumers demand, and gain access to global markets, agro-food firms have begun to adopt food safety practices (Jespersen et al., 2014; Fiore et al., 2016; Do et al., 2019).

Considering that food safety cannot be easily realized, standards programs and certification bodies play a substantial role in the food industry (Bar and Zheng, 2019). In this context, standards specify minimum requirements for quality; ensure food is not contaminated and

confirm no fraudulent practices have taken place (Khan et al., 2019). Besides, this increases consumer confidence and grants legitimacy for business operations (Bush, 2018; Riganelli and Marchini, 2016). Thus, food safety standards (FSS) is considered as a subject of sustainability, that covers a range of voluntary standards related to the environment, social issues, product quality and other product attributes (Montiel et al., 2019). Traditionally, public standards have addressed food safety, which are outlined by government agencies and generally mandatory in practice (Hatanaka et al., 2005; Ehrich and Mangelsdorf, 2018).

The scope of these standards has expanded over time, which has resulted in the growth of private FSS (Casolani et al., 2018; Latouche and Chevassus-Lozza, 2015; Russo et al., 2014). These private FSS has been focusing on safety and quality issues, but lately have evolved to include other aspects like animal welfare, ethical and environmental concerns (Schuster and Maertens, 2015). Besides, private FSS are more than just product certifications, retailers can ask their suppliers for specific technologies and logistics, not directly related to food safety (Russo et al., 2014). Private FSS adoption is voluntary, meaning firms are not required to comply by law, but it is a part of business-to-business agreements between retailers and agro-food firms (Latouche and

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Chevassus-Lozza, 2015). Regardless of whether it is a private voluntary standard or public regulation, non-compliance could escalate exporting firms' cost (Trafialek and Kolanowski, 2017).

Moreover, food borne illnesses that would once have been contained in a small region can now spread quickly and result in significant losses due to increasing trade (Chen et al., 2018). Several outbreaks, such as Jack-in-the-Box outbreak in the USA and Bovine Spongiform Encephalopathy outbreak in Western Europe, lead to greater attention towards strengthening the food safety systems (Ollinger and Moore, 2008; Lemos and Zylbersztajn., 2018; Moon and Tonsor, 2020). Increased consumer awareness, technological advancement, and increased food trade have contributed to an increase in the number of food standards, indicating their relevance for further research in this area (Mosquera et al., 2013).

The growing use of FSS has an influence on food trade (Schuster and Maertens, 2015; El-Enbawy et al., 2016; Beestermöller et al., 2018). Several researchers believe that FSS implementation boosts exports (Casolani et al., 2018; Medin, 2019). According to them, compliance with FSS increases competitiveness and increase in demand outweighs negative cost impact (Nguyen et al., 2017; Neeliah et al., 2013). Despite these benefits, it is unclear why FSS implementation continues to be low and why some companies fail to get the certification or discontinue after some point (Ragasa et al., 2011a,b). Researchers find that additional costs related to compliance and uncertainties associated with standards reduces FSS implementation at firm level and affect exports (Fernandes et al., 2017; Montiel et al., 2019). Furthermore, DaSilva-Glasgow (2020) points out that various factors can influence transaction costs associated with regulatory compliance. Several researchers have also found that firms must consider both internal and external factors to maintain their competitive advantage (Galati et al., 2017; Zhou et al., 2011; Do et al., 2019). Besides, a body of literature highlights that FSS implementation has a significant impact on businesses on several levels, including economic value, societal benefits, and individual benefits (Escanciano and Santos-Vijande, 2014; Wilcock and Boys, 2017; Rincon-Ballesteros et al., 2019; Montiel et al., 2019). Similarly, various researchers studied the barriers to FSS implementation such as budget constraints (requirements to restructure the facility), organisational resistance (lack of knowledge), and environmental resistance (lack of consumer demand) (Ragasa et al., 2011a; Mahidin et al., 2017; Agyemang et al., 2018; Abebe et al., 2020). However, the extant body of literature is fragmented, and there is absence of an organizing framework, which makes it difficult to "handle" this information. Hence, we aim to conduct a systematic review of existing research to identify and analyse the factors (enablers, motives, and barriers) influencing FSS implementation at firm level and the impact of the FSS on firms' export performance.

The literature indicates that food safety has been the subject of several review articles in the past. The review article by Henson and Jaffee (2008) provides insight about strategic responses of developing countries towards evolving FSS. Later, Ortega & Tschirley (2017) comprehends the demand for food safety in developing nations. A number of academic studies have reviewed the impact of FSS on international trade (Beghin et al., 2015; Andersson, 2019). Additionally, Pérez-Mesa et al. (2019) analyse the impact of food crises on demand in the horticulture sector. Furthermore, a study by Hoffmann et al. (2019) focuses on identifying the factors that lead to food safety problems, especially in low- and middle-income countries. Though border rejection data shows food safety to be a major challenge for exports, it has not been studied much at the firm level due to lack of data. However, to understand the impact of FSS on firms' export performance, it is necessary to understand the dynamics of factors that affect the FSS implementation at firm level. Therefore, this study examines a number of key factors (enablers, barriers, and motivation) affecting the implementation of FSS at firm level and the impact of FSS on export performance. Additionally, we build an integrative framework to make sense of the varying research outcomes.

The importance of firm-level research cannot be overstated. In an export-oriented economy, firms are the primary agents perpetuating

export activities, thereby taking on the associated risk. Both domestic and international FSS affect a firm's export competitiveness. However, the dynamics of FSS and concerned requirements is fast changing that many times incur additional costs to firms on upgradation, management cost, and other variable costs (Antle, 1999; Sithamparam et al., 2017). Another useful reference is that compliance with FSS may result in an increase in demand, and encourages to charge premium prices (Mai et al., 2010; Fontagné et al., 2015; Medin, 2019). This makes companies more profitable, which eventually influences the economic viability of exporting countries. Within these potential trades-offs, it is imperative to conduct an analysis that can provide opportunities for both public and private initiatives, appropriate and necessary to assist firms in mitigating their problems while doing exports.

The paper is structured as follows: First, we discuss research methodology, followed by some descriptive statistics, and a comprehensive summary of various enablers categorized as internal and external factors. Further, we discuss motives and barriers influencing FSS implementation, and then we discuss impact of FSS on export performance through various export performance indicators. Later, we provide an integrated framework, followed by implications, research gaps, and future research directions.

2. Methodology

In contrast to traditional narrative reviews, the systematic literature review (SLR) offers various advantages, including transparency, reproducibility, and scientific methods (Tranfield et al., 2003). In developing a SLR, principles and procedures outlined by Tranfield et al. (2003) and Kitchenham and Charters (2007) are followed, and cover three primary steps; (a) planning, (b) conducting, and (c) reporting.

To begin with, we develop research objectives and pre-set the inclusion and exclusion criteria. The paper aims to study the following six research objectives:

RO1. Examine the progress of the literature over time, keywords used in the studies; identify the geographical areas, food safety measures and product categories covered by the literature.

RO2. What are the enablers that influence the implementation of the FSS at firm level, which are required to export?

RO3. What are the major barriers in FSS implementation at firm level?

RO4. What are the common motives behind FSS implementation at firm level?

RO5. What is the impact of FSS on firms' export performance and what are the key indicators of export performance used in the literature?

RO6. After compiling and synthesising barriers, motivation, and enablers influencing the implementation of FSS at firm level, the objective of this study is to develop an integrated conceptual framework addressing how a firm can improve its export through FSS implementation.

2.1. Inclusion criteria and exclusion criteria

For an article to be considered for review, it had to meet the three requirements as shown in Fig. 1. First, the articles should be in an industrial context. Second, the articles should be in accordance with the aforementioned themes. Third, the article must be published in English from 1996 to 2020 (as of January 30, 2020). Published articles since 1996 are considered as the World Trade Organization (WTO) was established in 1995, making food safety a global issue (Medin, 2019; Alsaleh, 2007). Additionally, there are several exclusion criteria used in preparing the final list: a) duplicate studies, b) unpublished papers, c) full-text not available, d) industry reports, textbooks, dissertations, magazines, literature review papers, and conference papers are not considered for review.

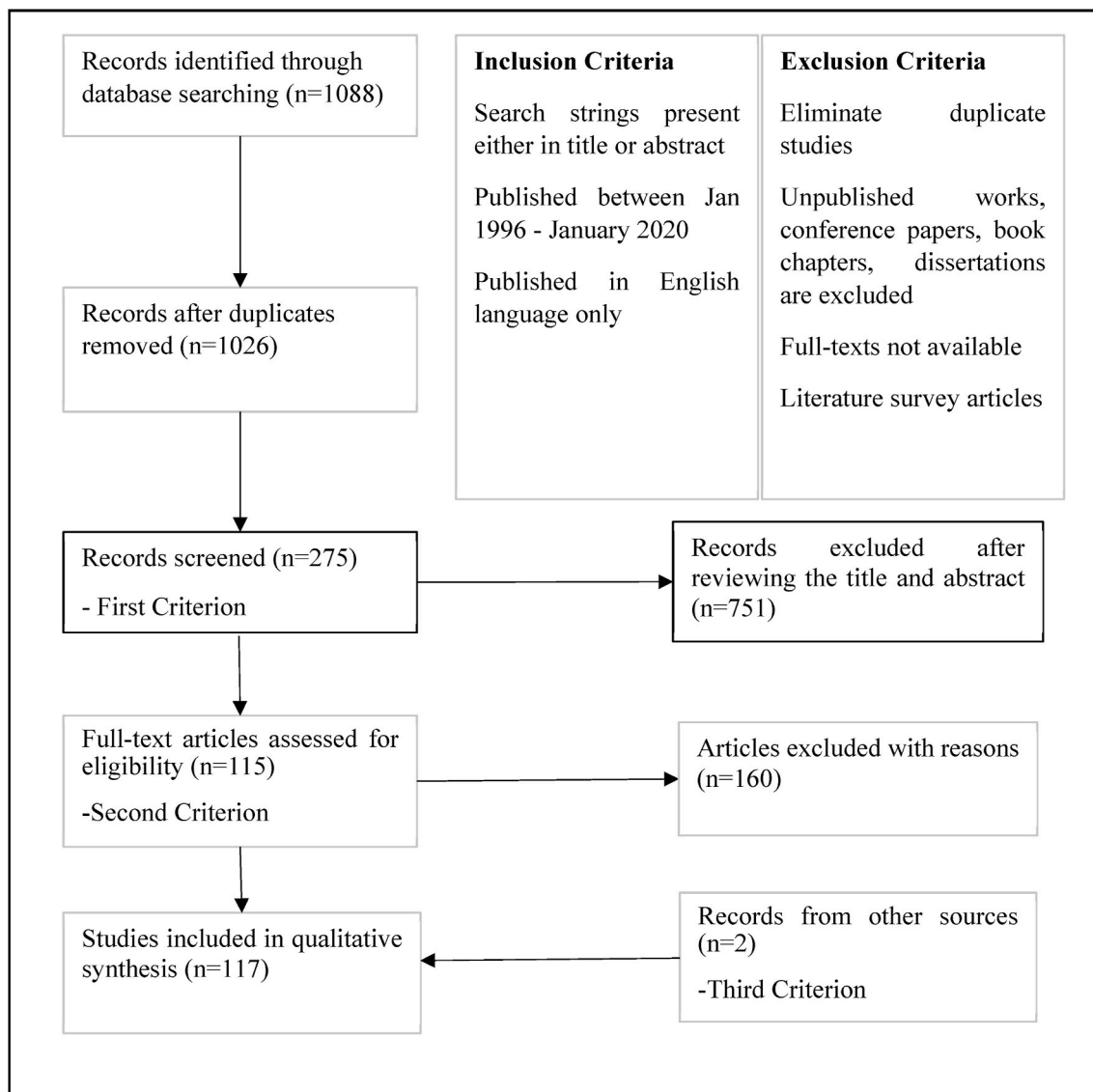


Fig. 1. Articles selection process.

2.2. Databases and execution of search string

For the SLR, papers are searched in Scopus, Web of Science, and ProQuest databases, as these databases are well respected and cover a broad spectrum of peer-reviewed journals. Together, all three databases provide an adequate number of articles for literature search.

To begin, we use the advanced search feature on all three databases to search for following terms: (“food safety”, OR “food standards”, “non-tariff”, OR “sanitary”) AND (“firm” OR “firms”) AND (“export” OR “exports” OR “trade”). The search resulted in 1088 articles, and then after removing duplicates, we obtained 1026 articles. An initial sorting is done based on the titles and abstracts of the articles. The following criteria should be used in order to exclude irrelevant articles: (i) not concerned with food products; (ii) not in an export trade context; (iii) not addressing factors influencing FSS implementation at firm level and (iv) literature reviews. After applying the inclusion and exclusion criteria, we identified 115 articles; later, two more articles were identified via backwards and forwards searches. As shown in Fig. 1, we selected 117 articles for analysis. Each of the selected articles contains information that is relevant to one or more themes. We exclude the articles that do not fit into any theme and group them under ‘other categories’.

2.3. Data extraction

After identifying all relevant articles, the information extraction structure is developed, and data is extracted into an excel worksheet. Co-authors conducted independent coding for classification, and the final code is assigned after resolving all disagreements. The information is analysed based on product category, country studied, FSS type, enablers, motives, barriers, and export performance indicators.

Enablers influencing FSS implementation at firm level are divided in two categories: internal factors and external factors. Besides, barriers associated with firm-level FSS implementation are grouped into three categories: organisational resistances, financial constraints, and environment resistance. Similarly, motives/benefits associated with firm-level FSS implementation are grouped into four categories: ethical, efficiency, legitimacy, and commercial components. Furthermore, a set of export performance indicators was developed to show the universally used export performance indicators like intensive margin, extensive margin, rejection frequency, etc. This can be used to develop compound indicators to assess the impacts of FSS across countries, industries, and companies.

2.4. Review of the studies

Developing a conceptual framework in this direction requires reviewing theories that have been used in the literature. Research in this domain encompasses several theories, such as resource-based views (RBVs), industrial organization theory, contingency theory, institutional theory, knowledge theory, personality theory, and theory of reasoned action. Besides, several different approaches have been used to understand associations, including the DEMATEL (Decision making trial and evaluation laboratory) approach, the triple helix, heterogeneous firm model, the augmented Melitz–Chaney model, duopoly Cournot competition model, etc. After considering RBV and institutional theory's diverse application in understanding FSS implementation, we have used them as a theoretical lens for classifying enablers.

In order to shed light on the trend, we analysed the selected articles based on their publication times, keywords, journal type, geographical distribution, and product categories. The results of previous studies have been confined to different products and multiple standards in different countries, recommending the need to consolidate the findings.

3. Descriptive results: characterising food safety standards adoption at the firm-level

In order to provide an overview of the range of papers reviewed, several descriptive summaries are mentioned. The study of author-indicated constructs through word clouds reveals that literature focuses on “food,” “firms,” “export,” “standards,” and “safety,” as graphically represented in the appendix by figure A. Similarly, author-indexed keywords reveal that “food safety,” “exports,” “food industry,” “standards,” and “HACCP” are some of the most commonly used keywords in literature, as shown in the appendix by figure B.

3.1. Publication timeline

The chronological summary of publications is graphically represented in the appendix by figure C. Over three-fourth of the articles were published since 2010 (90 articles), while 26 articles were published between 1996 and 2010. The number of publications during 2019, 2018, and 2017 were 14, 14, and 15, respectively, indicating the growing trend of contributions to the field and the relatively novel nature of the subject.

3.2. Geographical distribution, product category, & standard studied

The papers selected for SLR cover a wide range of countries. Thus, countries that appear twice or more are shown in the appendix by figure D. To avoid confusion and ensure consistency, articles that focus on multiple countries or regions have been excluded from figure D. There is a substantial portion of the study devoted to China ($n = 11$), Vietnam ($n = 7$), Italy ($n = 6$), Brazil ($n = 6$), and Turkey ($n = 6$). Similarly, the product categories examined in reviewed papers are graphically represented in the appendix by figure E. Likewise, table A (see appendix) provides a summary of various food safety regulations studied in prior literature.

3.3. Papers across journals

The selected articles have appeared in a variety of journals. Thus, table B (see appendix) listed only journals that have published at least three reviewed papers. Utilising the functionalities given by SCImago journal rank, dominant journal subject areas are identified, namely “agricultural and biological sciences,” “economics, econometrics, and finance business,” and “management and accounting”.

4. Key themes

The study examines common concerns that have appeared consistently across reviewed literature and identifies four core themes: enablers, motives, barriers influencing FSS implementation at the firm level and impact of FSS on various export performance indicators. An in-depth discussion of each theme is provided in the following sections:

4.1. Understanding the enablers

In the paper, enablers are defined as individuals, strategies, agencies or other assistance that might help firms to implement FSS. The paper categorises enablers as either internal or external factors based on RBV and institutional theory, respectively. The RBV asserts that a firm's capacity to gain a competitive advantage relies upon the unique bundle of assets at the organization's core (Galati et al., 2017). Alternatively, institutional theory advocates that firms in an industry work inside an institutionalised environment in which different control mechanisms shape the firms' conduct and practices (Zulfakar et al., 2018). The internal factors are further divided into three subgroups: (i) firm characteristics (FC), (ii) managerial characteristics (MC), (iii) export marketing strategies (EMS). While external factors are classified into two subgroups: (iv) foreign market characteristics (FMC); and (v) domestic market characteristics (DMC).

4.1.1. Firm characteristics

- 1. Firm size:** The most commonly used indicator of firm size is the number of employees (Pekkirbizli Zemestani et al., 2019; Fiore et al., 2016). Evidence suggests that large firms are less likely to face challenges and are more likely to implement FSS (Fontagné et al., 2015; Wang et al., 2009). Large companies are generally more productive and easily overcome associated compliance costs (Fontagné et al., 2015). Whereas small firms perceive themselves to be at high-risk (Casolani et al., 2018). Introducing FSS increases their risk of being eliminated from the export chain (Henson et al., 2005), and can lead to market exit (Fulponi, 2006). However, small firms can still target regional markets with lenient FSS (Woods et al., 2012).
- 2. Human capital:** The type of labour employed influences the firms' export strategy; permanent workers adopt lenient FSS whereas skilled workers adopt strict FSS to expand in foreign markets. (Hatab et al., 2018). Besides, lack of educated employees make it difficult for firms to maintain hygiene (Mol et al., 2014). Thus, investing in employees is imperative, especially when handling sensitive products (Renko et al., 2019). In addition, top management's compensation incentives influence their standards implementation decisions (Song Tao, 2014). A study by Colen et al. (2012) observed that standards implementation affects employee welfare positively.
- 3. International experience:** Firms with international experience will face fewer border rejections and are less likely to leave a market regardless of FSS requirements (Hatab et al., 2018). While firms with little or no international experience are more likely to be held at borders (MacPherson, 2008). Evidence suggests that international experience enables a firm to develop better management techniques, facilitate smooth international transactions, and build stronger partnerships (Galati et al., 2017). Additionally, presence in the export market facilitates standard implementation through the quality control support provided by trading partners (Zhou et al., 2011).
- 4. Ownership structure:** FSS implementation is strongly influenced by the ownership structure of companies, as foreign-owned and foreign-controlled firms have access to superior technology and resources, increasing their likelihood of implementing FSS (Herath et al., 2007). Another noteworthy finding by Pekkirbizli Zemestani et al. (2019) demonstrated that even though 'limited companies' have a low

financial capacity, they implement greater number of food safety measures than 'joint-stock companies.

5. **Market orientation:** A well-planned export market orientation would allow firms to tap into the enormous potential of the ever-growing market (Galati et al., 2017; Do et al., 2019). Firms with foreign market orientation adopted more FSS that improved firms' management systems (Zhang et al., 2014). According to Abebe et al. (2020), market orientation is the most significant factor behind the implementation of ISO 22000 in Lebanon. Similarly, many researchers confirm that firms with higher export market orientation (firms with a higher proportion of export sales) are more likely to implement FSS (Arpanutud et al., 2009; Cobanoglu, 2012).
6. **Certifications:** Certification is an essential market access instrument required to enter foreign markets (Rincon-Ballesteros et al., 2019). Firms that implement voluntary certifications demonstrate their commitment toward FSS (Galati et al., 2017). According to Hatab et al. (2018), as the number of adopted certifications increases, the exports are much more likely to surpass 70%. Furthermore, a long period of certifications could bring additional benefits, such as improving the firm's image and access to foreign markets (Casolani et al., 2018).

Literature also sheds some light on anomalous findings associated with these characteristics. According to Prabawani (2018), it is too early to assume that small-sized firms are ignorant. Another study by Knoll et al. (2018) found no evidence to support the assumption that big companies have an advantage over smaller companies in knowledge and standards implementation. Moreover, contrary to several studies, Knoll et al. (2018) find that Brazilian beef firms' export experiences do not influence their knowledge level. Researchers argue that firms with high export orientation have no reserve capacity to adopt additional FSS, while firms with lower export orientation can more easily adopt the FSS (Pekkirbizli Zemestani et al., 2019). Moreover, many firms cannot ensure adequate food safety practices despite being certified (Trafialek and Kolanowski, 2017).

4.1.2. Managerial characteristics

It is important to analyse managers' perceptions of FSS to understand their strategic decision processes and firms' actions toward FSS implementation (Stranieri et al., 2018). Prior literature refers to several theories to understand managerial characteristics and their impact on decision-making process concerning FSS adoption (Galstyan and Harutyunyan, 2016; Stranieri et al., 2018; Pekkirbizli Zemestani et al., 2019). For example, the theory of reasoned action provides a theoretical framework to examine the effects of individual attitude on behaviour (Stranieri et al., 2018). Knowledge theory states that individuals' perceptions of danger from a given source are negatively correlated with how much they know about it (Pekkirbizli Zemestani et al., 2019). According to personality theory, individual factors (goals, aspirations, education, age, occupation, and lifestyle) influence how a person perceives the economic environment (Pekkirbizli Zemestani et al., 2019). The most studied managerial characteristics are as follows:

1. **Education:** Several studies claim that firms with managers who are well educated and possess proficiency in foreign languages are more likely to implement FSS and establish export operations (Mergenthaler et al., 2009; Galati et al., 2017).
2. **Age:** Manager's age is another important factor that determines risk perception toward FSS. Young managers are perceived as more innovative and risk-oriented when compared with veteran managers (Galati et al., 2017; Pekkirbizli Zemestani et al., 2019).
3. **Commitment:** Management commitment and willingness to produce safe food mitigate their perceptions about FSS adoption (Arpanutud et al., 2009; Kök, 2009; Maldonado-Siman et al., 2012; Maldonado-Siman et al., 2014; Ab Talib and Chin, 2018; Abebe et al., 2020).

4.1.3. Export marketing strategies

Firms' export marketing strategies influence FSS implementation (Ab Talib and Chin, 2018). Commonly studied export-marketing strategies are marketing research, technological innovation, network effects, and strategic response.

1. **Marketing research:** Investment in marketing research opens the vast potential of ever-growing foreign markets (Jespersen et al., 2014; Galati et al., 2017). Firms make considerable investments on advertising and promotional activities (Brewster and Goldsmith, 2007). Developing a brand image increases the likelihood of implementing multiple FSS (Zhou et al., 2011). However, it is found that negative publicity leads to colossal losses (Thomsen and McKenzie, 2001; Pang, 2017).
2. **Technological innovation:** Advancing technological capabilities helps in FSS implementation; it significantly improves food safety, quality, and productivity (Do et al., 2019). However, adopting new technologies is a complicated and risky process due to uncertainty in getting a premium price to produce safe products (Herath et al., 2007; Mensah and Julien, 2011).
3. **Network effect:** Network effect helps in FSS implementation by providing expertise to meet the requirements and information about standards (Arpanutud et al., 2009; Fernandes et al., 2017). Furthermore, the network effect reduces risks associated with evolutionary food safety measures, resulting in easy entry into foreign markets (Perez-Aleman, 2012; DaSilva-Glasgow and Hosein, 2018). In particular, it reduces administrative burdens, bridges the gap of skills and knowledge, and manages cost-effectively (Dolan and Humphrey, 2004; Köhr et al., 2017).
4. **Strategic response:** The constant evolution of FSS makes it difficult for firms to implement FSS (Ragasa et al., 2011a). Therefore, it is essential to develop different strategies to limit the impacts of FSS (Nguyen et al., 2017). Among all responses to food safety, offensive/proactive strategies appear to be most successful, primarily adopted by firms with a large number of employees, significant market shares, and more experiences (Zhang et al., 2014; Nguyen et al., 2017). Adopting offensive/proactive strategy is typically internally motivated and response intensity varies along with product category (Neeliah et al., 2013; Ab Talib and Chin, 2018). Most firms use a reactive strategy, whereas the most detrimental strategy seems to be a combination of 'exit' and 'reactive,' which is most common among firms with limited capacity, fewer experiences, and a low level of export dependence (Sithamparam et al., 2017).

4.1.4. Foreign market characteristics

Foreign markets differ in both public and private policy responses, so treating them as homogenous results in failure (Isaac et al., 2004). A study by Zhou et al. (2011) claims that adopting FSS depends on the importing partner. Besides, successful implementation of FSS at the firm level and recapturing foreign markets can only be possible through the joint efforts of global partners, overseas buyers, network bodies, governments, and knowledge infrastructure (Jaabi and Rasiyah, 2014). According to Herzfeld et al. (2011), firms from nations with weak or no trade relations with the EU face greater difficulty due to private standards. However, only a few studies have focused on foreign market characteristics, it is undoubtedly less informative than any other enabler. The literature only identifies two factors that characterise foreign markets: pressures from importing countries and foreign know-how sources.

1. **Pressures from the importing country:** Pressures for providing safe food in foreign markets are essential drivers to stimulate FSS implementation at the firm level (Demirbas and Karagoezlue, 2008; Pekkirbizli Zemestani et al., 2019). A study by Nguyen and Jolly (2018) observed that developed countries like the US, EU, Japan, etc. impose FSS, regulate them and set prices. Besides, researchers

Table 1
Categorisation of motives as identified in the SLR.

| Study | Food safety regulation | Ethical | | | | | Commercial | | |
|--------------------------------------|------------------------|------------------|----------------------------------|----------------------------|---------------------------------------|-----------------------|---|------------------------------------|---------------|
| | | Consumer Welfare | Uphold firm's ethical principles | Product safety and quality | Staff consciousness about food safety | Religious requirement | Improve capacity to access foreign market | Capture new customer & new markets | Price premium |
| Rincon-Ballesteros et al. (2019) | BRC | * | * | * | | | * | * | |
| Do et al. (2019) | Sustainable | * | | | | | | | |
| Macheka et al. (2013) | HACCP | | | * | | | | * | |
| | ISO 22000 | | | | | | | | |
| Cobanoglu (2012) | Food safety | | * | | | | | | |
| Manikas et al. (2010) | Traceability | | | * | | | | | |
| Al-Busaidi et al. (2017) | HACCP | | | * | | | | | |
| Escanciano and Santos-Vijande (2014) | ISO 22000 | | | * | | | * | * | |
| Casolani et al. (2018) | ISO 22000 | | | * | | | | | |
| Trifkovic (2014) | Food standards | | | * | | | * | | |
| Mai et al. (2010) | Traceability | | | * | | | | * | |
| Maldonado-Siman et al. (2014) | HACCP, ISO 9000 | | | * | | | * | * | |
| Ortmann (2000) | Quality | | | | | | * | | |
| Soderlund et al. (2008) | Food safety | | | | | | * | | |
| Thorpe and Bennett. (2004) | HACCP | | | | | | | | |
| Maldonado-Siman et al. (2012) | Traceability | | | | | | | * | * |
| Galstyan and Harutyunyan (2016) | HACCP | | | | * | | * | | |
| Mahajan et al. (2014) | Food safety | | | | | | | | |
| Russo et al. (2014) | Private standards | | | * | | | | | |
| Tan et al. (2017) | Halal | | | * | | | | | |
| Ragasa et al. (2011a) | HACCP | | | * | * | | | * | |
| Zulfakar et al. (2018) | Halal | | | | * | | | | |
| Wang et al. (2009) | HACCP | | | | | | | | * |
| Ab Talib and Chin, 2018 | Halal | | | | | | | | |

Notes-BRC (British Retail Consortium), HACCP (Hazard Analysis Critical Control Point), ISO (International Organization for Standardization).

indicate that if the food safety criteria are not met, firms' current shipments and upcoming ones will be rejected (Do et al., 2019).

2. *Foreign sources of know-how*: The inflow of information from both local and foreign sources is fundamental. According to Perez-Aleman (2012), foreign heads of know-how contributed significantly to innovation, especially for small enterprises.

4.1.5. Domestic market characteristics

Domestic market characteristics can be delineated by information support, domestic institutional support, certification support, training support, and financial support.

1. *Government information support*: To grab any export opportunity or provide safe and quality food, exporters must have information about the importing partner's food control system (Ferro et al., 2015; Zhao et al., 2019). It is found that firms in developing countries where information is not readily available are less likely to adopt FSS (Arpanutud et al., 2009). Hence, government agencies support is essential to acquire the information and technology, which facilitates FSS implementation at firm level (Mol et al., 2014).
2. *Domestic institutional support*: Firms relied on national institutions to acquire information and develop competencies for FSS implementation (Perez-Aleman, 2012). It mitigates risk and plays an important role in ensuring that firms function effectively (Lee et al., 2012; Ortmann, 2000). It facilitates FSS implementation at firm level by reducing transaction costs, improving efficiency, developing the adequate flow of goods, and building competitive markets (Hatanaka et al., 2005; Jespersen et al., 2014). Although weak infrastructure, weak institutions, corruption, and low levels of interpersonal trust are all obstacles to industrial transformation, the study by Coslovsky (2013) shows that they may not always be impossible to overcome.
3. *Certification support*: Today, customers make informed decisions based on certification (Bush, 2018; Riganelli and Marchini, 2016).

Besides, certification is also important to enter in foreign markets (Latouche and Chevassus-Lozza, 2015). A study by Seok et al. (2016) observed that only the highest level of certification could promote exports. However, some enterprises believe that there is little profit in complying (Mensah and Julien, 2011) and claim that certification requirements are complicated, detailed, and restrictive (Pokrivcak et al., 2013). Hence, to increase exports, firms should be provided with certification support by lowering their costs and making it mandatory (Ortmann, 2000; Sagheer et al., 2009; Zhou et al., 2011).

4. *Training support*: There is a need for sustainable training to improve employees' knowledge of FSS and its prerequisites (Demirbas and Karagoezlue, 2008; Zhou et al., 2011; Al-Busaidi et al., 2017). Government support for providing education and training to employees has been found to be crucial (Ortmann, 2000; Song et al., 2017). Some researchers observed that regulations concerning food safety are ineffective because the government focuses more on inspections and punishment rather than providing training (Zhang et al., 2014).
5. *Financial support*: Financial support is a concern among SMEs as getting affordable credit is critical to adopting FSS (Mensah and Julien, 2011). Many researchers claim that financial assistance is an essential element of government support for cultivating a favourable environment (Zhou et al., 2011; Sabourin, 2015). As witnessed, the financial assistance from the Thai government has contributed immensely to the development of SMEs (Nawawi et al., 2019).

4.2. Motives behind adoption of FSS by firms engaged in exporting

In the paper, motives are defined as the reasons for implementing FSS or it can be the opportunity that drives the implementation of specific management systems, and certification FSS implementations are generally motivated by different factors in different countries and product categories (Ab Talib and Chin, 2018; Casolani et al., 2018). For example, one of the main reasons firms get certification is to enter a

| Commercial | | | Legitimacy | | | | Efficiency | | | | | |
|-------------------------|-----------------------------|------------------------|-------------------------------------|---------------------------|-----------------------|-----------------------------------|----------------------------------|----------------------|--------------------------|------------------------|--------------------------------------|------------------------|
| Differentiated products | Increase product shelf life | Reduce market pressure | Comply with food safety legislation | Build consumer confidence | Meet consumer demands | Less complaints or product recall | Improve processes and procedures | Improve traceability | Reduce transaction costs | Reduce Production cost | Build firm image or brand reputation | Reduce product wastage |
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niche market by meeting consumers’ demand for exotic products with specific food safety characteristics (Hatanaka et al., 2005). Furthermore, it has been reported that halal certification among Australian meat exporters is motivated by institutional pressure, including coercive, mimetic, and normative pressures (Zulfakar et al., 2018). Meanwhile, in Malaysia, halal food standards are implemented through both proactive and reactive approaches (Ab Talib and Chin, 2018). The authors argue that proactive firms are motivated to improve internal operations, while reactive firms are motivated by external pressures to implement halal certifications. A similar approach was taken by the researchers, who found that internal factors like efficiency improvement and external factors like customer expectations play a significant role in implementing voluntary quality standards (Stranieri et al., 2018).

Various studies have been found to study the motivations for FSS implementation by agro-food firms (Galstyan and Harutyunyan, 2016; Al-Busaidi et al., 2017; Zulfakar et al., 2018). Researchers found that HACCP implementations are mainly driven by three motives like improved quality, enhanced brand reputation, and adequate export opportunities (Wang et al., 2009; Maldonado-Siman et al., 2014; Galstyan and Harutyunyan, 2016). For example, Italian firms were motivated to achieve product safety and traceability by implementing ISO 22000 (Casolani et al., 2018). Similarly, the Indian food processing industry implements food safety to achieve traceability and transparency requirements. (Mahajan et al., 2014). A study by Russo et al. (2014) proposes that the motivation behind PFSS implementation is to improve the supply chain efficiency and address other aspects of food safety. At the same time, economic and market factors are the main motivations behind the implementation of traceability systems by the Mexican dairy industries (Maldonado-Siman et al., 2012).

In the paper, motives are defined along four dimensions based on the Rincon-Ballesteros et al. (2019) study - (i) ethical; (ii) efficiency; (iii) commercial; and (iv) legitimacy. Table 1 lists the main motives cited across the reviewed papers. The first dimension of motives is ethical;

organisations demonstrate a sense of social responsibility for customer welfare. The second dimension of motives is efficiency; it indicates that organisations aim to achieve operational efficiency by building up their processes and expanding their production. The third dimension of motives is commercial; firms want to capture new markets and improve sales. The fourth dimension of motives is legitimacy; it implies that organisations seek to be accepted in the current market by complying with rules to advance stakeholder relationships. However, to ultimately achieve the benefits of food safety process control, a firm should apply efforts across various technologies and practices because focusing on one side may leave many opportunities unexploited (Ollinger and Moore, 2008).

4.3. Barriers faced during the adoption of FSS by firms engaged in exporting

Barriers pertain to circumstance, reason or obstacle, making firms inefficient and ineffective with FSS implementations (Abebe et al., 2020). For instance, lack of access to information, high information cost, and lack of qualified employees impede the HACCP implementation in the turkey seafood industry (Mol et al., 2014). Similarly, other researchers observed that HACCP implementation in the seafood industry in Oman and poultry industry in China are hampered due to significant initial investments and high operating costs (Wang et al., 2009; Al-Busaidi et al., 2017). Meanwhile, during sustainability standards implementation, critical barriers faced by African exporters are as follows: lack of managerial commitment, lack of traceability and integrated management information, and uncertainty regarding economic benefits (Agyemang et al., 2018). Furthermore, the study by Khan et al. (2019) confirms that multiplicity of standards hinders the implementation of halal standards, requiring repeated testing. It is observed that firms in developing countries face considerable uncertainties during multiple standards implementation due to lack of knowledge and resources

Table 2
Categorisation of barriers as identified in the SLR.

| Study | Food safety regulation | Organisational resistance | | | | | | |
|--------------------------------------|------------------------|----------------------------|-------------------|------------------------------|---------------------|------------------------|-------------------------------|-----------------------------------|
| | | Lack of firm' capabilities | Lack of knowledge | Slow down production process | Inadequate training | Clarity of regulations | Lack of management commitment | Take staff away from other duties |
| Casolani et al. (2018) | ISO 22000 | | | * | * | | | |
| Ragasa et al. (2011a) | HACCP | | | | | | * | * |
| Zhang et al. (2011) | Traceability | | * | | * | | | |
| Mahidin et al. (2017) | Halal | | * | | | | | |
| Abebe et al. (2020) | FSMS | | * | | | | | |
| Al-Busaidi et al. (2017) | HACCP | | * | | * | | * | |
| Ragasa et al. (2017) | HACCP | | * | | | | | |
| Vieira and Traill (2007) | EU regulations | * | | | | | | |
| Perez-Aleman (2012) | Food safety | * | | | | | | |
| Montiel et al. (2019) | Sustainability | * | | | | | | |
| Galstyan and Harutyunyan (2016) | HACCP | | | | | | * | |
| Zhang et al. (2014) | Food safety | | | | | * | | |
| KT and Mini (2017) | FSMS | | | | * | | | |
| DaSilva-Glasgow (2020) | SPS, TBT | | | | | * | | |
| Maldonado-Siman et al. (2012) | Traceability | | | | | * | * | * |
| Mensah and Julien (2011) | Food safety | | | | * | * | | |
| Agyemang et al. (2018) | Sustainability | | | | | | * | |
| Macheka et al. (2013) | HACCP | * | | | | | * | |
| Rincon-Ballesteros et al. (2019) | ISO 22000 | | | | | | | |
| Maldonado-Siman et al. (2014) | BRC | | | | * | | | * |
| Reardon et al. (1999) | HACCP, | | | | | | | |
| Mol et al. (2014) | ISO 9000 | | | | | | | |
| Alsaleh (2007) | Food standards | | * | | | | | |
| DaSilva-Glasgow and Hosein (2018) | HACCP | | | | | | | |
| Pavez et al. (2019) | Food quality | | | | | | | |
| Jaabi and Rasiah (2014) | NTB | | | | | | | |
| Elias et al. (2019) | SPS | | | | | | | |
| Demirbas and Karagoezlue (2008) | Food safety & quality | | | | * | | | |
| Khan et al. (2019) | Halal | | | | | | | |
| Coslovsky (2014) | Halal | | | | | | | |
| Vieira and Traill (2008) | EU regulations | | | | | | | |
| Pokrivcak et al. (2013) | Food safety | | | | | | | |
| Zhao et al. (2019) | NTM | | | | | | | |
| Escanciano and Santos-Vijande (2014) | Food quality | | | | | | | |
| | ISO 22000 | | * | | | | * | |

Notes- BRC, British Retail Consortium.

HACCP, Hazard Analysis Critical Control Point.

ISO, International Organization for Standardization.

NTB, Non-Tariff Barriers.

SPS measures, Sanitary and Phytosanitary Measures.

FSMS, Food Safety Management System.

TBT, Technical Barriers to Trade.

(Montiel et al., 2019). In Table 2, we present the most frequently studied barriers to FSS implementation at the firm level.

In the paper, barriers hindering FSS implementation at the firm level are classified into three dimensions; (i) organisational resistance, (ii) financial constraints, and (iii) environment resistance. Some frequently studied barriers faced by firms are discussed below:

1. **Information Cost:** In terms of information cost, firms do not have easy access to information when choosing which FSS to implement (Montiel et al., 2019). Furthermore, the information cost is not fixed due to future standards evolution unpredictability and customer requirement dynamism (Reardon et al., 1999; Ragasa et al., 2011a; Ghosh, 2014). To minimise risk and support FSS implementation, firms can adopt various governance structures such as Marfrig Group, a retail company that adopted many programs like 'Boi a Termo', 'Marfrig Club', 'Farol da Qualidade' etc. (Lemos and Zylbersztajn, 2018).
2. **Multiplicity of standards:** Multiplicity of standards happens because every nation has a particular institution and choose to implement

different standards than those predetermined by international agencies based on their food preferences and scientific capacity (Henson and Caswell, 1999; Isaac et al., 2004; Gunden et al., 2010; Montiel et al., 2019; DaSilva-Glasgow, 2020). It acts as a significant barrier, as prerequisites for each standard are unique, and the implementation process takes time and costs money (Zhang et al., 2011; Mensah and Julien, 2011; Pokrivcak et al., 2013; Neeliah et al., 2013). Similarly, Khan et al. (2019), who claim that multiple halal standards hinder trade due to unnecessary repetition of testing, find similar results.

3. **Documentation and procedural delays:** FSS implementation results in excessive documentation, compelling firms to take help from external consultants, make operational adjustments, and require extra staff time (Escanciano and Santos-Vijande, 2014; Maldonado-Siman et al., 2014; Galstyan and Harutyunyan, 2016; Abebe et al., 2020). The FSS implementation process can become more time-consuming and complicated by the usage of outdated customs procedures (DaSilva-Glasgow and Hosein, 2018; DaSilva-Glasgow, 2020).

| Finance & budgetary constraints | | | | Environmental resistance | | | | | | | |
|--|-----------------------|--|---|--------------------------|---------------------------|---------------------------------------|---|---|---------------------------|-------------------------|--------------------|
| Lack of expertise or technical support | Financial constraints | Requirements to restructure the facility | Excessive documentation & procedural delays | Weaker institutions | Inadequate infrastructure | Poor multi-tier suppliers' commitment | High information costs or lack of information | Unpredictability of raw material availability | Multiplicity of standards | Lack of consumer demand | Standard evolution |
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4. *Weaker national-level institutions:* A well-timed institutional adjustments and legislative framework enforced by the government can help the business in coping with the food safety crisis (Qian et al., 2012). However, most institutions face capacity constraints regarding legal enforcement, human, physical, and financial resources, which impede FSS implementation (DaSilva-Glasgow, 2020). The institutional weaknesses contribute to a higher cost burden, create infrastructural obstacles, slow down the inspection process, and result in more scrutiny and testing (Jespersen et al., 2014; Zhang et al., 2014; Abebe et al., 2020).
5. *Lack of knowledge/poor understanding of the food safety requirements:* knowledge is the key to a firm's competitiveness (Perez-Aleman, 2012). An employee without the necessary skills or knowledge about the procedure and process can be detrimental as it fuels risk perceptions and raises operating cost (Al-Busaidi et al., 2017; Pekkirbizli Zemestani et al., 2019; Elias et al., 2019; Abebe et al., 2020).

4.4. Implications of food safety measures on firms' export performance

FSS requirements influence trade in different ways (Neeliah et al., 2013; El-Enbaby et al., 2016; Medin, 2019). In literature, various constructs are used to measure the firms' export performance like extensive margin (EM), intensive margin (IM), export value, export to total sales, rejection frequency, export market shift, export prices, etc. Table 3 presents the main findings of the impact of FSS on firms' export

performance. Few findings from the past literature are as follows.

1. *Extensive margin (EM) & Intensive margin (IM):* The most commonly used export performance indicators are intensive and extensive margins. According to Rau and van Tongeren (2009), FSS leads to higher market entry cost, causing EM to shrink (fewer varieties) and IM to expand (expansion of exports from surviving firms). However, Ferro et al. (2015) reveal that average product standards negatively affect exports, specifically through EM, while IM has no significant impact. Similarly, El-Enbaby et al. (2016) demonstrate that SPS measures applied to products exported from Egypt do not affect IM. However, some authors observed that FSS does not affect export performance at EM or IM (Schuster and Maertens, 2015).
2. *Market shift:* Due to stringent FSS, firms start diverting their products to other markets with less stringent food safety requirements (Hatab et al., 2018; Fold and Larsen, 2011). Furthermore, stringent food safety regulations shift product supply from international to domestic markets, resulting in low exports (Rau and Van Tongeren, 2007).
3. *Change in unit prices:* FSS encourages firms to get premium prices by delivering safe food (Mosquera et al., 2013; Fontagné et al., 2015). However, some researchers witnessed that the negative effect of FSS on export volume overpowers positive changes in unit prices (Fernandes et al., 2017). Additionally, if any product recall happens due to food safety, it leads to lower unit prices (Moon and Tonsor, 2020).

Table 3
Past research on adoption of FSS and its impact on firms' export performance relationship.

| Reference | Measures | Product Category | Country Studied | Effect on Export Performance |
|-----------------------------|-------------------------|------------------------|----------------------|--|
| Medin (2019) | SPS | Seafood | Norway | Cost effect dominant. However, in case of fresh seafood, cost effect is overpowered by positive demand effect. |
| Gibson & Wang (2017) | SPS | Fruits & vegetables | China | Positive relationship among SPS measures and exports. |
| Fernandes et al. (2017) | Pesticide | Agriculture food | Developing countries | Negative effect on the intensive and extensive margins. Impact on firm export unit values is insignificant. |
| Beestermöller et al. (2018) | EU regulations | Agriculture food | China | Past rejection increases the likelihood to exit but favour the entry of new firms. Diversification effects at EM, and concentration effect at IM. |
| Ehrich & Mangelsdorf (2018) | IFS certificate | Agriculture food | Developing countries | Non-certified firms' export less in comparison of certified firms. Low-income countries do not gain benefit in terms of export volumes. |
| El-Enbavy et al. (2016) | SPS | Agriculture food | Egypt | Negative impact on EM but insignificant effect on IM. |
| Schuster & Maertens (2015) | Private standards | Asparagus | Peru | Insignificant impact on EM & IM |
| Fontagné et al. (2015) | SPS | Food products | France | Exit increases. Small firms are more likely to exit. Large firms get profited. |
| Ferro et al. (2015) | Product standards | Food products | – | Negative impact occurs through the EM, while IM is insignificant |
| Neeliah et al., 2013 | SPS | Seafood & Horticulture | Mauritius | Doesn't act as a hindrance due to increasing demand from profitable export market. |
| Pokrivcak et al. (2013) | NTM | Dairy products | EU | NTMs enforced by Russia are more restrictive to US exports than to EU exports, and have least effect on New Zealand's exports. |
| Mosquera et al. (2013) | Food safety | Chilli pepper | Caribbean | FSS not act as hurdle. Firms get access on the basis of quality |
| Qian et al. (2012) | Melamine | Dairy products | China | No access to foreign markets. |
| Ragasa et al. (2011b) | HACCP | Seafood | Philippines | The advantages to firms in developed countries may not hold in developing countries, where difficulties and trade-offs for food safety are higher. |
| Henson et al. (2011) | Global GAP | Fresh food | Africa | Certification increases income |
| Rau and van Tongeren, 2009 | Food standards | Meat | Poland | IM increases. EM drops because of higher market entry cost. |
| Mergenthaler et al., 2009 | Quality assurance | Horticulture | Vietnam | Companies face hurdles while accessing international supply chains, Firms temporarily lost foreign market access. |
| Rau & Van Tongeren (2007) | Food standards | Meat | Poland | Items shift towards domestic market. |
| Moon & Tonsor (2020) | E. Coli | Beef | – | Negatively affects aggregate returns but impact on prices is short term. |
| Nguyen & Jolly (2020) | Food safety and quality | Seafood | Vietnam | Number of firms reduces but capacity size expands. |

Notes- E.coli, *Escherichia coli*

Global GAP, Global Good Agricultural Practices.

HACCP, Hazard Analysis Critical Control Point.

IFS, International Featured Standard.

NTM, Non-Tariff Measurers.

SPS measures, Sanitary and Phytosanitary Measures.

4. *Foreign market access*: Foreign market access is another construct that is negatively affected by FSS (Mergenthaler et al., 2009; Ferro et al., 2015; Fernandes et al., 2017). For example, because of melamine contamination in milk, foreign countries became largely inaccessible by Chinese dairy firms (Qian et al., 2012). Likewise, a study by Beestermöller et al. (2018) revealed that if previous consignments of any exporters are rejected, the probability of a firm's exit increases.

4.5. Conceptual framework of food safety adoption and export performance

It becomes critical to understand factors influencing FSS implementation at firm level. Therefore, based on the SLR we summarise different factors affecting FSS adoption and export performance and develop a conceptual model consisting of five components: enablers, barriers, motives, food safety adoption, and firms' export performance.

Fig. 2 presents a conceptual framework that will facilitate the FSS implementation at firm level. Implementation of FSS is impeded by three interrelated barrier categories: organisational resistance, finance & budgetary constraints and environmental resistance. The conceptual framework explains how five interconnected enablers will overcome the identified barriers to attain the key motives i.e. ethical, commercial, efficiency and legitimacy as driving factors. Besides, the framework also explains the impact of FSS on different export performance indicators.

4.6. Theoretical implications

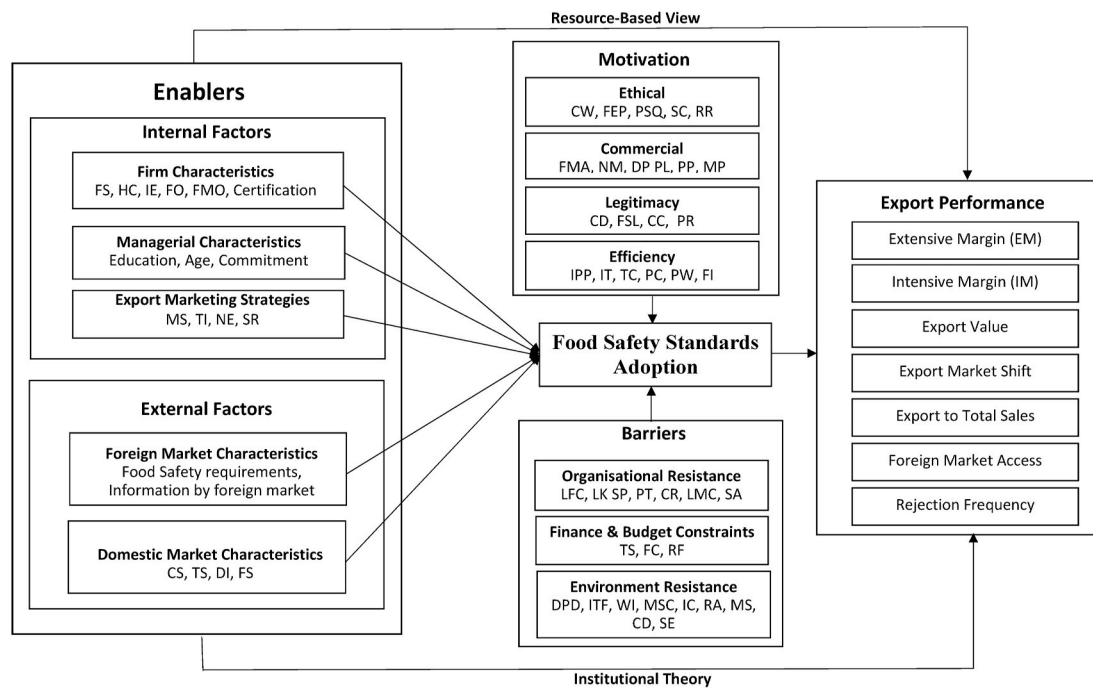
The SLR paper is the first attempt to classify various enablers, motives, and barriers influencing FSS implementation at firm level, then structure them into meaningful and defined dimensions. These categorisations will help researchers in deciding the choice of sizes for examining FSS adoption and its impact. It also highlighted the critical role of the RBV and institutional theory in studying enablers. Despite institutional theory being rarely used in FSS adoption research, the paper has shown that institutional explanations are crucial in determining external factors that drive adoption.

4.7. Practical implication

The firm-centered approach is motivated by various reasons. Firstly, the firm is the basic unit that perpetuates export activities and takes the risk. The FSS affects the degree of a firms' export competitiveness due to associated high costs. Therefore, the study is vital for policy-makers and evidence-based management to improve the quality and effectiveness of government and industry measures.

4.8. Limitations of the study

The paper has some limitations as well. The effects of FSS vary depending on the types of standards and proxies used for food safety requirements. Nonetheless, the study did not examine each standard separately to determine the impact of factors on implementation.



Notes: FS- firm size, HC-human capital, IE- international experience, FO- firm ownership, FMO- firm market orientation, MS- marketing search, TI- technological innovation, NE-network effect, SR-strategic response, CS- certification support, TS- training support, DI- domestic institute, FS- financial support, CW- consumer welfare, FEP- firm ethical principles, PSQ- product safety and quality, SC- staff consciousness, RR-religious requirements, FMA- foreign market access, NM- new market, PL- product life, DP- differentiated product, PP-price premium, MP- market pressure, CD- consumer demand, FSL- food safety legislation, CC- consumer confidence, PR- product recall, IPP- improve processes and procedures, IT- improve traceability, TC- transaction cost, PC- production cost, PW- product wastage, FI- firm image, LFC- lack of firm capabilities, Lk- lack of knowledge, SP- slow down the procedures, PT- Poor training, CR- clarity of regulations, LMC- lack of managerial commitment, SA- staff away, TS- technical support, FC- financial constraints, RF- restructure facility, DPD- documentation and procedural delay, ITF- infrastructure and transportation facility, WI-Weak institutions, MSC- multitier supplier commitment, IC- information cost, RA- raw material availability, MS- Multiplicity of standards, CD- consumer demand, SE- Standard evolution

Fig. 2. Integrated framework

Notes: FS- firm size, HC-human capital, IE-international experience, FO- firm ownership, FMO- firm market orientation, MS- marketing search, TI- technological innovation, NE-network effect, SR-strategic response, CS- certification support, TS- training support, DI- domestic institute, FS- financial support, CW- consumer welfare, FEP- firm ethical principles, PSQ-product safety and quality, SC- staff consciousness, RR-religious requirements, FMA-foreign market access, NM-new market, PL-product life, DP- differentiated product, PP-price premium, MP- market pressure, CD-consumer demand, FSL-food safety legislation, CC- consumer confidence, PR-product recall, IPP- improve processes and procedures, IT-improve traceability, TC- transaction cost, PC- production cost, PW- product wastage, FI- firm image, LFC- lack of firm capabilities, Lk-lack of knowledge, SP- slow down the procedures, PT- Poor training, CR-clarity of regulations, LMC- lack of managerial commitment, SA-staff away, TS- technical support, FC- financial constraints, RF- restructure facility, DPD-documentation and procedural delay, ITF- infrastructure and transportation facility, WI-Weak institutions, MSC- multitier supplier commitment, IC- information cost, RA-raw material availability, MS- Multiplicity of standards, CD-consumer demand, SE- Standard evolution.

Moreover, the study is qualitative and fails to establish the relative importance of various factors influencing FSS adoption. Food safety is a complex process that involves many components like farmers, institutions, etc. However, it's a partial attempt to understand the complete setup, as the study focused only on the firm level. Lastly, despite using inclusion and exclusion criteria, the literature review still involves individual judgments about what is relevant and not, which is another limitation.

5. Directions for future research

The review has revealed several gaps, consequently leaving several propositions for future research. Following the first research objective of the study, FSS are likely to intensify in the future and may increasingly touch on sustainability, labour standards, GM food, bioterrorism, traceability and other emerging standards, which are promising but understudied areas. Furthermore, FSS implementation by SMEs in developing countries has grown significantly in recent years. It is, therefore possible to conduct research in this direction.

Concerning the second research objective of the study, we identify that the firm size, managerial characteristics, and export marketing strategies are positively associated with FSS implementation at the firm level. However, a few studies have shown neutral or adverse effects. In our view, this inconsistency of results indicates that future studies need

to be conducted in greater depth. Considering that certification for the functioning of FSS required in firms is not mainstream, upcoming research can focus on the reasons behind it. In addition, most studies focus on internal factors, whereas external factors are understudied. Therefore, we propose that further research on FSS should include external factors such as foreign market characteristics and domestic market characteristics. Further investigation of whether there is an effective demand for certification from exporters within countries and its impact on adoption behaviour can be done.

Concerning the third and fourth objectives of the research, despite providing deep insights about barriers and motivates to implement FSS and other related practices, limited research has been conducted to study the effect of motives and barriers on the implementation of a FSS at the firm level. Even when firms are certified, the mandatory principles are not implemented properly in food businesses. Therefore, future research should examine what factors affect the correct operation and whether these are sufficient to ensure food safety.

Concerning the fifth objective of the research, most of the included studies have used cross-sectional data rather than longitudinal data, which makes learning and improving effects challenging to detect. In this way, longitudinal data can be used to determine whether food safety affects firms' export performance over time. A comparison or alliance study between developed and developing countries could have beneficial effects and require attention.

6. Conclusion

The advancements and uptake of actions in the food industry worldwide give strong hints that tackling food safety is on the international agenda. However, FSS implementation has received less attention from an intra- and inter-organisational management perspective (Song et al., 2017). Therefore, the study performed a SLR of 117 articles to bring together the theoretical arguments and conclusions from a divergent and multidisciplinary body of literature. The paper identifies and develops the constructs for enablers, motives, barriers affecting the implementation of FSS at the firm level and observes the impact of FSS on various export performance indicators. It is now conceivable to test and comprehend the relative significance of different FSS implementation components and firms' export performance with the theoretical framework.

The literature review on measuring and analysing FSS implementation at the firm level in different countries and across different food categories has generated the following conclusions. Seafood, meat, fruits, and vegetables were amongst the top rejected food categories. Many publications researched firm-level internal factors, and such studies are increasing with time. Paper findings identified the lack of studies focusing on external factors (FMC and DMC) reflecting the current low interest in off-grid systems. Further, 19 barriers are retrieved and categorized into three clusters: (1) organisational resistance; (2) finance & budgetary constraints; and (3) environmental resistance. Likewise, a list of 15 motives is retrieved and classified into four categories: (1) ethical; (2) commercial; (3) legitimacy; and (4) efficiency. Moreover, the study provides a set of export performance indicators to aid practitioners and policy-makers in assessing the effects of FSS on exports.

Food safety is a broad phenomenon with many regulations, which makes it very complex. Therefore, firms must invest in research & development and adopt more proactive/offensive strategies to minimise risk and product refusals. At the national level, the government should provide information and resource support on time. The government should also give financial support and assist firms in implementing FSS by lowering certification costs and training managers and representatives. There should be a push to stimulate harmonisation among different FSS across countries to promote food trade at the international level.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jclepro.2021.129708>.

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