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Unpacking sustainable business models in the Swedish agricultural sector— the challenges of technological, social and organisational innovation

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ABSTRACT

The global challenges of today are many, and one of the most concerning aspects relates to food production for an increasing global population. The sustainability of doing 'more of the same thing' is being increasingly called into question. Several sustainable business model frameworks have been presented in recent years to address these challenges, but our knowledge is limited about the change processes of the agricultural sector. This paper aims to increase our understanding of how sustainable business models have developed in the agricultural sector in Sweden. It maps eight archetypes of sustainable business models, clustered in three groups, with a focus on the technological, social, and organisational innovation components at agri-food companies. The study takes a quantitative, methodological approach, conducting a telephone survey with owners and managers of 1143 agri-food companies in Sweden, and using analysis of variance (ANOVA) for the analysis. The paper provides empirical evidence on the various options for sustainable business models that Swedish agri-food companies use. No major differences were found with respect to technical or social innovation components in the three regions: East, south, and north Sweden. However, significant differences were found between the regions with respect to the organisational innovation component. The organisational innovation component is based on two sustainable business model archetypes, namely, *repurpose for society/environment* and *develop scale up solutions*. North Sweden had a higher degree of organisational innovation than both south and east Sweden. The reason for this could be the larger environmental, economic, and organizational challenges in north Sweden compared to the rest of the country, which makes the need for innovation stronger. The paper also suggests new areas for researchers and practical avenues for stakeholders in the agricultural sector (and other industries) to translate social and environmental value creation into economic profit and competitive advantage. To our knowledge, this is the first study to use sustainable business model archetypes in an empirical setting in the agricultural sector.

1. Introduction

1.1. Background

The agricultural sector has a key role to play in addressing many of the global challenges identified in Agenda (2030). One of the major challenges is to feed a growing world population, and it has been estimated that global food production will have to increase by 50 percent by 2050 (Alexandratos and Bruinsma, 2012). Another challenge is that increase in food production must take place at the same time as the negative climate impact of agriculture is reduced (IPCC, 2019). These challenges are enforced by a situation where many companies in the agricultural sector is struggling with low profitability (Board of Agriculture, 2019) and low profit margins (ficompass, 2020).

The agricultural sector is experiencing increased global competition and the response in several industrialised countries seems to be doing more of the same thing. Companies have become fewer and larger, and have been focused on production efficiency, cost reduction and economies of scale (Alston, 2018). On a general level, this development would increase share of livestock, expand cultivated land and irrigation, and entail more and longer transports of goods. From a sustainability perspective, it is questionable whether this pathway can meet the global challenges ahead.

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1.2. Sustainable business models in the agricultural sector

One alternative would be to develop innovative and sustainable solutions along several different pathways, e.g., combining technological, social, and sustainable possibilities when creating new business opportunities. However, the research field of entrepreneurship and innovation has not focused on the agricultural sector to any great extent although there are some examples in recent years (Alsos et al., 2011, 2014; Dias and Franco, 2018; McElwee 2006; Ulvenblad et al., 2020). The majority of studies has been conducted in developing regions (Beuchelt and Zeller, 2016). Instead research about entrepreneurs in the agricultural sector has been largely overlooked (Dias et al., 2019; Fitz-Koch et al., 2018). Obviously, the agricultural sector is not a typical research field for entrepreneurship researchers to study; the entrepreneurial and innovation-oriented research field has a long tradition of focusing on emerging technology-based industries in the search for promising new products, services, companies and entrepreneurs. Moreover, most research within the agri-food industry tends to examine production rather than innovation. In addition, several researchers have called for more entrepreneurial skills in the industry (Dias et al., 2019; McElwee and Smith, 2012; Vesala et al., 2007).

Based on the need to find alternative ways of meeting the global challenges ahead, several contributions can be identified on the topic, such as sustainable business models (Geissdoerfer et al., 2018; Lüdeke-Freund et al., 2019), circular business models (Bocken et al., 2018; Lüdeke-Freund et al., 2019), sustainability-oriented innovations (Adams et al., 2016) and responsible innovation (Stilgoe et al., 2013). Many of the business models (BM) today focus on the traditional aspects of value proposition, value capture, value creation and delivery, but complimentary aspects such as value intention (Barth et al., 2017), value surplus, value absence, value missed and value destroyed (Yang et al., 2017) have been suggested. The literature has proposed many different frameworks and solutions that have the potential to address business development and sustainability as a common goal. The article by Bocken et al. (2014) is one of the most cited on the subject, presenting a detailed framework, based on previous research, of the patterns and attributes that address sustainable business goals. Sustainable business model (SBM) archetypes are presented to describe groupings of mechanisms and solutions (Bocken et al., 2014). This framework has also been used and developed in the banking industry (Yip and Bocken, 2018). Also, interesting to note is that experience from the manufacturing industry provides evidence that business model innovation is a promising approach for improving sustainability (Yang et al., 2017).

However, many business model innovations seem to fail, but our knowledge of this process is limited within the agricultural sector – especially when addressing SBM innovation. Furthermore, the agricultural sector has several characteristics that distinguish it from many other industries. First, many firms in the agricultural sector are owner-managed family businesses, deeply rooted in their communities (Nuthall and Old, 2017; Vesala and Vesala, 2010). Secondly, the owner often takes a long-term view and expects their heirs to continue the business – they regard themselves as stewards or custodians of the business and the environment, and have a responsibility to both living and non-living things (Fitz-Koch et al., 2018; Ulvenblad et al., 2016). Thirdly, the owners are not solely focused on growth and revenues (Barth et al., 2017). Fourthly, the industry has many small producers and processors at the start of the supply chain and power is often concentrated in retailers at the end of the supply chain (Carbone, 2017). Finally, a close connection exists between production processes and the quality and safety of the product (Rueda et al., 2017).

The growing number of publications in recent years provides evidence that the business model field is increasingly relevant to a wide range of scientific subject areas. Despite this development, several experts have called for empirical research in order to achieve major advances in the business model field of research (Wirtz et al., 2016). The number of studies that address sustainable business models is also increasing, but less attention has been devoted to measuring the sustainability aspect of business models – especially in the agri-food industry (Barth et al., 2017; Tell et al., 2016). There have also been calls for more quantitative empirical studies with a focus on analysing innovative forms of sustainable production in the agricultural sector (Dias et al., 2019).

This article attempts to bridge this gap, especially when it comes to empirical contributions and the measurement of organisational, technological and social innovation of business models. It provides empirical evidence of the progress towards sustainable business models in the agricultural sector in Sweden. Empirical research on innovation in the agri-food industry is essential given the present and future challenges to food production, agricultural profitability, and societal sustainability. Furthermore, the study contributes with theoretical insights regarding the relationship between regional context, infrastructure and the development of sustainable business models with different points of focus.

The aim of the paper is to map and describe the various SBMs of the Swedish agri-food industry with a special focus on the challenges of the technological, social, and organisational innovation components of those business models. The aim is also to analyse and create an understanding of the different types of sustainable business models in relation to geographical regions in Sweden. The research data comprise a telephone survey of entrepreneurs at agri-food companies in Sweden with an annual turnover of more than one million Swedish crowns.

1.3. The Swedish context

The conditions for agriculture are very heterogeneous in different parts of Sweden. The southern part of Sweden has equal conditions as Denmark, but in north Sweden agriculture has to be conducted close to the Arctic Circle. Terrain, zoning and soil also vary between different regions. Crops are common on the plains in the south and around the large lakes in central and east Sweden, where the soils provide good yields. Cattle for beef and milk production are important for north Sweden and in forest areas all over the country, since these parts of Sweden has poorer production conditions (Board of Agriculture, 2019).

The population of Sweden is concentrated around the three big cities; (i) Stockholm, situated in east Sweden and (ii) Göteborg and (iii) Malmö situated in south Sweden. North Sweden is much less densely populated than the other parts of the country. The most populated areas, in all parts of Sweden, are situated close to Sweden's long shoreline. Around half of Sweden's population lives within a mile from the sea (Statistics Sweden, 2020). Further, the majority of governmental institutions, EU-related functions and universities are situated in south and east Sweden, with a concentration to the Stockholm area, the capital of Sweden.

Sweden has approx. 15 500 full-time farms. The number of farms, however, has declined by 17% over the last ten years (Board of Agriculture, 2016), leading to larger farms with an average size of 43 ha (OECD, 2018). The remaining companies have fewer employees overall and a third of the agri-entrepreneurs are over 65 years old (Board of Agriculture, 2019). There is thus a need to stimulate a structural change to attract younger, highly educated people, which could also improve the possibility of developing innovation in the sector.

Sweden is a high-cost country that also has strict regulations

regarding environmental and animal welfare. Since the international agri-food market is very competitive and price sensitive, the Swedish agricultural sector is also facing challenges. However, the strict regulations can also be used as an incentive to produce high-quality sustainable products, which will lead to more value for the end customer. Another consequence of strict regulations is that consumer confidence in the quality and methods of Swedish food production is high (OECD, 2018).

Section 2 presents the theoretical framework for the research and introduces the SBM archetypes. Section 3, which presents the research method, describes the sample, the variables in the data collection, and the validation of the measures used to map SBMs in the Swedish agricultural sector. Section 4 describes the results of the research, while sections 5 and 6 present the discussion and conclusions, respectively.

2. Theoretical framework

2.1. Business models and business model innovation

The research literature and business practice have generated increased interest in BMs and business model innovation (BMI) in recent decades (Amit and Zott, 2012; Chesbrough, 2007; Magretta, 2002; Osterwalder and Pigneur, 2010; Osterwalder et al., 2005; Teece, 2010). Different definitions and settings appear in the research literature – some of which examines the single business, while other parts address the entire value network (Amit and Zott, 2012; Johnson, 2010; Zott et al., 2011).

The BM research is extensive. Magretta (2002) writes that a BM explains how an organisation earns a profit, how it functions, who its customers are, and what its customers value is. A similar definition is found in the literature on the BMs of social enterprises (Yunus et al., 2010). Teece (2010) defines the BM as a description of value creation, value delivery, and value capture. Gibson and Jetter (2014) claim that, while a well-planned and successfully implemented BM can generate large profits, poor planning and problematic implementation of a BM can severely damage an organisation.

The BMI research is nearly as extensive. BMI is generally interpreted as a process or an outcome. For example, BMI as a process may include experimentation and testing that takes a discovery-based approach (McGrath, 2010), while BMI as an outcome may relate to some form of BMI typology (Taran et al., 2015). A consensus exists that BMI is essential for successful organisational performance (Zott et al., 2011). For example, the BM canvas developed by Osterwalder and Pigneur (2010) seems useful for practitioners who are trying to develop and innovate with their BMs (Klang et al., 2014).

Lee (2015, p. 292) describes two approaches to BMI: (1) a static approach that "depicts a business model as a set of coherent interrelated core business model components", and (2) a dynamic approach that "depicts a business model as a tool to manage change and innovation in the organization". The dynamic approach assumes that interrelationships and interactions between BM components create value, where changes in one BM component can either directly or indirectly lead to changes in other components.

However, Chesbrough (2010) highlights that, although tools, maps, and guidelines are helpful in BMI, they are insufficient by themselves. Teece (2010) supports this view by conceptualising the BMI as an emergent, ongoing phenomenon rather than a one-off event (see also Zott and Amit, 2010). More recent research calls for a closer examination of the emergent processes of BMI and urges researchers to analyse the evolution of the BM over time by examining the process or by focusing on 'how' questions (Breuer et al., 2016; Geissdoerfer et al., 2018; Roome and Louche, 2016; Velu et al., 2016).

2.2. Sustainable business models and sustainable business model innovation

Researchers have also called for studies of BMs that address sustainable development and take a value-added approach (Boons and Lüdeke-Freund, 2013; Breuer et al., 2016; Lüdeke-Freund et al., 2019; Short et al., 2014; Stubbs and Cocklin, 2008). Wirtz et al. (2016) review of 681 articles on BMs reveals that BM research tends to focus on a variety of definitions, perspectives and components, though we still lack in-depth sustainability research on social, environmental and economic factors. Although Wirtz et al.'s (ibid) literature review focuses on the importance of "change and evolution" in BM research, the authors do not relate such research to the social and environmental aspects of sustainability. Arend (2013) and Markides (2015) argue for the potential benefit of viewing the BM as a model for value creation through non-monetary exchanges in new areas, such as social entrepreneurship and other non-traditional business contexts. Their work reflects the trend in research on SBMs that looks beyond a profit-centred focus to the environmental and social aspects of BMs. In addition, Lüdeke-Freund (2019) also stresses the importance of integrating sustainable entrepreneurship, innovation, and business models.

Bocken et al. (2014) describe SBMI as a tool that provides substantial positive environmental and societal effects achieved by changes in how the organisation and its value network create, deliver, and capture value, or by changes in its value propositions. This process often requires making strategic choices intended to maximise environmental regeneration, social benefits, and financial viability (i.e., 'doing well to do good') above the level achieved by traditional 'profit-normative' BMs (Upward and Jones, 2016).

According to Lüdeke-Freund (2010), an SBM can create competitive advantage through offering superior customer value and contributing to the sustainable development of both the organisation and society. Similarly, Schaltegger et al. (2016, p. 4) write that the SBM "helps in describing, analyzing, managing and communicating (i) a company's sustainable value proposition to its customers and all other stakeholders, (ii) how it creates and delivers this value, and (iii) how it captures economic value while maintaining or regenerating natural, social and economic capital beyond its organizational boundaries".

Geissdoerfer et al. (2016) refine the definition of SBMI by explicitly conceptualising it as a process with a specific focus on the integration of sustainable value among a wide range of stakeholders (including start-up companies and new entities following mergers or acquisitions). After the SBMI process is planned, it is necessary to follow systematic and well-established management practices and procedures (i.e., tools) that provide the organisation with stability and continuity. In such processes, these tools, which contribute to the SBMI's outcomes, can be enhanced by visual collaborative business modelling informed by stakeholders' goals (e.g., Elkington and Upward, 2016; Geissdoerfer et al., 2018; Jones and Upward, 2014; Joyce et al., 2015). These tools are particularly useful for stakeholders in the identification and communication of problematic areas in the BM and its building blocks, as well as in the creation of a blueprint for analysis (Gibson and Jetter, 2014; Osterwalder and Pigneur, 2010).

2.3. Sustainable business model archetypes

The traditional building blocks of BMI are (i) value proposition, (ii) value creation/delivery, and (iii) value capture. Bocken et al. (2014) apply an integrated approach to the development of eight

SBM archetypes around these blocks. These archetypes derive from questions of 'value proposition', 'value creation and delivery', and 'value capture'. These authors categorise the eight archetypes as *Technological*, *Social*, and *Organisational*. Together, the archetypes present a comprehensive view of SBMs.

Technological archetypes: (1) Maximise material and energy efficiency, (2) Create value from waste, and (3) Use Substitute with renewable and natural processes. The *Maximise material and energy efficiency* SBM archetype deals with how companies can do more with fewer resources, produce less waste, and reduce pollution. The *Create value from waste* archetype concerns the transformation of waste streams into useful and valuable production inputs through the improved usage of underutilised capacity. The *Use Substitute with renewable and natural processes* SBM archetype deals with the reduction of harmful environmental impacts and the increase in business resilience by addressing the 'limits to growth' associated with non-renewable resources and current production systems.

Social archetypes: (4) Deliver functionality rather than ownership, (5) Adopt a stewardship role, and (6) Encourage sufficiency. The *Deliver functionality rather than ownership* archetype shows how companies can provide services that satisfy users' needs without ownership of the physical products. The *Adopt a stewardship role* archetype shows how firms proactively engage with all stakeholders to ensure their health and well-being. The *Encourage sufficiency* archetype shows how companies employ solutions that actively seek to reduce consumption and production.

Organisational archetypes: (7) Repurpose for society/environment and (8) Develop scale up solutions. The *Repurpose for society/environment* archetype shows how companies prioritise the delivery of social and environmental benefits rather than financial profit (i.e., shareholder value) through close integration between the company, its community, and other stakeholder groups. The traditional business model, where the customer is the primary beneficiary, may shift. Lastly, the *Develop scale up solutions* archetype shows how companies deliver sustainable solutions on a scale that maximises benefits for society and the environment.

The original eight business models were developed based on the manufacturing industry (Bocken et al., 2014). Yip and Bocken (2018) have also conducted a study regarding business models for sustainability in the banking sector. Their point of departure was the original eight business models archetypes, which were revised after semi-structured interviews with bankers. One important reason for the revision was that the banking industry is a service industry which is different from manufacturing (Yip and Bocken, 2018).

The agricultural sector, which is the focus in this study, has several common denominators with the manufacturing industry. Both sectors focus on products, not services, and have developed into increasingly high-tech, machine-intensive operations with high levels of productivity but relatively few workers (Walden, 2014). Hence, the study presented here will be based on the original eight archetypes of Bocken et al. (2014).

3. Method

3.1. Research project setting and background

The research presented in this paper is part of the larger research project, *Lean Innovation* (initiated in 2012 at Halmstad University, Sweden). This paper reports on one aspect namely sustainable business models (SBMs) in the agri-food industry.

Fig. 1 shows how the research process is embedded in the larger research project and outlines the research process from (i) deciding on the main focus of the research through the (ii) planning of data collection, (iii) data collection and (iv) data analysis to enable to create an understanding of different types of sustainable business models in the agricultural sector in Sweden.

3.2. Pilot study

In order to test and potentially improve the method used in the full-scale study a pilot study was conducted. The pilot study consisted of two parts; (i) four qualitative case studies of agri-food companies, and (ii) 204 structured interviews with agri-food companies. Both the case studies and the structured interviews included companies focusing on cattle, dairy and/or crops production and processing. The 204 structured interviews are included in the total number of conducted interviews.

The aim of the four case studies was to get a deeper understanding of the applicability of Bocken et al. (2014) archetypes in the agricultural sector. Since the four case studies indicated that the eight original archetypes where relevant to the agricultural sector, the 204 structured interviews were conducted to further validate the relevance of the archetypes. The structured interviews study also showed that Bocken et al. (2014) archetypes were relevant to the agricultural sector.

Further, the aim with the combination of qualitative case studies and quantitative structured interviews was to validate the conformity of the results of the different methods used. The results of the pilot study (Ulvenblad et al., 2019) confirmed that the construction and layout of the main study was adequate. Finally, the aim was to analyse all the empirical data from a different theoretical angle e.g., sustainability-oriented innovation (Adams et al., 2016).

3.3. Data collection in the main study

Both primary and secondary data are used in this research. The primary data were collected through a telephone survey to all Swedish full-time agricultural entrepreneurs with at least an annual company turnover of 1 million SEK (approx. 100 000 Euro). All 4064 agricultural entrepreneurs were identified from the Agricultural Register for 2015 issued by Statistics Sweden. The goal was to conduct interviews with the entire population, but it was not possible to establish contact with some entrepreneurs and some declined to participate. Eventually, the telephone survey was conducted with 1143 agricultural entrepreneurs, which is a 28% response rate.

The secondary data (from Statistics Sweden) provided the following facts: company location (county), company characteristics (crops, dairy, etc.), annual turnover, land area, and contact information.

The telephone survey was conducted from June 2016 to June 2017. Prior to the telephone survey, we mailed letters to all 4064 entrepreneurs describing the eight SBM archetypes, which were the focus of the survey questions. The 1143 telephone surveys, in Swedish, lasted for about 20–30 min each. The respondents could reply to questions in their own words or choose among pre-structured answers. The data were processed using the Statistical Package for Social Sciences (SPSS).

The population of this study was classified using NUTS (Nomenclature of Territorial Units for Statistics[1]). Sweden has 21 counties that are defined on NUTS Level 3. On NUTS Level 2, the

[1] The NUTS classification (Nomenclature of Territorial Units for Statistics) is a system for dividing the economic territory of the European Union for the purpose of collection, development, and harmonisation of regional statistics in Europe, as well as for socioeconomic analysis and comparison. The NUTS Levels are the following: (i) NUTS 1: major socioeconomic regions, (ii) NUTS 2: basic regions for the application of regional policies, (iii) NUTS 3: small regions for specific diagnoses (retrieved 2017-09-28 from http://ec.europa.eu/eurostat/web/nuts/overview).

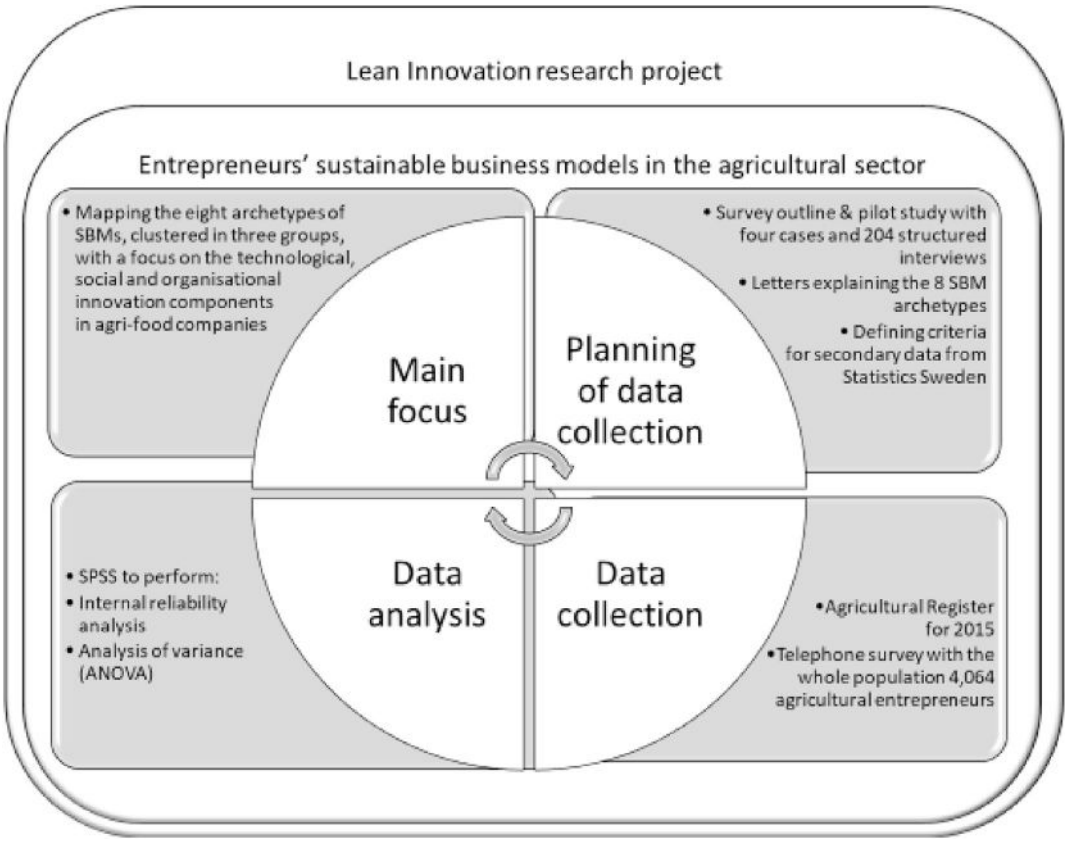

Fig. 1. Outline of the research process.

counties are transformed into eight different regions. Furthermore, these eight regions form three large parts of Sweden in NUTS Level 1: (i) East Sweden (SE 1), (ii) South Sweden (SE 2) and (iii) North Sweden (SE 3). See Fig. 2.

Table 1 displays the figures for the entire population of agricultural entrepreneurs for NUTS Level 1.

Of the total number of companies 80% have an annual turnover of between 1 million and 10 million SEK. As far as farm size is concerned, 34% of the farms in the population average between 100 and 200 ha of land, while 78% of the farms have between 50 and 400 ha of land.

The companies mainly produce beef cattle, crops, and dairy products. Table 2 displays the distribution of respondents regarding the main production focus in terms of cattle, crop, and dairy figures for NUTS Level 1 and by this shows how well the distribution of respondents represents the total population.

Of the total number of companies 1003 focus on cattle. 37,8% of these have participated in the study. 2597 companies in turn focus on crops, 23% of those have participated and finally 464 companies focus on dairy, 35% have participated in the study.

3.4. Variables and measures

The survey had one question about the county and 24 questions on the eight SBM archetypes. Each business model archetype had three questions with the following focus: (a) what value is delivered, (b) how value is delivered, and (c) how does the company earn money and capture other values. A Likert scale (1–5) was used for all 24 questions: 1) absolutely agree, 2) agree, 3) neutral, 4) partially disagree, and 5) absolutely do not agree. Consequently, the lower the Likert scale value is for every question, the higher the degree of the respondent's agreement.

A translated version of the questionnaire can be viewed in appendix A, including the three questions for each of the eight business models, and the descriptive statistic (appendix B) generated from the study. Following Bocken et al.'s logic in defining the descriptive categories, we used higher order groupings (aggregations) that describe the principal SBM archetypes (Technological,

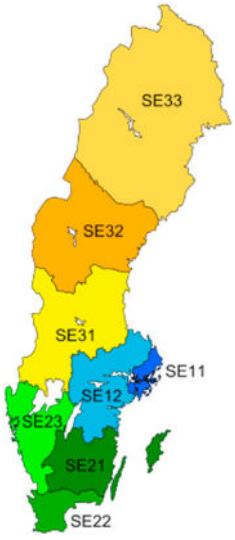

Fig. 2. Map of Sweden with division by NUTS classification. East Sweden includes SE 11 and SE12. South Sweden includes SE 21, SE22, and SE 23. North Sweden includes SE 31, SE32, and SE33.

Table 1
Total number of firms and response rate for NUTS Level 1 distributed.

NUTS 1	Total no. of firms	Response rate
East Sweden	1003 (25%)	312 (31%)
South Sweden	2597 (64%)	719 (28%)
North Sweden	464 (11%)	112 (24%)
Total	4064 (100%)	1143 (28%)

Social, and Organisational). According to Bocken et al. (2014, p. 48):

> "The technical grouping includes archetypes with a dominant technical innovation component (e.g., manufacturing process and product redesign); the social grouping includes archetypes with a dominant social innovation component (e.g., innovations in consumer offering, changing consumer behaviour) while archetypes in the organisational grouping have a dominant organizational innovation change component (e.g., changing the fiduciary responsibility of the firm)."

Using SPSS, a reliability test was conducted to determine the scales' internal consistency, i.e., how free of errors each scale was, meaning that Cronbach's alpha tests to see if multiple-question Likert scale surveys are reliable. Following Nunnally (1978) recommendation, a minimum level of 0.7 of Cronbach's quotient ά for each scale was needed to validate its reliability and include it in the subsequent analysis (Pallant, 2005). This quotient shows the average correlation among all questions that form the scale (i.e., the extent to which each question measures the variable [attribute] set). Performing a reliability test in our study was important since no survey instrument on SBM archetypes that was previously validated existed. Therefore, through Cronbach ά we could ensure that the items (questions) included in each set are closely related as a group.

For the telephone survey, we first performed the reliability test for the eight SBM archetypes each consisting of three items/questions. However, only two archetypes (*Maximise material and energy efficiency* and *Substitute with renewable and natural processes*) had proven internal reliability and compatibility with values of Cronbach's quotient ά over 0,7. They can be claimed as reliable scales (parameters) with the sample surveyed. Table 3 presents the results from the test for reliability of the scales, where the other six SBM categories show values lower than 0,7.

The same test was performed for the higher order groupings (technical, social, and organizational). Technological and Social SBM archetypes have a proven internal reliability and compatibility with values of Cronbach's quotient ά over 0,7, thus showing that the items are closely related as a group. Organisational SBM archetypes showed a slightly lower value of Cronbach's quotient ά. Nevertheless, as Pallant (2005) points out, the values of Cronbach's quotient ά are influenced by the number of questions included in the scale, and these values have a tendency to reveal lower outcomes when there are fewer than ten questions.

After these tests and analyses were completed, we prepared indexes by calculating the mean values of all questions forming one main component (question), thus creating three essential variables. The results reflected the higher order groupings of SBMI (components of Technological, Social, and Organisational innovation).

4. Results

In this section, we present the results of the statistical tests based on three major regions of Sweden (NUTS Level 1). First, we analysed the aggregated level of the eight SBM archetypes identified as 'higher order groupings'. Our focus was on describing the main SBM archetypes. Thereafter, we continued the analysis of the organisational grouping variable, for which a homogeneity test revealed no difference between the major region groups (Levine Test).

Table 4 shows that the respondents of all three regions regard the technological component '*Maximise material and energy efficiency*' as being the most prominent. The least prominent component is in turn connected to the organisational component '*Develop scale up solutions*', which is valid for all three regions.

The analysis of variance (ANOVA) in Table 5 shows the results for the three innovation component groups and the independent variable NUTS Level 1. Significant differences were found for the organisational variable: $F(2, 1130) = 14{,}28$, $p = 0{,}001$. But no significant differences were found for the technological and social variables.

Since the range of the Likert scale used in this study is from 1 to 5, where 1) is "absolutely agree" and 5) is "absolutely do not agree", the organisational innovation components *Repurpose for society/environment* and *Develop scale up solutions* are more common in north Sweden than in the other parts of Sweden.

Employing the Bonferroni post hoc test, the results show that the agri-entrepreneurs of north Sweden regard all the innovation components; technological, social and organisational, more prominent than agri-entrepreneurs in other parts of Sweden. The only exception is the technological innovation component, where the agri-entrepreneurs of south Sweden make the same assessment as their colleagues in north Sweden. The agri-entrepreneurs of east Sweden regard their business models less prominent in all three dimensions than in both south and north Sweden. The largest difference, which is statistically significant, is found regarding the organisational innovation component, where the sustainable business models in north Sweden has a more prominent organisational innovation component than the other parts of Sweden. (Bonferroni, $p < 0{,}05$).

Overall, according to the Bonferroni post hoc test, the results show that the agri-entrepreneurs of north Sweden regard the sustainable business model archetype *Repurpose for society/environment* as more prominent than the agri-entrepreneurs in both east Sweden and south Sweden (see Table 6). Furthermore, this is also valid for the sustainable business model archetype *Develop scale up solutions* where the agri-entrepreneurs of north Sweden also show significantly higher assessment than both east and south Sweden (Bonferroni, $p < 0{,}05$).

Table 2
Distribution of responses for the total population focusing cattle, crop, and dairy for NUTS Level 1.

NUTS 1	Total no. of firms 4064 (100%)			Response rate 1143 (28%)		
	Cattle	Crop	Dairy	Cattle	Crop	Dairy
East Sweden	329 (33%)	951 (37%)	85 (18%)	108 (28%)	155 (26%)	49 (30%)
South Sweden	541 (54%)	1299 (50%)	347 (75%)	256 (68%)	364 (61%)	99 (61%)
North Sweden	133 (13%)	347 (13%)	32 (7%)	15 (4%)	82 (13%)	15 (9%)
Total	1003 (100%)	2597 (100%)	464 (100%)	379 (100%)	601 (100%)	163 (100%)

Table 3
Results from scales internal reliability analysis (Cronbach ά).

Business model archetypes	No. of Items	Cronbach's Alpha	Groupings	No. of items	Cronbach's Alpha
Maximise material and energy efficiency	3	0.729	Technological component	9	0.77
Create value from waste	3	0.645			
Substitute with renewable and natural processes	3	0.799			
Deliver functionality rather than ownership	3	0.679	Social component	9	0.73
Adopt a stewardship role	3	0.563			
Encourage sufficiency	3	0.674			
Repurpose for society/environment	3	0.475	Organisational component	6	0.665
Develop scale up solutions	3	0.533			

Table 4
Mean value for the business model archetypes based on Bocken et al. (2014) for east, south and north Sweden.

Groupings	Business model archetypes	East Sweden	South Sweden	North Sweden
Technological component	Maximise material and energy efficiency	1.83	1.77	1.75
	Create value from waste	2.51	2.30	2.30
	Substitute with renewable and natural processes	2.43	2.50	2.51
Social component	Deliver functionality rather than ownership	2.48	2.63	2.66
	Adopt a stewardship role	2.33	2.17	2.07
	Encourage sufficiency	2.95	2.75	2.58
Organisational component	Repurpose for society/environment	2.77	2.64	2.37
	Develop scale up solutions	3.23	2.83	2.73

Table 5
ANOVA results for technological, social, and organisational innovation components.

Innovation components	NUTS n = 1143								
	East		South		North				
	M	sd	M	sd	M	sd	F	df	p
Technological innovation	2.26	0.63	2.19	0.64	2.19	0.68	1.17	2	0.311
Social innovation	2.59	0.8	2.52	0.78	2.45	0.63	1.69	2	0.185
Organisational innovation	2.74	0.85	2.52	0.79	2.31	0.8	14.28	2	0.001

5. Discussion

Sustainable business models are an important and growing field of interest among researchers and practitioners (Daspit, 2017; Evans et al., 2017; Geissdoerfer et al., 2018; Lüdeke-Freund et al., 2019). However, knowledge of the development and use of SBMs is limited, specifically in the agri-food industry (Tell et al., 2016), which is facing many challenges such as increased global competition, price pressure, reduced profitability, increased administrative and statutory requirements, and changing demands from society (see, for example, Alexandrato and Bruinsma, 2012; Swedish Government, 2017).

The findings from this research offer new insights into SBM archetypes in the agricultural sector of Sweden. The most common business model archetype in all three regions is *Maximise material and energy efficiency*, which is defined as part of the technological component. This is not surprising since agricultural companies often regard themselves as primary producers and not entrepreneurs (Ulvenblad, 2021). The producer-farmer focus on production within traditional boundaries (Stenholm and Hytti, 2014) which puts material and energy efficiency in focus, rather than other ways of business development.

Further, the findings reveal that no major differences exist between the technological and social innovation components in three of the country's regions. However, significant differences were revealed for organisational innovation components between the three regions for two SBM archetypes: *Repurpose for society/environment* and *Develop scale up solutions*. The agri-entrepreneurs of north Sweden assessed that their sustainable business models had more significant organisational innovation components than their colleagues in both east and south Sweden.

It is interesting that the agri-entrepreneurs of north Sweden seem to be more innovative when it comes to sustainable business model innovation than the other parts of Sweden. Especially when considering the challenges of north Sweden, with long distances and transports to large and medium-sized cities. Furthermore, north Sweden has a colder climate so conditions for agri-food production are generally more limited than in east or south

Table 6
ANOVA results with Bonferroni post hoc test.

BM archetypes	NUTS n = 1133								
	East		South		North				
	M	sd	M	sd	M	sd	F	df	p
Re-purpose	2.77	0.86	2.64	0.85	2.37	0.85	9.27	2	0.001
Develop scale up solutions	3.23	0.98	2.83	0.92	2.73	0.96	22.65	2	0.001

Sweden. North Sweden, in comparison with east and south Sweden, has a higher risk of farmland abandonment due to low farm incomes and a weak land market (Terres et al., 2015). It could be assumed that business values such as profit maximisation would be addressed before sustainable values during harsh conditions like that.

However, this could also indicate that other strategies are addressed when it comes to the rural development in north Sweden. For example, more differentiated strategies that focus on sustainable and local business values could be addressed by the consumers in the region. These types of strategies could be beneficial for sustainable development of rural areas and for the promotion of food systems towards sustainability in food consumption (Tóth et al., 2020).

The *Repurpose for society/environment* SBM archetype shows how companies prioritise delivery of social and environmental benefits over economic profit maximisation through their close integration with the community and other stakeholders. The traditional BM focus, in which the customer is the primary beneficiary, may therefore alter. Knickel (2018) show for example that providing new governance structures and cooperation with several actors can help to integrate different interests and increase socio-ecological resilience at regional level.

The *Develop scale up solutions* archetype shows how companies deliver sustainable solutions on a large scale in order to maximise benefits for society and the environment. Due to the long distances in north Sweden, it could be argued that the scale up solutions have been developed further here to fulfil sustainable as well as economic aspects of the business. Rural areas are not only a place for production, but also a place for consumption (Rivera, 2018). Empirical findings suggest an increased emphasis on environmental conservation and residential decentralization in Sweden, as well as other countries (Knickel, 2018).

The results presented in this article are in line with Taalbi (2017) who has studied drivers of innovation and found that many innovations were developed as a creative response to challenges and economic problems. Environmental, economic, and organizational challenges in different industries have shifted the focus of firms towards search for new solutions and innovations. Further, after studies of innovations in northern parts of Sweden, Norway and Canada, Healy (2017) found that geographical location and environmental conditions have formed the foundation for developing higher-value activities in companies. He concludes that "recognizing the value of these assets, rather than seeing them as constraints, has opened up possibilities for innovation-led economic development" (p. 25).

The results are also in line with the final evaluation report of the EU Rural Development Programme in Sweden, which identifies the importance of business model innovation in the agricultural sector (Johansson et al., 2016). Further, the final evaluation report emphasizes three main conclusions, which all correspond with the results of this paper and are detailed below.

First, rural development programmes in the future should adapt more to local conditions, such as climate, geography, population, and distance to large cities/markets, etc. Secondly, the rural development programmes should emphasise regional and local capacity, decision-making skills, and mutual trust between companies and their various stakeholders. In this study, all these factors are important. South Sweden has higher degrees of organisational innovation than east Sweden, although lower than north Sweden. South Sweden, in general, has a good growing climate and is also rather densely populated. However, it lacks a national population centre equivalent to that of Stockholm in east Sweden. These factors may explain the differences found in this study. The logic is that with easier conditions for running the business, the less incentives for working with business model innovation. Thirdly, future rural development programmes ought to focus more on innovation. According to the evaluation report (Johansson et al., 2016), the Swedish programme has supported the renewal of production capacity rather than the development of new sustainable business models – even though the latter could create more value for companies and their customers. The results of the study presented here indicate that there is a potential for development of a higher degree of business model innovation within the Swedish agri-food sector if local conditions as stated above is considered.

6. Conclusions

This article presents empirical data on sustainable business model innovation in the Swedish agricultural sector. The research takes an integrated approach based on technological, social, and organisational innovation components of selected agricultural companies in Sweden. Bocken et al. (2014) eight SBM archetypes are the basis of the analysis.

No major differences were found with respect to technological and social innovation components in the three major regions of the country. However, significant differences were identified with respect to organisational innovation components in all three regions. North Sweden reports a more prominent organisational innovation component than both east and south Sweden. The organisations innovation component encompasses two SBM archetypes, which explain the differences between the regions: *Repurpose for society/environment* and *Develop scale up solutions.*

North Sweden has a harsh climate, long distances and is not heavily populated. Further, nature is regarded as a resource to use and to keep. It seems reasonable that the *Repurpose for society/environment* SBM archetype, which builds on close integration between the firm and local communities and other stakeholder group is prioritized by agri-entrepreneurs in north Sweden, where cooperation between actors in the value chains are needed. In line with Bocken et al. (2014) it also implies that the agri-entrepreneurs prioritise delivery of social and environmental benefits rather than economic profit maximisation.

The same arguments are valid for the *Develop scale up solutions* SBM archetype, which also is more common in north Sweden than the rest of the country. The agri-entrepreneurs of north Sweden are more likely to develop sustainable solutions to maximise benefits for society and the environment based on collaborative approaches regarding sourcing, funding, and lobbying and open innovation (Bocken et al., 2014).

We call attention to two limitations in this study of SBM archetypes. First, the approach of using such archetypes emphasizes environmental innovations. From a sustainability perspective, it is of interest to explore social and economic variables when using the different archetypes. For example, 'value intention' could be of interest because the concept focuses on the mind-set of the owner (and manager) of an agri-food company, including her/his attitude to change and innovation (Barth et al., 2017). From an individual owner's perspective, sustainability could be a means, a goal, or something else that enhances or limits the business model. This perspective could be relevant because agri-food companies are often owner-managed, family businesses that place a priority on values other than profit maximisation. Second, it would also be of interest to address socio-economic characteristics such as age, education, and income. Unfortunately, this data was not available, but would be of interest to develop further as these aspects could be of relevance to the different SBM archetypes.

Even though more research is needed to help explain the contextual differences, the findings presented here have implications for business practices, regional extension services and rural

development programs since an integrated approach to SBM innovation seems linked to the regional context and infrastructure.

To conclude, Sweden has a record of high innovation performance in general in international comparisons (Torregrosa-Hetland et al., 2019). Further, the Swedish government has set a goal to make food production in Sweden a globally competitive, innovative, sustainable, and attractive industry by the year 2030 (Swedish Government, 2017). Innovation in Swedish agriculture has focused both on competitiveness and sustainability, as well as on the productivity and financial viability of the companies. The findings in the study presented here have the potential to be useful and generate knowledge that can be relevant in an international context as well.

CRediT authorship contribution statement

Henrik Barth: Writing – original draft, preparation, Methodology, Investigation, Formal analysis, Visualization, Writing- Reviewing and Editing. **Pia Ulvenblad:** Writing – original draft, preparation, Methodology, Investigation, Formal analysis, Visualization, Writing- Reviewing and Editing, Conceptualization, Project administration, Funding acquisition. **Per-Ola Ulvenblad:** Writing – original draft, preparation, Methodology, Investigation, Formal analysis, Visualization, Writing- Reviewing and E diting. **Maya Hoveskog:** Writing – original draft, preparation, Methodology, Investigation, Formal analysis, Visualization, Writing- Reviewing and Editing.

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.

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Appendix A. Supplementary data

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References

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., Overy, P., 2016. Sustainability-oriented innovation: a systematic review. Int. J. Manag. Rev. (2), 180.
Agenda 2030. UN General Assembly, Transforming our world : the 2030 Agenda for Sustainable Development. (Accessed 19 April 2021).
Alexandratos, N., Bruinsma, J., 2012. World Agriculture towards 2030/2050: the 2012 Revision. ESA Working Paper No. 12-03. FAO, Rome.
Alsos, G.A., Carter, S., Ljunggren, E., 2011. The Handbook of Research on Entrepreneurship in Agriculture and Rural Development. Edward Elgar Publishing, Cheltenham.
Alsos, G.A., Carter, S., Ljunggren, E., 2014. Kinship and business: how entrepreneurial households facilitate business growth. Enterpren. Reg. Dev. 26 (1–2), 97–122.
Alston, J., 2018. Reflections on agricultural R&D, productivity, and the data constraint:unfinished business, unsettled issues. Am. J. Agric. Econ. 100 (2), 392–414.
Amit, R., Zott, C., 2012. Creating value through business model innovation. MIT Sloan Manag. Rev. 53, 41–49.
Arend, R.J., 2013. The business model: present and future—beyond a skeumorph. Strat. Organ. 11 (4), 390–402.
Barth, H., Ulvenblad, P.-O., Ulvenblad, P., 2017. Towards a conceptual framework of sustainable business model innovation in the agri-food sector: a systematic literature review. Sustainability 9, 1620.
Beuchelt, T.D., Zeller, M., 2016. The role of cooperative business models for the success of smallholder coffee certification in Nicaragua: a comparison of conventional, organic and Organic-Fairtrade certified cooperatives. Renew. Agric. Food Syst. https://doi.org/10.1017/S1742170512000087.
Board of Agriculture (2016). Agricultural Statistics of Sweden, 2016. (Accessed 19 April 2021).
Board of Agriculture, 2019. Agricultural Statistics. Statens jordbruksverk.
Bocken, N.M.P., Short, S.W., Rana, P., Evans, S., 2014. A literature and practice review to develop sustainable business model archetypes. J. Clean. Prod. 65, 42–56.
Bocken, N., Schuit, C., Kraaijenhagen, C., 2018. Experimenting with a circular business model: lessons from eight cases. Environmental Innovation and Societal Transitions 28, 79–95.
Boons, F., Lüdeke-Freund, F., 2013. Business models for sustainable innovation: state of-the-art and steps towards a research agenda. J. Clean. Prod. 45, 9–19.
Breuer, H., Fichter, K., Lüdeke-Freund, F., Tiemann, I., 2016. Requirements for sustainability-oriented business model development. In: Paper Presented at the 6th International Leuphana Conference on Entrepreneurship, 14-15th January. Lüneburg, Germany.
Carbone, Anna, 2017. Food supply chains: coordination governance and other shaping forces. Agricultural and food economics 5 (1), 1–23. https://doi.org/10.1186/s40100-017-0071-3.
Chesbrough, H., 2007. Business model innovation: it's not just about technology anymore. Strat. Leader. 35, 12–17.
Chesbrough, H., 2010. Business model innovation: opportunities and barriers. Long. Range Plan. 43, 354–363.
Daspit, J.J., 2017. D. Andreini and C. Bettinelli: business model innovation: from systematic literature review to future research directions. J. Manag. Govern. 21 (3), 785–792.
Dias, C., Franco, M., 2018. Cooperation in tradition or tradition in cooperation? Networks of agricultural entrepreneurs. Land Use Pol. 71, 36–48.
Dias, C.S., Rodrigues, R.G., Ferreira, J.J., 2019. Agricultural entrepreneurship: going back to the basics. J. Rural Stud. 70, 125–138.
Elkington, R., Upward, A., 2016. Leadership as enabling function for flourishing by design. J. Global Resp. 7 (1), 126–144.
Evans, S., Vladimirova, D., Holgado, M., Van Fossen, K., Yang, M., Silva, E.A., Barlow, C.Y., 2017. Business model innovation for sustainability: towards a unified perspective for creation of sustainable business models. Bus. Strat. Environ. 26 (5), 597–608.
Fitz-Koch, S., Nordqvist, M., Carter, S., Hunter, E., 2018. Entrepreneurship in the agricultural sector: a literature review and future research opportunities. Entrepren. Theor. Pract. 42 (1), 129–166.
Geissdoerfer, M., Vladimirova, D., Evans, S., 2018. Sustainable business model innovation: a review. J. Clean. Prod. 401.
Gibson, E., Jetter, A., 2014. Towards a dynamic process for business model innovation: a review of the state-of-the-art. In: Proceedings of PICMET '14: Infrastructure and Service Integration. IEEE, pp. 1230–1238.
Healy, A., 2017. Innovation in Circumpolar regions: new challenges for smart specialization. N. Rev. 45, 11–32.
Intergovernmental Panel on Climate Change. Global Warming of 1,5 C. (Accessed 19 April 2021).
Johansson, J., Holmquist, M., Jonasson, M., Mattsson, M., Ulvenblad, P.-O., Weisner, S., 2016. Syntheses for Sustainable Rural Development, Evaluation of the Overall Effects of the Program. Final Evaluation of the Swedish Rural Program 2007–2013. Board of Agriculture, Jönköping, Sweden.
Johnson, M.N., 2010. The time has come for business model innovation. Leader Leader 6–10, 2010.
Jones, P.H., Upward, A., 2014. Caring for the future: the systemic design of flourishing enterprises. The third symposium of relating systems thinking and design (RSD3), Oslo, Norway, 3 (1), 1–8.
Joyce, A., Paquin, R., Pigneur, Y., 2015. The triple layered business model canvas: a tool to design more sustainable business models. In: ARTEM Organizational Creativity International Conference, 26-27 March 2015, Nancy, France.
Klang, D., Wallnöfer, M., Hacklin, F., 2014. The business model paradox: a systematic review and exploration of antecedents. Int. J. Manag. Rev. 16, 454–478.
Knickel, K., et al., 2018. Between aspirations and reality: making farming, food systems and rural areas more resilient, sustainable and equitable. J. Rural Stud. 59, 197–210. https://doi.org/10.1016/j.jrurstud.2017.04.012 [Online] 59197–210.
Lee, I., 2015. A social enterprise business model for social entrepreneurs: theoretical foundations and model development. Soc. Entrepren. Innov. 3 (4), 269–301.
Lüdeke-Freund, F., 2010. Towards a conceptual framework of business models for sustainability. In: Wever, R., Quist, J., Tukker, A., Woudstra, J., Boons, F., Beute, N. (Eds.), Proceedings of ERSCP-EMSU Conference 2010—Knowledge Collaboration and Learning for Sustainable Innovation. European Roundtable on Sustainable Consumption and Production Society.
Lüdeke-Freund, F., Froese, T., Schaltegger, S., 2019a. The role of business models for sustainable consumption: a pattern approach. A Research Agenda for Sustainable Consumption Governance. Edward Elgar Publishing.
Lüdeke-Freund, F., 2019b. Sustainable Entrepreneurship, Innovation, and Business Models: Integrative Framework and Propositions for Future Research. Business Strategy and the Environment.
Lüdeke-Freund, F., Gold, S., Bocken, N.M., 2019c. A review and typology of circular economy business model patterns. J. Ind. Ecol. 23 (1), 36–61.
Magretta, J., 2002. Why Business Models Matter. Harvard Business Online, January.
Markides, C., 2015. Research on business models: challenges and opportunities. In: Baden-Fuller, C., Mangematin, V. (Eds.), Business Models and Modelling. Emerald Group Publishing Limited, pp. 133–150.

McElwee, G., 2006. Farmers as entrepreneurs: developing competitive skills. J. Dev. Enterpren. 11, 187–206, 03.
McElwee, G., Smith, R., 2012. Classifying the strategic capability of farmers: a segmentation framework. Int. J. Entrepreneurial Ventur. 4 (2), 111–131.
McGrath, R.G., 2010. Business models: a discovery driven approach. Long. Range Plan. 43, 247–261.
Nunnally, J.C., 1978. Psychometric Theory, second ed. McGraw-Hill, New York.
Nuthall, P.L., Old, K.M., 2017. Will future land based food and fibre production be in family or corporate hands? An analysis of farm land ownership and governance considering farmer characteristics as choice drivers. The New Zealand case. Land Use Pol. 63, 98–110. April 2017.
OECD, 2018. Innovation, Agricultural Productivity and Sustainability in Sweden, OECD Food and Agricultural Reviews. OECD Publishing, Paris, France. https://doi.org/10.1787/9789264085268-en.
Osterwalder, A., Pigneur, Y., 2010. Business Model Generation. John Wiley and Sons, Inc., New Hoboken, NJ.
Osterwalder, A., Pigneur, Y., Tucci, C.L., 2005. Clarifying business models: origins, present and future of the concept. Commun. Assoc. Inf. Syst. 16, 1.
Pallant, J., 2005. SPSS - Survival Manual. Open University Press, Berkshire.
Rivera, M., et al., 2018. Rethinking the connections between agricultural change and rural prosperity: a discussion of insights derived from case studies in seven countries. J. Rural Stud. 59, 242–251. https://doi.org/10.1016/j.jrurstud.2017.07.006 [Online] 59242–251.
Roome, Nigel, Louche, Céline, 2016. Journeying Toward Business Models for Sustainability: A Conceptual Model Found Inside the Black Box of Organisational Transformation. Organization & environment 29 (1), 11–35. https://doi.org/10.1177/1086026615595084.
Rueda, X., Garrett, R.D., Lambin, E.F., 2017. Corporate investments in supply chain sustainability: selecting instruments in the agri-food industry. J. Clean. Prod. 142, 2480–2492, 2017.
Schaltegger, S., Hansen, E.G., Lüdeke-Freund, F., 2016. Business models for sustainability: origins, present research, and future avenues. Organ. Environ. 29, 3–10.
Short, S.W., Bocken, N.M., Barlow, C.Y., Chertow, M.R., 2014. From refining sugar to growing tomatoes. J. Ind. Ecol. 18, 603–618.
Statistics Sweden, 2020. Annual Yearbook of Agricultural Statistics.
Stenholm, P., Hytti, U., 2014. In search of legitimacy under institutional pressures: a case study of producer and entrepreneur farmer identities. J. Rural Stud. 35, 133–142. Stilgoe, J., Owen, R., and Macnaghten, P. (2013). Developing a framework for responsible innovation. Research policy, 42(9), 1568-1580.
Stubbs, W., Cocklin, C., 2008. Conceptualizing a "sustainability business model". Organ. Environ. 21, 103–127.
Swedish Government, 2017. En livsmedelsstrategi för Sverige – fler jobb och hållbar tillväxt i hela landet [A food strategy for Sweden – more jobs and sustainable growth in the entgire country. Stockholm, Prop 17 (104).
Taalbi, J., 2017. What drives innovation? Evidence from economic history. Res. Pol. 46, 1437–1453.
Taran, Y., Boer, H., Lindgren, P., 2015. A business model innovation typology. Decis. Sci. J. 46, 301–331.
Teece, D.J., 2010. Business models, business strategy and innovation. Long. Range Plan. 43, 172–194.
Tell, J., Hoveskog, M., Ulvenblad, P., Ulvenblad, P.O., Barth, H., Ståhl, J., 2016. Business model innovation in the agri-food sector: a literature review. Br. Food J. 118 (6), 1462–1476.
Terres, J., Scacchiafichi, L.N., Wania, A., Ambar, M., Anguiano, E., Buckwell, A., Zobena, A., 2015. Farmland abandonment in Europe: identification of drivers and indicators, and development of a composite indicator of risk. Land Use Pol. 4920–4934. https://doi.org/10.1016/j.landusepol.2015.06.009.
Torregrosa-Hetland, S., Pelkonen, A., Oksanen, J., Kandera, A., 2019. The prevalence of publicly stimulated innovations –A comparison of Finland and Sweden, 1970–2013. Res. Pol. 48 (Issue 6), 1373–1384.
Tóth, J., Migliore, G., Schifani, G., Rizzo, G., 2020. Sustainable value creation in the food chain: a consumer perspective. Sustainability 12 (4), 1438. https://doi.org/10.3390/su12041438.
Ulvenblad, P.-O., 2021. Development of sustainable business models for innovation in the Swedish agri-sector: resource-Effective producer or stewardship-based entrepreneur? In: Campos, H. (Ed.), The Innovation Revolution in Agriculture. A Road Map to Value Creation, 117-145. Springer, Cham.
Ulvenblad, P.-O., Ulvenblad, P., Tell, J., 2016. Green Innovation in the food value chain - will Goliath fix it – or do we need David?. In: Paper (Extended Abstract) Presented at the 61st ICSB (International Council for Small Business) World Conference June 15-18, 2016, New Jersey/New York, USA.
Ulvenblad, P.-O., Ulvenblad, P., Tell, J., 2019. An overview of sustainable business models for innovation in Swedish agri-food production. J. Integr. Environ. Sci. 16 (1), 1–22.
Ulvenblad, P., Barth, H., Ulvenblad, P.O., Ståhl, J., Björklund, J.C., 2020. Overcoming barriers in agri-business development: two education programs for entrepreneurs in the Swedish agricultural sector. J. Agric. Educ. Ext. 1–22.
Upward, Antony, Jones, Peter, 2016. An Ontology for Strongly Sustainable Business Models: Defining an Enterprise Framework Compatible With Natural and Social Science. Organ. Environ. 29 (1), 97–123. https://doi.org/10.1177/1086026615592933.
Velu, C., Smart, A., Phillips, M., 2016. The Imperative for Business Model Innovation - A Research and Practice Perspective. University of Cambridge and the University of Exeter. White Paper. June 2016.
Vesala, H.T., Vesala, K.M., 2010. Entrepreneurs and producers: identities of Finnish farmers in 2001 and 2006. J. Rural Stud. 26 (1), 21–30.
Vesala, K.M., Peura, J., McElwee, G., 2007. The split entrepreneurial identity of the farmer. J. Small Bus. Enterprise Dev. 14 (1), 48–63. https://doi.org/10.1108/14626000710727881.
Walden, M., 2014. You Decide: How Are Farming and Manufacturing Alike? Cals (The College of Agriculture and Life Sciences) Magazine. NC State University. https://cals.ncsu.edu/news/you-decide-how-are-farming-and-manufacturing-alike/.
Wirtz, B.W., Pistoia, A., Ullrich, S., Göttel, V., 2016. Business models: Origin, development and future research perspectives. Long. Range Plan. 49, 36–54.
Yang, M., Evans, S., Vladimirova, D., Rana, P., 2017. Value uncaptured perspective for sustainable business model innovation. J. Clean. Prod. 140 (Part 3), 1794–1804.
Yip, A.W., Bocken, N.M., 2018. Sustainable business model archetypes for the banking industry. J. Clean. Prod. 174, 150–169.
Yunus, M., Moingeon, B., Lehmann-Ortega, L., 2010. Building social business models: lessons from the Grameen experience. Long. Range Plan. 43 (2–3), 308–325.
Zott, C., Amit, R., 2010. Business model design: an activity system perspective. Long. Range Plan. 43 (2), 216–226.
Zott, C., Amit, R., Massa, L., 2011. The business model: recent developments and future research. J. Manag. 37, 1019–1042.