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# Servitisation and technological complexity in family and non-family firms: European evidence

#### Abstract

Servitisation is an emerging topic in practice and in the academy. In this article we address the influence of family ownership on servitisation strategy, using data collected through the European Manufacturing Survey, an international large scale survey on trends in manufacturing. We approach our hypotheses through the lens of the socio-emotional wealth, considering the characteristics of family firms and the rationales for servitisation. This article provides evidence of the important role of technological factors in understanding the particular behaviour of family firms and provides empirical support for the rationales behind the socio-emotional wealth approach.

Keywords: family business, servitisation, socioemotional wealth, manufacturing

## 1. Introduction

While the behaviour of family firms has been analysed in relation to numerous business activities and strategies, little is known about service activities in family firms. Previous studies show service offers have positive effects for both the provider and the customer (Brady et al., 2005; Boyt and Harvey, 1997). Furthermore, approximately 85 percent of European manufacturing companies offer at least one service and services generate an overall value of sales of roughly 16 percent (Lay et al., 2010). Because of its competitive advantage and its importance for manufacturers in Europe (Lay et al., 2009), the discussion of so called "servitisation" has emerged in recent decades (Baines et al., 2009; Vandermerwe and Rada, 1988). Servitisation describes the increased service orientation of industrial firms and of manufacturing industry as a whole (Neely, 2008).

According to this discussion, it can be seen that there are three major rationales for industrial firms to engage with service strategies: growth, profit and innovation (Vandermerwe and Rada, 1988; Mathieu, 2001; Oliva and Kallenberg, 2003; Gebauer et al., 2005; Brax and Jonsson, 2009; Goh and McMahon, 2009; Dachs et al., 2014). Because service offers enable firms to diversify their sources of income and markets, servitisation may allow manufacturers to increase growth, increase profit and innovate while taking

on a limited increase of risk compared with other business strategies. Given that family firms are more aware of risk, in order to protect their socio-emotional wealth (SEW), we presume that family-owned firms may be willing to use servitisation more than non-family firms. The socio-emotional wealth (SEW) perspective suggests that family-owned firms behave differently from non-family firms (Berrone et al., 2012; Gómez-Mejía et al., 2007) because they take into account the non-financial aspects of their activities and consider the affective needs of the family, such as identity, family influence and perpetuation of the dynasty (Gómez-Mejía et al., 2007). In particular we address the following research questions:

(1) Do family firms behave distinctively in their service strategies compared with non-family firms?

(3) What is the relative importance of technological aspects and family ownership in relation to servitisation?

This study has implications for both servitisation research and family business research. On the one hand, this article aims to provide insights into the service orientation and service behaviour of family firms and to analyse their role in the process of servitisation. On the other hand, the analysis highlights the question of whether service offers are used strategically to contribute to SEW in family firms, quite independently of whether the stimulate profit, growth and innovation.

To make such a contribution and answer the research questions we firstly give an overview of the determinants of servitisation and then we explore the expected distinctive behaviour of family firms in the light of the literature on family businesses, with particular emphasis on the SEW perspective. From this theoretical perspective we derive the hypotheses from the literature, which address the research questions and build the framework for the empirical analysis. These hypotheses are tested by means of a large-scale survey, the European Manufacturing Survey (EMS). This survey is chosen, because it includes family aspects and it considers the field of servitisation in an international context. The context of internationalisation is valuable for this study, because both family business research and servitisation research are topics that are in an international context and analyses are conducted in different European countries. Moreover, the European Manufacturing Survey covers more than 2500 valid cases drawn from many countries,

and the content makes it possible to study family firms. The article continues with discussion and reflections and concludes with implications, contribution and limitations.

#### 2. Literature review

### 2.1. Servitisation in manufacturing firms

The term "servitisation" was introduced to describe the innovative services that have been bundled with goods by firms that had previously been known strictly as manufacturers (Neely, 2008; Baines et al., 2009). A set of indicative characteristics have been identified for a servitized good, which blends the traditional product being sold with a series of supporting activities which will provide more value to the buyer or user (Baines et al., 2009). The range of product-related services can vary from the assembly and initial startup activities to maintenance and support services for the customer (Llach et al., 2012) and include, for example, consulting, design and development, installation, operation, procurement, transportation, and financial services among others (Neely, 2008).

A common rationale described in the servitisation literature involves the transition from products to services by three different routes (financial, marketing and strategic) and this may have an impact on the organization's performance (Gebauer et al., 2005; Gebauer, 2007). From the strategic point of view, the fact that services are less visible and more labour dependent makes them a strategic opportunity and a sustainable source of competitive advantage. Financial opportunities include additional service revenues throughout the product life cycle. The increase of the potential revenue, higher profit margins and the fact that services provide more stable income, constitute the financial benefits. Finally, marketing opportunities involve using services to increase the product offering and augment the quality of the customer interaction (Gebauer, 2007).

In order to be successful with a servitisation strategy, firms need to introduce new objectives, structures and processes for their operations (Oliva and Kallenberg, 2003), which will probably be different from the way the firm was operating with a traditional manufacturing strategy (Baines et al., 2009).

However, analysis of whether a servitisation strategy makes firms more successful is still an under researched topic (Dachs et al., 2014; Bikfalvi et al., 2013). In the current literature, the most commonly used methodological approaches to servitisation are theoretical and case-study-based research; quantitative, survey-based analyses are still rare (Gebauer, 2007; Bikfalvi et al., 2013). Most of the quantitative analyses that do exist are based on surveys covering only specific regions with focused objectives (Dachs et al., 2014). Examples include the research carried out by Leo and Philippe (2001) on exports in product-service systems, which is based on the responses of 8,480 French manufacturers, the study of Panesar et al. (2008) which deals with barriers to servitisation based on the responses of 62 Norwegian companies in the oil and gas industry, the study of Antioco et al. (2008) which presents the organisational implications of servitisation based on the responses of 137 companies from Belgium, the Netherlands and Denmark, and the study of Davidsson et al. (2009), which compares the service orientation of Swedish pulp and paper industries to the rest of Swedish manufacturers based on a survey covering 364 firms. As an example of an exceptional, cross-regional study, Gebauer (2007) examines the interaction of service differentiation with customer centricity and innovativeness through a cross-sectional study of 332 European manufacturing companies.

An alternative approach to studying servitisation uses secondary data, and is exemplified by the studies by Fang et al. (2008), who employed the COMPUSTAT database, and Neely (2008), who based his studies on the OSIRIS database. These studies seek to fill a gap in the literature by presenting empirical evidence on the range and extent of servitisation.

#### 2.2. Determinants of servitisation

The literature provides a series of possible factors or determinants that influence a firm's servitisation strategy. One of the most frequently cited factors is the **strategic commitment** of companies (Windahl et al., 2004; Gebauer, 2007). Strategic commitment refers to the fact that effective implementation of any strategy requires managerial motivation and supporting organizational arrangements.

The **breadth of services** offered is considered to be another variable affecting returns from services (Homburg et al., 2002; Antioco et al., 2008; Dachs et al., 2014). Various authors propose that the benefits associated with services are proportional to the number of services in the value proposition. In fact, according to Homburg et al. (2002), these two determinants are the most important in determining service performance and are clear indicators of the level of service strategic commitment of an organization.

Other dimensions cited as possible determinants of service offerings are **technological characteristics**, which include the complexity of the products (Leo and Philippe, 2001; Oliva and Kallenberg, 2003) and technological innovation (Windahl et al., 2004), which motivates customers to acquire supportive services, and customization. Finally, another dimension of servitisation is the **firm's general economic context**. The **company size**, **main industry sector, and country** can also play a role in the way it offers its products and services (Dachs et al., 2014).

#### 2.3. Drivers of servitisation in manufacturing firms

The literature on servitisation has reached consensus about the main rationales that lead manufacturing companies to introduce a service strategy (Vandermerwe and Rada, 1988; Mathieu, 2001; Oliva and Kallenberg, 2003; Gebauer et al., 2005; Brax and Jonsson, 2009; Goh and McMahon, 2009; Dachs et al., 2014). These drivers are growth, profit, and innovation.

The **growth rationale** assumes that a company will gain competitive advantage with services and differentiation by stimulating product sales and by selling additional services (Mathieu, 2001; Gebauer et al., 2005; Oliva and Kallenberg, 2003). From the **profit perspective**, an organization seeks financial performance through an increase in margins to obtain profits from new services (Baines et al., 2009). In addition, services can mitigate the impact of demand shocks as well as stabilize profits by levelling capacity use in times of decreasing product sales (Mathieu, 2001; Oliva and Kallenberg, 2003). Finally, the **innovation rationale** is a less frequent topic in the literature. Service innovation has some differential characteristics from product innovation: it needs less investment, it involves less risk and it is more dependent on internal resources (Llach et al., 2012). Increasingly,

technologies such as the internet and communication technologies can greatly improve service innovation (Gebauer, 2007), allowing firms to create new sources of added value and competitiveness (Neely, 2008).

## 3. Hypothesis development

#### 3.1. Servitisation: family firms' willingness and ability

Family business research is based on the assumption that family firms will exhibit different behaviour from non-family firms. What differentiates family from non-family businesses is the family, which owns and participates in a business, within a range of possible involvement. The family is expected to have its own values, desires and motives to behave in its own particular, idiosyncratic way, different from firms that do not have family involvement (Carney, 2005). However, the particular behaviour of family firms is not predetermined; it depends on the willingness of families to take different decisions from non-family owners. A recent article analyses the importance of willingness, as well as ability, to engage in family-oriented particularistic behaviour (De Massis et al., forthcoming).

In the case of servitisation, this research examines whether family firms are willing to engage in more or less servitisation than non-family firms. To this end, we use the lens of socio-emotional wealth (SEW) to construct the hypothesis on family firms' servitisation behaviour and performance.

The SEW perspective proposes that SEW is the most important differentiator of family firms, and can explain why they behave distinctively (Berrone et al., 2012; Gómez-Mejía et al., 2007; Gómez-Mejía et al., 2010; Berrone et al., 2010; and Gómez-Mejía et al., 2011a). SEW is conceptualised as the stock of affect-related value that a family derives from its controlling position in the family firm and includes the exercise of personal authority and influence on the business and the close identification with the firm that may even carry the family's name (Gómez-Mejía et al., 2007). Other authors argue that SEW is based on the attachment to the family firm, strongly based on the emotional bonds between owners and family tradition (Miller et al., 2003; Sharma and Irving, 2005).

Essentially, the SEW approach argues that family firms frame their decisions based more on SEW preservation than on the maximization of financial value (Gómez-Mejia et al., 2007) and this explains why they can take strategic decisions that are different from the classical ones based on financial goals (Berrone et al., 2010; Gómez-Mejía et al., 2011a; Gómez-Mejía et al., 2011b).

As noted above, firms can use servitisation to increase their revenues, diversify their sources of income and possibly their markets, and engage in incremental innovation, since servitisation is related to the products already produced by the firm. Thus, servitisation may allow firms to enhance growth, profits or innovation (e.g., Brax and Jonsson, 2009; Goh and McMahon, 2009; Dachs et al., 2014), with a limited increase of risk, as a result of balancing two effects: the reduction of risk because of diversification of income and markets, and the increase of risk arising from the relatively innovative nature of diversification. These arguments suggest that servitisation may be perceived by families as a good strategy to preserve their SEW and economic benefits, and thus it can be considered as a way to protect the emotional endowment of the family, especially in comparison to other strategies that imply more risk, like more radical innovations or unrelated growth.

Apart from willingness, it is important to examine the ability of family firms to offer more or less services than non-family firms, in terms of the availability of the resources and capabilities needed. According to the literature on servitisation, a service strategy requires a set of organizational characteristics (Baines et al., 2009) where family firms have proved to be outstanding, such as trustworthy relationships with their supply chains (Berrone et al., 2012), cross-functional structures and flexible human resource practices (De Kok et al., 2006; Reid and Adams, 2001). Servitisation is also most successful for firms which offer a limited number of related products, which means less product diversification, and again this is typical of family firms (Anderson and Reeb, 2003, Gomez-Mejia et al., 2010). These arguments lead to the expectation that family firms will be more willing to engage in servitisation than non-family firms and are likely to have the resources available to put their willingness into practice. However, some studies find that industry sector is relevant in relation to servitisation (Dachs et al., 2014) and that technological complexity is also important (Leo and Philippe, 2001; Oliva and Kallenberg, 2003). It is therefore relevant to explore the role of these technological aspects.

#### 3.2. Service intensity and technological complexity

Technological aspects can be viewed differently by family firms and non-family firms, as these aspects add additional business risk, because higher technological or innovation requirements involve greater investment, and this increases the possibility of greater losses. The perception of risk is the key to defining the framing and reference points of decisions (Wiseman and Gómez-Mejía, 1998) and it therefore requires a more detailed analysis of servitisation behaviour.

In the case of sectors that have low technological complexity, technological requirements are low and they do not add a significant additional risk. Thus, we can expect family firms in less technologically complex sectors to outperform non-family firms, because, following the arguments presented above, a strategy like servitisation will be perceived as desirable, since it will be aligned with SEW protection. Thus we propose:

# H1a: In sectors with low technological complexity family firms will have more service intensity than non-family firms.

In contrast with this, family firms in more risky sectors will be conscious of their business risk exposure and therefore be willing to reduce this exposure if it threatens their SEW, for example if it makes them risk some of their SEW, and if it raises survival concerns. To anticipate the servitisation behaviour of family firms (compared with non-family firms) in highly technologically complex sectors, we can draw on the literature on technological diversification and R&D investment, assuming that servitisation decisions share a common basis with decisions on technological and research investments. For example, Gomez-Mejia et al. (2011a) point to the higher risk-aversion of family firms in engaging in these investments, because they threaten SEW in several ways: i) they increase the need for specialized knowledge and skills and the need for expertise from outside the family circle, that would entail a loss of control for the family and hence loss of SEW; ii) they require new experimentation from the current methods of operation; iii) they are less beneficial in family firms since they do not have broad product lines that can cross-fertilise with new investments; iv) they may need additional funding that may require the entrance of new investors, that could undermine the family's power. These hypotheses were supported in Gomez-Mejia et al. (2011b) in technology-intensive firms,

where family control was associated with lower R&D expenditure and less technological diversification. Therefore the following proposition can be raised:

H2a: In highly technologically complex sectors family firms will have less service intensity than non-family firms.

#### 3.3. Service scope and technological complexity

In addition to deciding the intensity of servitisation, firms may choose a different scope of product-related services; they need to choose what services they will offer among the multiple possible services that could be added to their products. A wider scope of services will require a deeper transformation of the structure of the company (Baines et al., 2009), which can compromise some of the components of SEW such as the control and position of family members, and the past identity of the company that has to change to be a service provider. Also, servitisation is likely to involve new managerial human capital which may not be available within the family or the family firm (Chrisman and Patel, 2012; Gómez-Mejía et al., 2010) and recruiting new managers challenges the existing family control and affective stock, and therefore threatens the existing SEW (Cruz et al., 2010). These aspects pose threats to the family SEW, which increase with the number and variety of new services offered by the firm. For this reason, despite the SEW-protection benefits of servitisation that led us to argue that there will be higher servitisation intensity for family firms in the case of low technological intensity, we can expect more SEW concerns with an increasing scope of servitisation, which may reduce the difference between family and non-family firms. Hence in low technologically complex sectors, we argue that family firms will not develop their scope of servitisation more than non-family firms, essentially because a wider scope of product-related services requires a more substantial transformation of the company (Baines et al., 2009), which may be seen as a threat to SEW. Thus we propose the following hypothesis:

# H1b: In sectors with low technological complexity family firms will have a similar extent of services to that of non-family firms.

However, in the case of highly technologically complex sectors, according to the same arguments raised for service intensity, family firms will perceive a greater risk in servitisation and that will influence them in the direction of reducing R&D and technological diversification (Gomez-Mejia et al., 2011b). Thus we can expect family

firms in more technologically complex sectors to prefer a narrower extent of services, and thus we propose the following:

H2b: In highly technologically complex sectors family firms will have a narrower extent of services to that of non-family firms.

# 4. Data and methodology

### 4.1. Method and sample

The data employed in this paper has been collected through the *European Manufacturing Survey* (EMS), an initiative of the Fraunhofer Institute for Systems and Innovation Research ISI, Germany, started in the beginning of the 1990s (ISI, 2014). International since 2003, EMS collects relevant information every three years about product, service, process and organisational innovation in European manufacturing establishments with more than 20 employees. It also aims to complement official innovation survey information with data related to innovation diffusion, emerging trends and modernisation techniques in manufacturing.

The 2009 edition consists of 3,693 valid data points representing 10 countries. However, servitisation and family involvement details are only available for Croatia, Germany, the Netherlands, Spain and Switzerland, amounting to a sample of 2,658 items that can be used to perform the analysis. The largest group of firms is contributed by Germany and Switzerland, 55% and 25% respectively. About 87% of firms are small and medium-sized enterprises, fairly representing the European distribution of firms according to size measured by employees. For almost three quarters (72.4%) of the analysed establishments, the major owner is a person or a family and eight out of ten (79.2%) of these have at least one member of the family involved in management. Table 1 gives an overview of the sample.

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Insert Table 1 about here

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The information presented in Table 1 shows family firms predominate in all countries. There is a higher concentration of family firms in low and medium technologically complex sectors as well as a clear predominance among SMEs. Statistically significant differences by country, sector and size are relevant in terms of family firm distribution. Previous publications using the same survey methodology about *servitisation* include Lay et al. (2010), Bikfalvi et al. (2013), Dachs et al. (2014), while publications focusing on *family firms* include Llach and Nordqvist (2010) and Llach et al. (2012).

#### 4.2. Operationalisation of variables and analysis

The EMS questionnaire contains a specific thematic block of questions dedicated to product-related services. The first section includes the question: "Which of the following product-related services do you offer to your customers?" Manufacturing firms have the option to tick (yes/no) in response to eight possibilities, namely design/consulting/project planning, technical documentation, software development, leasing/renting/finance, installation, start-up procedure, training, maintenance/repair and build-operate-owner site. The criteria underlying the selection of these services are variety and generality. Taking into account the fact that the questionnaire is addressed to all manufacturing sectors, a team of experts – both academics and practitioners – constructs and revises the selection of services in each survey round. For the purpose of this paper, using this information a new variable was computed (*service scope*), taking values from 0 to 8 depending on the number of services offered. Another aspect includes the concept of service intensity. Participating companies are asked about directly invoiced services as a percentage of turnover, which we use as the indicator of *service intensity*.

Quantitative approaches in the field of family business research, especially through largescale international surveys, are rare and seldom address the topic of innovation. EMS aims to contribute to the field by adding a section regarding ownership and management aspects that relate to family issues. Respondents are asked "*Who is the majority or exclusive owner of the firm your factory belongs to?*" with response options such as private person/family, financial investor (e.g. venture capital), other firm (not financial investor), foundation, other owners, no major owner. In the case of an affirmative answer to the first option, an additional question is posed in the following form: "*Is the family represented in the management board?*" Using this information a family involvement variable has been computed with two options as an answer: no family ownership (*nonfamily ownership*) and family ownership (*family ownership*).

Regarding technological aspects in relation to servitisation we first consider a macro aspect that is linked to the firm's sector of activity. We classify sectors of economic activity using Peneder's (2010) classification, an integrated grouping of sectors and firms based on technological regimes and variety of innovation behaviour. We further aggregate and differentiate between highly technologically complex sectors (*high technological intensity*) and others (*lower technological intensity*). Second, we include a micro aspect which relates to a firm's main product characteristic, which we call *complexity*. We distinguish between three main categories: simple products, medium complexity products and complex products.

The unit of analysis is the firm. We distinguish – based on ownership – between family and non-family firms. Due to the non-normal distribution of both dependent variables we select an ordinal regression analysis with categorical dependent variables and multiple independent variables. An interaction variable is computed corresponding to *technological complexity x family ownership* resulting in a four options categorical variable. A total of 6 models are computed, three of which include the dependent variable *service intensity (Models 1 to 3)* and three of which include the dependent variable *service scope (Models 4 to 6)*.

#### 5. Results

We present the results according to the firm characteristics of family firms, which is the distinctive feature of this study (Table 2). Due to the non-normal distribution of most of the variables, median values are offered because this statistic captures the cut-off point between the upper half and the lower half of the samples better than mean values.

In general, family firms are smaller than non-family firms in terms of both employees and turnover. Their median number of employees is slightly above 50 and their median turnover in 2008 was 8 million euros. Corresponding employment figures in non-family firms are two or three times as large (Table 2).

Insert Table 2 about here

Regarding aspects of servitisation, data in Table 2 shows that half the family firms offer up to 4 product-related services. Overall, the economic significance of services in manufacturing is still low for all firms; 50% of respondent firms (of both categories) are invoicing less than 5% of their turnover directly for product related services. There are statistically significant differences in the case of basic structural variables such as employees and turnover.

Table 3 shows means, standard deviations, medians, interquartile range (IQR) and bilateral correlations among the study's variables. The correlations among the variables are in the predicted directions and in line with theory. None of the correlation coefficients exceeds 0.40 which means moderate to weak correlation, and therefore no multicollinearity concerns are raised.

Insert Table 3 about here

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Table 4 summarizes the results of the multivariate regression analysis. Control variables, maintained constant in each model, show that *service intensity* varies significantly according to size and product complexity, in the sense that, more complex products generate higher directly invoiced turnover from services (Model 1). Regarding country differences, compared to Germany as the baseline case, the Netherlands have significantly higher service intensity, while Swiss companies generate significantly lower shares of turnover from directly invoiced services. In terms of *service extent* the baseline model (Model 4) produces similar results, which highlights the explanatory power of the variables. Service extent increases with product complexity and company size, and – compared to Germany – Swiss, Dutch and Croatian companies have less service extent.

In order to determine the effect of family ownership and technological aspects we introduce an interaction term in our models. The interaction models are tested twice, changing baseline categories, in order to estimate the statistical significance of differences, first for the low technological complexity firms (Models 2 and 5, for intensity and scope respectively) and secondly for the high technological complexity firms (Models 3 and 6, for intensity and scope respectively).

We start by testing differences in the less technologically complex sectors, where family firms predominate in our sample. Model 2 presents the results for *H1a* and Model 5 for *H1b*. The results show that in less technologically complex sectors family firms have a higher share of turnover from services than non-family firms, with a coefficient indicating

statistically significant differences, which implies the *acceptance of H1a*. In contrast with this, and consistent with the reviewed literature, we expect a similar service extent for the analysed firms in less technologically complex sectors. We find *support for H1b* in the results shown for Model 5, where family firms offer a similar scope of services to non-family firms.

Shifting attention to highly technologically complex sectors, Model 3 and Model 6 test hypotheses H2a and H2b, respectively. The results show that non-family firms have higher service intensity than family firms. Regression coefficients are significant for the difference at p < 0.010 levels, which indicates strong *support for H2a*. In terms of scope, comparing family to non-family firms in highly technological contexts, the results show that non-family firms have a wider service extent than family-firms. However, the coefficients do not indicate statistically significant differences between the two groups, so we conclude that there is *no support for H2b*.

The results of the regression analysis for service intensity are depicted in Figure 1. The figure indicates that in low technology sectors, family firms outperform non-family firms in service intensity, as predicted in H1a. It also indicates that this situation is inverted in the case of high technology sectors (H2a). This makes clear that technological intensity significantly interacts with service intensity performance and changes the position of family firms in this type of performance. It can also be seen that servitisation is higher in the case of high technological intensity. On the whole, this picture represents the richness and nuanced nature of the technological aspects. An analysis which treated family and non-family firms together would ignore the differential impact that technology has on servitisation among family and non-family firms.

Insert Figure 1 about here

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The results for service scope are depicted in Figure 2, which indicates that family firms outperform non-family firms in less technologically intense sectors and the better performance of non-family firms in the highly technologically intense sectors. However, this time the differences are not statistically significant. Again the scope is higher for higher technological intensity.

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#### Insert Figure 2 about here

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#### 6. Discussion

The results presented here are intended to contribute to the literature on family businesses and the literature on servitisation in several ways, at the same time as linking the two fields. We discuss the answers to the two research questions in turn.

Our response to the question, *Do family firms behave distinctively in their service strategies compared with non-family firms? based on the theoretical approach of SEW,* is in the affirmative. However, we discover the need to distinguish between service intensity, measured by the importance of turnover obtained from services, and service extent, measured as the number of different services offered.

In the case of service intensity, based on SEW, the theoretical analysis initially predicts more servitisation for family firms than for non-family firms. However we eventually argue that this is only predicted in less technologically complex sectors, because SEW concerns increase in highly complex sectors and reduce the attractiveness of servitisation as a SEW-protecting strategy. Our results provide strong support for these hypotheses (H1a, H2a) and therefore provide evidence of the use of SEW arguments for this type of decision.

On the other hand, in relation to service scope, the theoretical analysis predicts a higher perception of risk for increasing the scope of services, that bring additional threats to SEW and therefore we anticipate a more conservative behaviour of family firms regarding scope of services. The findings support the disinclination of family-owned firms to engage in a broader portfolio of services, even in less technologically intense sectors. This result is in accordance with the previous findings that family-owned firms diversify less (Anderson and Reeb, 2003, Gomez-Mejia et al., 2010).

As regards to the second research question, *What is the relative importance of technological aspects and family ownership in relation to servitisation?*, this article shows that technological aspects are important but that family ownership is also relevant, and thus there is an interaction between both aspects analysed. In particular we argue for the need to consider **technological aspects** to understand the differential behaviour of family firms. This brings together the understanding provided by SEW theories and

technological aspects as important determinants in the definition of the context in which to judge the possible gains and losses of SEW. Technological aspects are an important part of the business risk that firms confront, and thus will influence the possible threats to socio-emotional wealth. We study how engaging in more servitisation modifies these threats and therefore the preferences of family principals regarding servitisation, controlling for the technological context.

#### 6. Conclusions, limitations and implications

This article shows that including technological contingencies, such as product complexity and technological complexity, clarifies the behaviour of family firms and explains their differential service performance in terms of service intensity. This matches the arguments of SEW as a behavioural theory in the sense that it is important to distinguish risk contexts. Further, it can be stated that the performance of family firms is also a response to their positioning in some sectors and not others. The family firms in our sample, and this may be representative of many economies, are more often in industries with lower risks or innovation requirements, a circumstance that may strongly influence some performance results, as we have found in this study.

The present study has three main **limitations**. First, there is a bias in geographical distribution of the data, with German and Swiss companies' responses representing three quarters of the total sample. To deal with this, we have considered country differences, which tend to disappear when technological and family variables are included in the analysis. Second, there are limitations in the operationalization of the complex construct of family involvement. The dichotomous variables of family ownership do not make it possible to establish continuous scales of family involvement or a richer taxonomy. And finally, we used the SEW theoretical approach to derive our hypothesis on the assumption that it applies homogeneously to family firms, without explicitly measuring SEW preferences. This is a remaining avenue for future research.

The present study highlights the importance of studying different facets of servitisation, such as intensity and extent. This conclusion applies beyond the field of family businesses, to the whole literature on service orientation. Further studies could tackle

other aspects of servitisation, such as service innovation or business model innovation in the direction of firms' willingness to engage in value and wealth generation.

Despite the limitations, our results are valuable in terms of their **implications** for three specific audiences: i) for *family business management* we highlight the opportunity of servitisation as a strategy to widen operations, generate additional economic benefits and a possible strategy of self-protection from business risks; ii) we contribute to *family business research* by providing awareness and empirical evidence from a large scale international survey dealing with manufacturing trends, especially because the results demonstrate that technological aspects matter, and iii) for the *servitisation literature* we show that family ownership is a relevant aspect to consider, especially taking into account family firms' predominance and importance worldwide.

In terms of **contribution** this article aims to contribute both to theory and to empirical evidence. The main *empirical contributions* consist of the following: i) we provide extensive empirical evidence in an area where there is hardly any research on family firms *and servitisation*, using a large international database with rich data on technological aspects and family ownership; ii) we find commonalities within family firms across countries, since the significant results are robust in *international* terms; iii) we *compare family firms and non-family firms*, although to obtain significant differences we need to take into account technological aspects; iv) we contribute to the debate about the heterogeneity of family firm behaviour and we identify differences in terms of sectoral technological complexity; v) we find that *performance variables matter*, since the hypotheses and results are different depending on the dependent variable.

Finally, there are two broad aspects of the *theoretical contribution*. Firstly, we provide reasoning on how family ownership matters and explains a differential willingness to engage in certain strategies – like servitisation – without ignoring the relative importance of ability (De Massis et al., forthcoming), both in terms of resource availability and of the capability to implement the willingness of the family principals. This article aims to contribute to the understanding of the particularistic willingness of family firms from the SEW perspective. Secondly, we explore the likely influence of technological aspects on the determination of the loss/gain context in SEW theoretically, and thus reveal that technological aspects are contingencies that can help distinguish the reasons for

heterogeneity (between sectors) and homogeneity (within sectors) in family firms and also in respect to non-family firms.

#### References

- Anderson, R.C., and Reeb, D.M. (2003b) 'Founding-family ownership, corporate diversification, and firm leverage', *Journal of Law and Economics*, Vol. 46, pp.653–684.
- Antioco, M., Moenaert, R.K., Lindgreen, A. and Wetzels, M.G.M. (2008) 'Organisational antecedents to and consequences of service business orientations in manufacturing companies', *Journal of the Academy of Marketing Science*, Vol. 36, No 3, pp.377– 358.
- Baines, T., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A. and Shehab, E. (2009)
  'Towards an operations strategy for product-centric servitisation', *International Journal of Operations & Production Management*, Vol. 29 No. 5, pp.494–519.
- Berrone, P., Cruz, C. and Gómez-Mejía, L.R. (2012) 'Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research', *Family Business Review*, Vol. 25, No. 3, pp.258–279.
- Berrone, P., Cruz, C., Gómez-Mejía, L.R. and Larraza-Kintana, M. (2010) 'Socioemotional wealth and corporate responses to institutional pressures: do family-controlled firms pollute less?', *Administrative Science Quarterly, Vol.* 55, No. 1, pp.82–113.
- Bikfalvi, A., Lay, G., Maloca, S. and Waser, B.R. (2013) 'Servitisation and networking: large-scale survey findings on product-related services', *Service Business*, Vol. 7, No. 1, pp.61–82.
- Boyt, T. and Harvey, M. (1997) 'Classification of Industrial Services-A Model with Strategic Implications', Industrial Marketing Management, Vol. 26, pp.291–300.
- Brady, T., Davies, A. and Gann, D. M. (2005) 'Creating value by delivering integrated solutions', *International Journal of Project Management*, Vol. 23, No. 5, pp.360– 365.
- Brax, S. and Jonsson, K. (2009) Developing integrated solution offerings for remote diagnostics. *International Journal of Operations & Production Management*, Vol. 29, No. 5, pp.539–560.

- Carney, M. (2005) 'Corporate Governance and Competitive Advantage in Family-Controlled Firms', *Entrepreneurship Theory and Practice*, Vol. 29, No. 3, pp.249–265.
- Chrisman, J.J. and Patel, P.C. (2012) 'Variations in R&D Investments of Family and Nonfamily Firms: Behavioral Agency and Myopic Loss Aversion Perspectives', *Academy of Management Journal*, Vol. 55, No. 4, pp.976–997.
- Cruz, C.C., Gómez-Mejía, L.R. and Becerra, M. (2010) 'Perceptions of benevolence and the design of agency contracts: CEO-TMT relationships in family firms', *Academy* of Management Journal, Vol. 53, No. 1, pp.69–89.
- Dachs, B., Biegeb, S., Borowieckia, M., Lay, G., Jägerb, A. and Schartingera, D. (2014) 'Servitisation in European manufacturing industries: empirical evidence from a large-scale database', *The Service Industries Journal*, Vol. 34, No. 1, pp.5–23.
- Davidsson, N., Edvardsson, B., Gustafsson, A. and Witell, L. (2009) 'Degree of serviceorientation in the pulp and paper industry', *International Journal of Services*, *Technology and Management*, Vol. 11, No. 1, pp.24–41.
  - De Kok, J., Uhlaner, L., and Thurik, A. (2006) 'Professional HRM practices in familyowned-managed enterprises', *Journal of Small Business Management*, Vol. 44, No. 4, pp.441–460.
  - De Massis A., Kotlar J., Chua J.H. and Chrisman J.J. (2014) 'Ability and Willingness as Sufficiency Conditions for Family-Oriented Particularistic Behavior: Implications for Theory and Empirical Studies', *Journal of Small Business Management*, in press. DOI: 10.1111/jsbm.12102.
  - Fang, E., Palmatier, R.W. and Steenkamp, J.B. (2008) 'Effect of service transition strategies on firm value'. *Journal of Marketing*, Vol. 72, pp.1–14.
  - Gebauer, H., Fleisch, E. and Friedli, T. (2005) ,Overcoming the service paradox in manufacturing companies', *European Management Journal*, Vol. 23, No. 1, pp.14–26.
  - Gebauer, H. (2007) 'The logic for increasing service revenue in product manufacturing companies', *International Journal of Services and Operations Management*, Vol. 3 No. 4, pp.394–410.
  - Goh, Y.M. and McMahon, C. (2009) 'Improving reuse of in-service information capture and feedback', *Journal of Manufacturing Technology Management*, Vol. 20, No. 5, pp.626–639.

- Gómez-Mejía, L.R., Makri, M. and Larraza-Kintana, M. (2010) 'Diversification decisions in family-controlled firms', *Journal of Management Studies*, Vol. 47, No. 2, pp.223–252.
- Gómez-Mejía, L.R., Cruz, C., Berrone, P. and De Castro, J. (2011a) 'The bind that ties: Socioemotional wealth preservation in family firms', *The Academy of Management Annals, Vol.* 5, No. 1, pp.653–707.
- Gómez-Mejía, L.R., Haynes, K.T., Núñez-Nickel, M., Jacobson, K.J.L. and Moyano-Fuentes, J. (2007) 'Socioemotional Wealth and Business Risks in Familycontrolled Firms: Evidence from Spanish Olive Oil Mills', *Administrative Science Quarterly, Vol.* 52, No. 1, pp.106–137.
- Gómez-Mejía, L.R., Hoskisson, R., Makri, M., Sirmon, D., Campbell, J. (2011b) Innovation and the preservation of socioemotional wealth in family controlled high technology firms. Unpublished technical report. Management Department, Texas A&M University, College Station, Texas.
- Homburg, C., Hoyer, W.D. and Fassnacht, M. (2002) 'Service orientation of a retailer's business strategy: dimensions, antecedents, and performance outcomes', *Journal* of Marketing, Vol. 66, No. 4, pp.86–101.
- ISI Fraunhofer Institute for Systems and Innovation Research ISI (2014) European Manufacturing Survey (EMS), retrieved 4th of March, 2014 from http://www.isi.fraunhofer.de/isi-en/i/projekte/fems.php
- Lay, G., Copani, G., Jäger, A. and Biege, S. (2010) 'The relevance of service in European manufacturing industries', *Journal of Service Management*, Vol. 21, No. 5, pp.715–726.
- Lay, G., Schroeter, M. and Biege, S. (2009) 'Service-based business concepts a typology for business-to-business markets', *European Management Journal*, Vol. 27, No. 6, pp.442–455.
- Leo, P.Y. and Philippe, J. (2001) 'Offer of services by goods exporters: Strategic and marketing dimensions', *The Service Industries Journal*, Vol. 21, No. 2, pp.91– 116.
- Llach J., Marquès, P., Bikfalvi, A., Simon, A. and Kraus, S. (2012) 'The innovativeness of family firms through the economic cycle', *Journal of Family Business Management*, Vol. 2, No. 2, pp.96–109.
- Llach, J. and Nordqvist, M. (2010) 'Innovation in family and non-family businesses: a

resource perspective', *International Journal of Entrepreneurial Venturing*, Vol. 2, No. 3, pp.381-99.

- Mathieu, V. (2001) 'Service strategies within the manufacturing sector: Benefits, costs and partnership', *International Journal of Service Industry Management*, Vol. 12, No. 5, pp.451–475.
- Miller, D., Steier, L. and Le Breton-Miller, I. (2003) 'Lost in time: Intergenerational succession, change, and failure in family business', *Journal of Business Venturing*, Vol. 18, No. 4, pp.513–531.
- Neely, A. (2008) 'Exploring the financial consequences of the servitisation of manufacturing', *Operations Management Research*, Vol. 1, No. 2, pp.103–118.
- Oliva, R., Kallenberg, R. (2003) 'Managing the transition from products to services', International Journal of Service Industry Management, Vol. 14, No. 2, pp.160– 172.
- Olhager, J., Johansson, P. (2012) 'Linking long-term capacity management for manufacturing and service operations', *Journal of Engineering Technology Management*, Vol. 29, pp.22–33.
- Panesar, S.S., Markeset, T., Kumar, R. (2008) 'Industrial service innovation growth and barriers. International', *Journal of Services, Technology & Management*, Vol. 9, pp.174–193.
- Peneder, M. (2010) 'Technological regimes and the variety of innovation behaviour: Creating integrated taxonomies of firms and sectors', *Research Policy*, Vol. 39, No. 3, pp.323–334.
- Reid, R.S. and Adams, J.S. (2001) 'Human resource management: A survey of practices within family and non-family firms', *Journal of European Industrial Training*, Vol. 25, No. 6, pp.310–320.
- Sharma, P. and Irving, P.G. (2005) 'Four bases of family business successor commitment: Antecedents and consequences', *Entrepreneurship Theory and Practice*, Vol. 29, No. 1, pp.13–33.
- Vandermerwe, S. and Rada, J. (1988) 'Servitisation of business: Adding value by adding services', *European Management Journal*, Vol. 6, No. 4, pp.314–324.
- Windahl, C., Andersson, P., Berggren, C. and Nehler, C. (2004) 'Manufacturing firms and integrated solutions: characteristics and implications', European Journal of Innovation Management, Vol. 7, No. 3, pp.218–28.

Wiseman, R. M. and Gómez-Mejía, L. R. (1998) 'A behavioral agency model of managerial risk taking', Academy of Management Review, Vol. 22, pp.133–153.

		F	amily ow	nership	Sig. (bilateral)	
		Non-				-
		family	Family	Total		
		firms	firms		Ν	
	Total	27.6%	72.4%	100%	2658	Mann-Whitney
Country	Germany	22.3%	77.7%	100%	1470	.048
	Switzerland	36.6%	63.4%	100%	670	
	Netherlands	25.4%	74.6%	100%	323	
	Croatia	48.3%	51.7%	100%	89	
	Spain	33.0%	67.0%	100%	106	
Sector	Low/Medium	25.8%	74.2%	100%	1800	.004
Innovation intensity <sup>1</sup>	High	31.2%	68.8%	100%	858	
	<50	19.0%	81.0%	100%	1098	.006
Size	50-249	29.9%	70.1%	100%	1207	
	>249	46.2%	53.8%	100%	353	

Table 1: The	EMS sam	ple and f	amily owr	iership

Source: European Manufacturing Survey 2009, authors' calculations

<sup>1</sup>Classification of innovation intensity based on Peneder (2010)

	F	amily inv	Sig. (bilateral)					
	Non-family							
	firms		Family firms					
	Median IQR		Median IQR		Mann-			
					Whitney			
CHARACTERISTICS								
Turnover 2008 [M€]	18.35	43.73	8.00	14.61	.000			
Employees 2008	91.00	165.25	51.00	75.00	.000			
SERVITISATION								
Number of services offered [1-8]	4.50	3.00	4.00	4.00	.113			
Share of turnover from service	5.00	9.00	5.00	9.00	.769			
(directly) [%]								

Table 2. Decem	intire Statistics	hu daamaa	of fomily	involvenent
Table Z: Desch	IDHVE STATISTICS	nv degree	OF FAILURY	invoivemeni
	ipti te btatisties	o, acgive	OI IGHINI /	III , OI , OIIIOIIC

Source: European Manufacturing Survey 2009, authors' calculations

	Ν	Mean	St. Dev.	Median	IQR	1	2	3	4	5
1. Turnover in 2008 [Million Euro]	2459	91.77	2039.65	10.000	23.70	1				
2. Number of employees in 2008	2693	4.30	1.12	4.094	1.45	.364**	1			
3. Share of turnover with service (directly) [%]	1735	6.39	10.26	4.000	10.00	.002	.047	1		
4. Total services offered [1-8]	2655	3.02	2.20	3.000	4.00	.026	.041*	.248**	1	
5. Product complexity [1-3]	2609	2.09	.706	2.000	1.00	024	.058**	.148**	.367**	1

Table 3: Descriptive Statistics and Pearson Correlation Matrix of Studied Variables

\* p < .05 (two-tailed); \*\* p < .01 (two-tailed).

Table 4: Multivariate regression model: Servitisation

0		H1a	H2a		H1b	H2b
	Control model for service intensity	In sectors with low technological complexity family firms will have	In highly technologically complex sectors	Control model for service scope	In sectors with low technological	In highly technologically complex sectors
		more service intensity	family firms will have		firms will have a	family firms will have
		than non-family firms.	less service intensity		similar extent of	a narrower extent of
			than non-family firms.		services to that of	services to that of
					non-family firms.	non-family firms.
						×
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Dependent variable		Service intensity			Service scope	
Independent variables	β	β	β	β	β	β
Turnover	2.063E-5	2.548E-5	2.548E-5	1.376E-5	1.989E-5	1.989E-5
Number of employees	081**	056	056	.143***	.164***	.164***
Croatia	225	084	084	422**	223	223
Spain	289	184	184	290	238	238
The Netherlands	.383**	.445***	.445***	441***	363***	363***
Switzerland	228**	251**	251**	187**	219**	219**
Germany	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>
Simple products	-1.375***	-1.030***	-1.030***	-1.969***	-1.575***	-1.575***
Medium complexity products	673***	531***	531***	-1.156***	952***	952***
Complex products	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>	0 <sup>a</sup>
NFF_low			-1.122***			-1.401***
FF_low			792***			-1.271***
NFF_high			.269*			.182
FF_high			0 <sup>a</sup>			0 <sup>a</sup>
FF_high		1.122***			1.401***	
NFF_high		1.391***			1.583***	
FF_low		.330**			.131	
NFF_low		0 <sup>a</sup>			0 <sup>a</sup>	
Model characteristics						
Model Sig.	.000	.000	.000	.000	.000	.000
R <sup>2</sup> Nagelkerke	.077	.143	.143	.165	.267	.267

<sup>a</sup> This parameter is set to zero because it is redundant; \*\*\*p < 0.010, \*\*p < 0.050, \*p < 0.100.





Note: Numerical figures represent  $\beta$  values from the regression model (see Table 4, Model 2)

Figure 2: Summary of findings: Service scope



Note: Numerical figures represent  $\beta$  values from the regression model (see Table 4, Model 5)