NEW BUSINESS MODELS AND DIGITALIZATION IN MICRO FIRMS AND SMES

- Case study on wood products industry in Finland

Master’s thesis in Business
Minna Komulainen (268476)
15.11.2016
Abstract
UNIVERSITY OF EASTERN FINLAND

Faculty

Faculty of Social Sciences and Business Studies

Department

Business School

Author

Minna Komulainen

Supervisor

Professor Tommi Laukkanen

Title

New business models and digitalization in micro firms and SMEs
– Case study on wood products industry in Finland

Main subject

Service Business

Level

Master’s Thesis

Date

15.11.2016

Number of pages

108 + 5

Abstract
Emerging digitalization has created challenges to the traditional product-driven industry, not only in marketing, but also business models and the entire value chain. This study explored the impact of digitalization on the business of Finnish wood products companies. The survey found that size of the company was a major driver in adoption behavior. Micro firms were more often Laggards than Early adopters. Furthermore, the study found some evidence that owners may be more conservative in introducing innovations in their companies than staff. Different product groups or market areas were not found to vary in their perceived adoption behavior.
The wood product companies had a low rate of applying digital tools. Only few had joined a web platform or online retail channel. None of the respondents sold their products to the online retailers, which may be due to the lack of suitable selling channels and manufacturers’ pivotal position between brick-and-mortar shops and ecommerce.
Impact of digitalization was perceived mainly as positive among the wood products companies. Most of the Laggards and the Majority felt that digitalization has opened new market options, while Early adopters also felt that it has supported them in defending their current market positions. Only a few were of the opinion that digitalization has hindered their business.
The respondents perceived that the most beneficial advantages from digitalization were bringing in new clients, especially for domestic enterprises, improved customer services and increased customer satisfaction. In other benefits, the opinions distributed within the adopter categories.
The most important finding in this study was that the Early adopters had a strong customer orientation. They valued “responding to customers demand on digital services”, “distribution of product information directly to clients via digital channels” and “increasing co-creation with customers” more than the Majority and the Laggards. Thus as a result, Early adopters agreed more with “increases sales to current customers” than the Majority. Laggards observed the value of “probability of increasing international competition in B2B markets” to be higher than the Majority and the Early adopters. The probability of increasing online retailing and the importance of brands were evaluated the lowest.
The study found evidence that the potential of digital channels are not fully utilized. The respondents considered the most unlikely disruptive business models to be increasing direct selling from producers to end-users and the rise of joint multiple retailing channels. Despite that, those emerging business models may offer micro firms and SMEs new opportunities for growth. The development activities should be directed to the beginners in learning about digital tools, where the leap in sales may be the most beneficial.

Key words
Adoption of innovation, Digitalization, Digital marketing, Business models, Open innovation
## Contents

Abstract .......................................................................................................................... 2
SUMMARY IN FINNISH ................................................................................................... 6
FOREWORD .................................................................................................................... 8

1. INTRODUCTION ......................................................................................................... 9
   1.1 Background ............................................................................................................ 9
   1.2 Scope of the study ................................................................................................. 10
   1.3 Positioning the study ........................................................................................... 10
       1.3.1 Theoretical importance of the subject ...................................................... 10
       1.3.2 Managerial importance to the industry branch ........................................ 11
   1.4 Objectives and research questions ..................................................................... 12
   1.5 Key Concepts ....................................................................................................... 15
   1.6 Structure ................................................................................................................ 17

2. THEORETICAL BACKGROUND ................................................................................. 19
   2.1 Theories explaining the innovation diffusion ..................................................... 19
   2.2 Research on the adoption of innovation .............................................................. 22
   2.3 Drivers explaining adoption ................................................................................. 24
   2.4 Digitalization and emerging business models ..................................................... 28
   2.5 Review of the suggested benefits of e-business ................................................. 30
   2.6 Emerging trends in the digitalized market ........................................................... 35
   2.7 Summary on the factors in digitalization .............................................................. 40

3. MATERIALS AND METHODS .................................................................................. 44
   3.1 Selection of methods ............................................................................................. 44
   3.2 Collection of the material ...................................................................................... 47
       3.2.1 Pre-study ....................................................................................................... 47
       3.2.2 Development of the questionnaire ............................................................ 50
   3.3 Description of the collected data ......................................................................... 54
   3.4 Reliability and validity ......................................................................................... 57

4. RESULTS ..................................................................................................................... 61
   4.1 Characteristics of adopter categories ................................................................. 61
       4.1.1 Product group ............................................................................................... 62
       4.1.2 Market area .................................................................................................. 63
       4.1.3 Size of the company .................................................................................... 64
       4.1.4 Age .............................................................................................................. 65
       4.1.5 Gender ......................................................................................................... 65
       4.1.6 Occupation .................................................................................................. 65
   4.2 Adoption of digital marketing .............................................................................. 66
4.2.1 Applied digital tools .................................................................66
4.2.2 Share of digital marketing budget .............................................68
4.3 Information channels .................................................................69
4.4 Impact on the firm’s business opportunities .....................................70
4.5 Perceived benefits ......................................................................71
4.6 Trends in B2C and B2B market .......................................................75
5. DISCUSSION .................................................................................83
  5.1 Results in the theoretical framework ...........................................83
  5.2 Rate of adoption ......................................................................84
  5.3 New opportunities for business ..................................................88
    5.3.1 Impact of digitalization on firms’ businesses ............................88
    5.3.2 Advantages of digitalization .................................................89
    5.3.3 Market trends for the wood products industry in the digital era ....92
  5.4 Limitations of the survey .............................................................95
  5.5 Managerial implications ..............................................................96
    5.5.1 Learnings from adopter types .............................................96
    5.5.2 Future development and research needs ..................................99
6. REFERENCES ..............................................................................101
APPENDICES 1. Questionnaire .........................................................109
LIST OF FIGURES

Figure 1. How does digitalization affect the market of the wood products industry?
Figure 2. Applied digital tools in respondents’ companies.
Figure 3. Frequency of benefits presents the share of agrees and disagrees.
Figure 4. The evaluated trends how the business will change in B2C market based on the importance to business and probability of the trend.
Figure 5. Estimated trends in the B2B market based on the importance for businesses and the probability of the trend.
Figure 6. Comparison of the probability of trends in B2C and B2B markets.

LIST OF TABLES

Table 1. The innovation research framework, which is related to the phenomenon of digitalization.
Table 2. Summary of the drivers effecting on adoption in companies.
Table 3. Research questions and applied analysis methods.
Table 4. Distribution of the interviewed in the different groups.
Table 5. The relationship between the applied theory, research questions and questions.
Table 6. Background information on the respondents’ companies.
Table 7. Demographic information about the respondents.
Table 8. The benefits were tested for their dependence with the variables by Fishers Exact test.
Table 9. The probability of the trend and its importance to a firm’s business in B2C market.
Table 10. The probability of the trend and its importance to a firm’s business in B2B market.
Table 11. The summary of the results presents the characteristics of the various adopter type.
SUMMARY IN FINNISH

TIIVISTELMÄ

ITÄ-SUOMEN YLIOPISTO
Yhteiskuntatieteiden ja kauppatieteiden tiedekunta
Kauppatieteiden laitos, Palveluliiketoimintatiedekunta

KOMULAINEN MINNA: Uudet liiketoimintamallit ja digitaalisen kaupankäynnin mahdollisuudet mikro- ja pk-yrityksissä – Case puutuoteteollisuus Suomessa
Pro gradu tutkielma, 108 s. + 5 s. liitteet
Tutkielman ohjaajat: professori, KTT Tommi Laukkanen
15.11.2016

Avainsanat: Uudet liiketoimintamallit, Innovaatioiden leviäminen, Digitalisaatio, Digitaalinen markkinointi, Puutuoteteollisuus, Avoin innovaatio

Digitalisaation nopea kehitys haastaa perinteisen tuotantoteollisuuden, ei pelkästään yritysten markkinoinnin, vaan myös tavanomaisen liiketoimintamallin ja koko arvoketjun. Tutkimus tarkastelee ilmiötä suomalaisten puutuoteryritysten näkökulmasta, millaisia vaikutuksia digitalisaatiolla on yritysten liiketoimintaan, mitä digitaalisia työvälineitä yritykset ovat ottaneet käyttöön ja mitä hyötyjä ne saivat digitaalisesta kaupankäynnistä. Tutkimus kartoitti myös erilaisten markkinatrendien todennäköisyttä ja merkitystä liiketoiminnassa sekä kuluttaja-asiakkaiden ja yritysten välisessä kaupankäynnissä. Tutkimuksen tavoitteena oli löytää sellaisia tekijöitä, jotka auttavat yrityksiä pärjäämään kiristyvässä kilpailutilanteessa sekä löytää uusia liiketoimintamalleja.


Kyselyaineiston analyysissä käytettiin ristiintaulukointia, Fisherin, Mann-Whitney’n ja Kruskall-Wallisin tilastollisia testejä. Vastaajat jaettiin innovaation omaksumisen perusteella edelläkävijöihin (Early adopters), enemmistöön (Majority) ja viivyttelijöihin (Laggards) Rogersin teorian mukaisesti. Yrityksen koon havaittiin olevan tärkeä tekijä innovaation omaksumiseen. Mikroyritykset omaksuivat digitaalisen kaupankäynnin menetelmiä myöhemmin kuin suuremmat yritykset. Yrityksen suuntautuneisuuden eri tuoteryhmien tai koti- tai ulkomaankauppan on havaittu vaikuttavan omaksumisasenteeseen.

Aseman yrityksessä havaittiin vaikuttavan digitaalisuuden käyttöönottoon, sillä yrityksen omistajien ja johdon asenne oli hieman konservatiivisempi digitaalisen kaupankäynnin mahdollisuuksiin kuin työntekijöiden. Tähän saattavat tosin vaikuttaa myös muut taustamuuttujat, kuten yrityksen koko ja vastaajan ikä.

Vastaajajoukon edelläkävijöiden runsaan määrän valossa, puutuotealan yritykset näyttäisivät ottaneen hitaasti käyttöön digitaalisen kaupankäynnin välineet. Digitaalisen markkinoinnin osalta yleisin oli viidennenkellä käytössä oleva yrityksen oma internet-sivu, kun taas sosiaalinen media,
sähköiset hakemistot tai bannerimainonta olivat käytössä vain muutamalla. Vain hyvin harvalla oli oma verkkokauppa tai ne osallistuivat verkoston kautta yhteismarkkinointiin. Kukaan ei myynyt tuotteitaan suoraan itsenäisille verkkokaupoille, mihin saattoi vaikuttaa sopivien ostokanavien puute, sopimukset jälleenmyyjän kanssa sekä tuotevalmistajan asema kivijalkakaupan ja verkkokaupan välissä.

Digitalisaation vaikutus liiketoimintaan koettiin pääosin myönteisesti. Suurin osa enemmistöön ja viivyttelijöihin kuuluuviita koskien, että digitalisaatio oli avannut heille uusia markkinoita, kun taas edelläkävijät näkivät saanut auttaa näitä uusia markkinoita. Muutama vastaajasta oli sitä mieltä, että digitalisaatio ei auttanut yrityksen asemaksi markkinoilla. Yrityksen koko ja tuoteryhmä vaikutti tilastollisesti merkitsevästi mielipiteen muodostumiseen vaikutusten osalta.


Digitalisaation nähtiin mahdollistavan pienten toimijoiden pääsyn kansainvälisille markkinoille, mutta erityisesti viivyttelijät koskien kansainvälisen kilpailun kasvavan Suomen markkinoilla, toisin kuin edelläkävijät.

Vastaajat arvioivat verkkokaupan roolin kasvamisen todennäköisyyden hyvin varovaisesti, vaikka sen merkitys liiketoiminnalle nähtiin toisaalta trendien kärjessä tärkeänä osalta. Verrattuna vastaajien ilmoittaman digitaalisen kaupankäynnin määrään, näyttää siltä, että digitaalinsa kanavia hyödynnetä niin laajasti kuin se olisi mahdollista. Vastaajat näkivät brändien merkityksen vähäisimpänä kuluttajamarkkinoilla, mutta kuin yritysten välisessä myynnissä sen merkitys kasvoi.

Disruptiiviset liiketoimintamallit, kuten suuramyynti valmistajilta kuluttajille sekä myynnin monikanavaisuutta koskien epätodennäköisimpinä. Suuramyyynnin tärkeys oli merkittävämpää yritysten välissä kaupankäynnissä, mutta kuluttajakaustiakkauden kanssa perinteisen jakeluketjun roolin nähtiin säilyvän. Vaikka myynnin monikanavaisuutta arvostettiin vastaajien keskuudessa vähiten, niin se voi mahdollistaa mikroyrityksille ja pk-yrityksille liiketoimintamallin uusiutumista ja uusien kasvumahdollisuuksien syntymistä. Tutkimuksen tuloksia voidaan käyttää mikroyritysten ja pk-yritysten digitaalisten liiketoimintastrategioiden kehittämiseen. Tutkimus tunnistoi erilaisia tekijöitä, joiden avulla voidaan tunnistaa ja suunnata yritysneuvontaa erityisesti niihin yrityksiin, joissa jo pienin neuvontaponnistuksen olisi saavutettavissa huomattava kilpailukyvyn nousua.
The idea of new business models has inspired me ever since working as the innovation consultant. During my studies on business, the theme of digitalization emerged everywhere, in politics, newspapers, society and education.

At the national Finnish wood exhibition, the topic aroused much discussion about how the wood products industry could enter the digital era and benefit from digitalization. The wood products industry is important for the Finnish economy.

This study was carried out under the E-wood-research project of the Natural Resources Institute Finland, led by Dr. Tarmo Räty, with researchers Thomas Rimmler and Maria Riala. The project was partly funded by the Association of Finnish Wood Industry Technicians and Engineers, and it aimed to produce background information for the national strategy and the training program. Therefore, the aim of this pilot study was to investigate the benefits, trends and applied tools from the SME’s perspectives. The study was conducted in co-operation with the University of Eastern Finland, Department of Business, supervised by Professor Tommi Laukkanen.

During the research, I was lucky to get a fascinating opportunity to visit the University of California, Berkeley, Haas School of Business and the 2nd World Open Innovation Conference, chaired by Professor Henry Chesborough and learn more about rapidly emerging companies in Silicon Valley. It was remarkable that the firms in Silicon Valley do not speak much about digitalization, but they merely use words such as disruption, business models, innovation ecosystems, open innovation, whether inbound or outbound, and especially platforms.

Therefore, this study was complemented by the theory of business models, in addition to the main applied theory of adoption by Everett Rogers (2003). Furthermore, the “Open innovation - An emerging perspective on science-based innovation and entrepreneurship”–course in the University of Copenhagen, organized by Professor Marcel Bogers, deepened my understanding about the dynamics of business models, innovation cultures and commercialization. I am grateful to the Finnish Association of Non-fiction Writers for the grants for writing and travelling.

I hope that the results of the survey will provide inspiring insights into digital business-models and the business patterns of Early adopters, those who are ahead in their search for new opportunities and growth from the digital era. Adopting gradual improvements step by step and refining present business models, the firms may take a huge step forward in their competitiveness.
1. INTRODUCTION

1.1 Background

Digitalization has had an important impact to the industry and its value chain (Rajala & Westerlund & Möller 2012). Increasing flow of information, spread by the rise of internet and related technology, has shortened the product life span (Chesborough 2011, 2), which has had the disruptive effect to the traditional business models (Christensen 2007). While disrupting some, it may also open new market areas for early adopters by providing an interactive relationship with the market and a new position in the value chain and network (Porter & Heppelmann 2014).

Emerging digitalization, with the increasing usage of the internet and social media, has changed the market environment of companies (Porter 2001, 2015). Actually, it has been mentioned as an enabler of a new and economically efficient marketplace according to Pires and Aisbett (2003). Pires and Aisbett (2003) stated that entry into ecommerce may demand the adoption of new business strategies. It is important for a firm in the emerging situation to gain the competitive advantage by distinguishing themselves through a strategy, and the ICT technology offers new options for firms to create distinctive strategic positions than earlier (Porter 2001).

The research on digitalization has more over focused on studying the large ITC-technology firms or online retailing in general (Doherty & Ellis-Chadwick 2009), but there is a shortage of the research on the adoption of digitalization in the product-driven industry and SME’s (Chesbrough & Crowther 2006). Kotler et al. (2009) raised the importance of the question of how firms can gain competitiveness by utilizing digitalization in the situation of changing markets. The other important question is, how digitalization challenges present business models.

On average in Finland, the rate of adoption and the usage of digital marketing has been slow (Digile 2014, Lippiäinen & Karjaluoto 2012, TEM Industrial review on Furniture 2013). According to the national report on digitalization (DiViA 2014), firms are searching for the strategic benefits of digitalization, not only in increasing the efficiency in firms but especially in digital marketing, branding and customer co-creation.
1.2 Scope of the study

The digital phenomenon creates challenges for the traditional product-driven companies. The wood products industry is a traditional, product-driven industrial sector, which is modifying step-by-step its business models towards more open ecosystems (Päätäri, Puumalainen, Jantunen & Sandström 2011). One crucial question to the wood products industry is related to the adoption of digitalization. It is interesting to analyze, what are the factors for adopting innovations and business models?

This study focused on the Finnish wood products industry, from saw mills to furniture producers, which is facing high international competition in their domestic market of Finland, partly due to the digitalization (TEM 2013).

This study aims to describe, what is the impact of digitalization for the Finnish wood products industry. Which digital tools the firms have adopted? What benefits do they perceive in digitalization? The study examines that how B2C (business-to-customer) market and B2B (business-to-business) market are changing through digitalization. This study investigates the potential drivers for new business models making use of digitalization.

1.3 Positioning the study

1.3.1 Theoretical importance of the subject

The product-driven industry is looking for more knowledge on how to scope or adjust business to the digital era. What are its’ impacts on the wood products industry? Which new opportunities may it provide to firms?

Digitalization can be seen as an innovation, the impacts of which can be analyzed and the diffusional gaps narrowed by learning from other organizational processes (Rogers 2003). Shaikh and Karjaluoto (2015) found that a growing interest amongst organizations has risen for digital collaboration systems, which can work as innovation platforms for cooperation.

In order to diffuse the knowledge in the industry, Lipiäinen (2014) suggested that the benefits of the usage should be investigated from the viewpoint of the companies. According to Michaelidou, Siamagka and Christodoulides (2011), the surveys into social media networks has been concentrated
more on the consumer market, despite the popularity of social media and its potential to support brands. Companies most likely need more knowledge or support to adopt the emerging technologies.

Factors for adoption have been suggested to provide valuable insights into what encourages organizations to adopt social media at the early phase (Michaelidou et al 2011). Therefore, this study focuses on the extent to which companies apply digital tools and how they currently perceive their impacts, benefits and trends. This study combines various methods, to distinguish the present progress. This study aims not only to describe the current state and causality behind, but also to find some guidelines for digitalization strategy in the wood products industry.

According to Rogers (2003, 440), the consequences of innovation has been studied less. Diffusion research has been more focused on analyzing the rate of adoption, adopter categories and decision-making, ignoring how the choice of adoption is implemented and what the impacts of adopting that innovation are. Therefore, from the theoretical perspective it is interesting to evaluate the consequences of digitalization on the Finnish woods products industry. The research approach is presented more precisely in the next Chapter 2: Theory.

**1.3.2 Managerial importance to the industry branch**

The development of digitalization has been estimated to provide significant advantages, not only to the service business, but to the industry as a whole. The National Finnish Industrial Review found that in general, firms that have invested in digital development are succeeding better in their businesses than other companies (TEM 2015).

The wood products industry is a diverse industrial branch, which produces saw wood products as well as processes furniture, kitchen furniture, doors, windows and interior products. According to the National Industry Review of Furniture (TEM 2013), the majority of wood products companies are micro companies and SMEs, whose businesses have focused on the domestic market where ecommerce and digitalization are changing the conditions. The importing of furniture and building materials is growing and Finnish producers have difficulties in finding distribution channels for their products in the B2C and B2B markets (TEM 2015).

This study examined Finnish wood products companies to investigate how digitalization has affected their business. The focus group was from sawmills to furniture producers. The national report of TEM (2015) stated that it had less adopted the digital tools and business models, and wood products
industry suffered from international retailers in its domestic market. However, the review suggested that the industry could also benefit from the fast increase in competitiveness through digitalization.

The nationwide wood products industrial report (TEM 2015) suggested that the wood products companies invest in the adoption of digital tools for product-development, production, sales and marketing. Wood products companies utilize less social media or cloud services than other industries in general (TEM 2015). The focus group was selected on the basis on the recommendations of the industrial reports, as the Natural Resources Institute wanted to answer to the needs of the industry.

The wood products industry has tried to respond to the challenge on the national and regional levels. There are web platforms, such as nation-wide wood information web platforms (www.puuinfo.fi) and regional web platforms (Puutuotetori.fi, Puukymi.fi). However, in spite of public web platforms, the knowledge about the utilization of various forms of digitalization in the wood products industry is limited.

Research has been done on the digital market in general and on retailing in Finland, in the forms of digital barometers (Digile et al. 2014), annual digital marketing barometer (DiViA 2014) and regional surveys on firms’ needs (Lipiäinen & Karjaluoto 2012). The surveys show the current state of digitalization by pointing out the gaps and peaks, but do not provide operational or strategic guidance to enterprises for adapting efficiently to the digital business environment.

Therefore, the Finnish Natural Research Institute launched the E-wood research project in order to provide the base for the development of a national digitalization strategy for the wood products industry. The aim of the E-Wood project has been to evaluate the possibilities of digital tools from the viewpoint of the wood products industry and to develop steps to help firms implement the independent or joint digital strategies in the changing markets. (Räty & Komulainen 2015).

1.4 Objectives and research questions

The main objective of this study was to examine the drivers of digitalization in the micro companies and SME’s among Finnish wood products companies. This study aimed to support the wood products industry in identifying the impacts and trends emerging through digitalization and to find the main benefits of adopting digital practices. The results were aimed to provide a base for the creation of
national digitalization strategy for the Finnish wood products industry to be implemented by the Nature Research Institute Finland.

Many questions were raised while forming the industrial strategy which required investigation, such as how the digital tools have been proceeded in the wood products industry, what was the rate of adoption, what tools were applied, where the information was gathered and how much the enterprises have invested in digital tools. These clarifications should support the practical implementation in order to target the development of strategy and training to encourage the desired outcome.

However, from the theoretical perspective, the enterprises are versatile and their needs vary according to their backgrounds. It can be questioned whether there is an average firm, or whether counselling average companies helps them achieve their goals. Rogers (2003) identified different adopter categories in the adoption process. According to the adoption theory of Rogers (2003), the range of firms varies from Early adopters to Laggards from the viewpoint of their adoption behavior.

Therefore, for this study it was important to also evaluate the differences, which factors affect adoption, and whether there are differences between various adopter categories, like Early adopters and Laggards in order to identify their characteristics.

Thus, the main objective was derived from Rogers’ (2003) adoption theory, which provided a suitable tool for clarifying the phenomenon from the viewpoint of small-scale industry.

The main research question was based on the adoption theory as follows:

- How the adoption of digitalization has been proceeded in Finnish wood products companies, and which factors impact the adoption behavior?

According to the theory the phenomenon of diffusion can be assessed e.g. by the rate of adoption, adopter categories and consequences of innovation (Rogers 2003). The main focus in the survey was to clarify the drivers for adoption and to find out if there are differences in various adopter categories that predict the degree of adoption. These drivers can be related to the internal factors in companies and the demographics of the respondent. Furthermore, the perceived benefits, barriers and the whole external network may have an impact on the rate of adoption.
The rate of adoption at company level may depend on innovativeness, available resources and information channels. From the industry point of view, external factors should also be taken into account. Rogers (2003) raised the perceived benefits and consequences of the innovation as a key factor in the diffusion. Porter and Heppelmann (2014) and Chesborough (2003) identified the impacts especially from the viewpoint of digitalization, and named various forces that shape the market in the digital era.

Therefore, in order to analyze the adoption of digitalization the perceived benefits, impacts and trends were included in the sub-questions. The study aims to assess the rate of adoption in the above mentioned industry, and to widen the research questions to include how firms perceive the impact of digitalization, its’ benefits and market trends in creating new opportunities for generating new business models suitable for the digitalized era.

In order to examine the phenomenon, the main question has been divided into following sub-questions. The sub-questions are twofold, first describing the observed rate of adoption of digital tools, and then analyzing more the factors affecting adoption behavior in more detail for each specific question.

The detailed research questions and their sub-questions to be studied:

1. How has the adoption of digitalization been proceeded in Finnish wood products companies? (Rate of adoption in applied tools, budget, information channels)
   1.1 Which factors impact to the adoption behavior? Are adoption categories dependent on variables of size, product group, market area, occupation, age or gender?
2. What kind of impacts have firms perceived due to digitalization?
   2.1 Are perceived impacts dependent on categories or other variables?
3. Which benefits have firms perceived from the digitalization?
   3.1 Are perceived benefits dependent on adopter categories or other variables?
4. How important do firms perceive different digitalization related trends in the B2C and B2B markets to be?
   4.1 Is the importance dependent on the adopter categories or other variables?

The theoretical framework of the survey is described in more detail in Chapter 2. Theory.
1.5 Key Concepts

The main concepts related to the subject are the diffusion of innovation, digitalization, digital marketing, ecommerce and business models. This chapter describes the selection and usage of the key concepts based on the innovation research framework.

*Innovation* is in general language linked to invention, reflecting a long process of product development and immaterial property rights, like patents and such, e.g. Chesborough (2003) used innovation to mean an invention implemented and taken to the market. Oxford Advanced Dictionary defined innovation as the introduction of novelty or a countable word as a new idea. The term origins from Latin as *innovatio(n)* and from the verb *innovare* (Oxford Advanced Dictionary 2015).

Innovation research considered the concept of innovation similar to an action or process of innovating (Zien & Buckler 1997) or an idea or item that was considered novel by a person or organization (Rogers 2003, 12). Zien and Buckler (1997) defined the topic as a providing new value to clients and a monetary value for a firm. Möller, Rajala and Svahn (2006) stated that different scientific disciples are defining the concept of innovation in versatile ways emphasizing its meaning as a technical (product or process) or social phenomenon (way of doing or a business model).

From the research perspective, it is interesting to identify how new ideas can be created, transferred, adopted or rejected, and what are the consequences of that (Rogers 2003, 6). While studying digitalization in SMEs, one key concept is *diffusion*, meaning the progress “by which an innovation can be transferred across different channels over time amongst the people of a society” (Rogers 2003, 5, 11).

Many alternatives, in describing the phenomena called digitalization, exists. E-business, ecommerce, e-market and internet-based business refer to firms’ models to conduct commercial transactions electronically (Zott, Amit and Massa 2011). *Digital marketing* is also widely applied in relation to the phenomenon, meaning all digital forms of marketing and selling, such as internet pages, marketing analytics, emails, online and mobile services, online marketing, search engine marketing, extranet- and intranet solutions (Lipiäinen & Karjaluoto 2012).

Digitalization is rather new concept, ranging from ecommerce to mobile-banking (Shaikh & Karjaluoto 2015), digitalized product-service systems (Lerch & Gotsch 2015), cloud services, big
data analytics and to social media (Accenture 2014). There is no official meaning, as the phenomenon is still developing, but the concept often refers to the themes of the impacts of online retailing to brick-and-mortar-shops (Doherty and Chadwick 2008), the disruption of new technology (Christensen 1997, 2007), the opportunities of internet of Things (Porter & Heppelmann 2014) and the structural changes of industry and society.

According to Ilmarinen & Koskela (2015, 22) the main driver behind the phenomenon is the digitizing, which occurs when objects, things or processes are digitalized partly or as a whole. The technologies commonly related to the digitalization are also described as social media, mobile technology, the analytics of big data and cloud services (TEM 2015). Mobile technology is currently the most advanced, while the breakthrough of business analytics and intelligence is believed to occur within some years (TEM 2015).

Digitalization can be surveyed on the individual enterprise level or widely on macroeconomics level, like market dynamics and behavior models. In the study, the main focus is on enterprise level, where the evaluation concerns e.g. how digitalization impacts the strategies of the enterprise and its business logics, services, knowledge etc. Thus, it is crucial to introduce the concept of business models as well, which is the emerging stream of research on e-business and internet (Zott, Amit & Massa 2011). Amit & Zott (2001) described the concept as the contents, construction and management of trading which were implemented to produce value via the utilization of business possibilities. To analyze the ways of value-creation of firms, Osterwalder and Pigneur (2002) created “the Business Model Canvas”, where the business model is analyzed by the customer value, material and immaterial resources and implementing processes.

The business model can be considered too as a subject of innovation (Zott, Amit & Massa 2011). As digitalization challenges the traditional strategies of competition, value creation and competitive advantage, business models seem to lead more on cooperation, networks and platforms (Zott, Amit & Massa 2011), which are common in the digital ecosystems. Chesborough (2003) introduced the concept of open innovation, where companies could transfer their ideas over the external boundaries, instead of working only with their internal product-development. Open innovation emphasized the adoption of sharing or licensing technologies, and thus also becoming a part of intellectual property (Chesborough 2003).
Digitalization can be seen from a wider or a narrower point of view. For ex. in the value chain they can be as the following: manufacturing, marketing, sales, logistics and customer service (Porter 2001).

To summarize the above discussion on the key concepts, it was challenging to define the studied phenomenon and concepts precisely, because the terms were not well established and new contents through new innovations was emerging continuously. Digitalization, digital marketing or e-business can be described with versatile concepts, but its content can range from digital marketing solutions and online retailing to new business models, thus all those implications were considered relevant in this study.

Digital marketing may be more familiar to the responding enterprises, but its meaning is more limited to marketing tools like social media, banner advertising etc., and it does not take into account the wide perspective of the whole phenomenon. Therefore, this study applied two concepts in the survey. Digital marketing was applied in second part of the questionnaire (Part II), where the usage of digital marketing tools was evaluated. In that part, the usage of digitalization may have caused the risk of non-answering as the concept was rather new to the respondents, causing the pre-assumptions of needing more knowledge of information technology and therefore not answering the question.

When studying the consequences of innovation (Rogers 2003), the words of digitalization or digital business were applied to cover the studied phenomenon instead of mere digital marketing.

1.6 Structure

The structure of this study follows the structure of academic guidelines. Chapter 1 describes the framework of the study, sets the objectives and research questions. Chapter 2 discusses relevant innovation theories from the viewpoint of adoption behavior of SME’s. It also defines the applied theoretic framework.

Chapter 3 describes the methodology of the study. It presents the twofold procedure of the data collection, the pre-study and the formulation of the questionnaire. In the chapter the collected data is described and its validity is evaluated.
Chapter 4 presents the results in order of the applied research questions. The adoption of digitalization is described from the point of the applied tools, budget, information channels, perceived impacts, benefits and trends. Dependences on adopter categories from the internal and external variables are analyzed.

Chapter 5 summarizes the findings from the viewpoint of previous research and practice. It presents future research ideas based on the comparison of the results.
2. THEORETICAL BACKGROUND

2.1 Theories explaining the innovation diffusion

Digitalization can be referred to as an innovation, which has impact on the market of goods and services (Rogers 2003). Many theories explain the phenomena of innovation and digitalization through either the consumer behavior or the entrepreneurial perspectives. This chapter evaluates the relevant innovation theories from the viewpoint of the study in order to construct the framework for the selection of the applied theory.

Consumer digital shopping behavior has been explained by several models and theories (Kotler et al. 2009, 136), which could be utilized to predict the organizational behavior of firms too. Consumer and organizational behavior in digital environments can be assessed e.g. by the Adoption of innovations (Rogers 2003), the Theory of Planned Behavior (Fishbein & Ajzen 1975) and Technology Acceptance Model (Davis 1989) according to Kotler et al. (2009, 136).

Digitalization can be considered as an innovation that diffuses through the society and organizations according to the theory of adoption (Rogers 2003). The theory described the factors of diffusion, the rate of adoption, barriers and communication channels in the diffusion process. The adoption theory is discussed in more detail in the next chapter.

Technology adoption has been evaluated through the technology acceptance model (TAM) to conceptualize the attitudes of individuals with regard to the voluntary or intended usage of certain technology (Davis 1989). Research suggested that easiness and usefulness effect positively on consumer’s aim to apply online channels (Kotler et al. 2009, 137). Although widely applied in the consumer research, the TAM approach is also relevant to research on digitalization from the organizational behavior perspective.

The theory of planned behavior (TPB, Fishbein & Ajzen 1975) explained the contradiction between intentions and actual behavior, for example a firm that perceives a positive attitude towards online retailing and does not take action to develop that kind of service. Furthermore, the theory of perceived
behavioral control (PBC) described the subjective assumptions that may be barriers to adopting the innovation.

In the process of adopting digital business, the transaction-costs and perceived risk theories are also applicable. The channel trade-offs and transaction cost theories explained the online retail buying behavior of B2B- and B2C-customers that the channel, which reduces perceived transaction costs (money, time and other resources) has more probability to be chosen to be utilized (Kotler et al. 2009, 137). From the perceived risk perspective, uncertainty and asymmetry of information may raise the transaction costs, because the perception of potential negative outcomes or suffering harm or losses may result in the behavioral decision (Lim 2003).

Renewal of the market can occur not only through product development or technologies, but also through reforming clientele, marketing channels, distribution or value chain. The major innovation that has had an impact on the renewal processes of business is digitalization. Internet technology changed the ways of doing business and provided more opportunities for firms to tailor their strategy positions than before (Porter 2001). However, it forced firms to consider how to ensure their competitiveness in the newly reformed value-chains, as the rules of competition and competitive advantage still apply (Porter & Heppelmann 2014) as in Porter’s Five Forces theory, which explained the rivalry by the drivers of existing competitors, the threat of new entrants and products, bargaining power of buyers and suppliers (Porter 1985, 2001).

According to the theory of disruptive innovation, innovations are disrupting traditional business models (Dru 2015, Christensen 1996). Digitalization offers new market opportunities and economic rise to developing countries, as presented in the theory of Frugal innovations by Hamel Prahalad (Base of the Pyramid). For example, Africans were among the early adopters in mobile banking (like M-Pesa in Kenya and Tanzania).

Digitalization may change the business processes and a firm’s position in value chain (Porter 2001). *Open innovation* is an emerging phenomenon that considers that companies could apply outbound and inbound innovations in their product development and market entry (Chesborough 2003). It also stresses the importance of building platforms for other business to build on, which are interactive areas where the firms can evaluate which innovations it will gain itself and which ones it should license to others (Chesborough 2003).
The phenomena of digitalization can be examined from various viewpoints, for example, how it advances a firm’s competitiveness gradually (Leeflang, Verhoef, Dahlström & Freundt 2014), or how it creates new business models through disruption (Christensen 1997, Chesborough 2011).

Table 1. The innovation research framework, which is related to the phenomenon of digitalization. The potential research questions linked to the topic of this study is shown in the right section of the table.

<table>
<thead>
<tr>
<th>Theory</th>
<th>Sources</th>
<th>Questions related to the topic of Digitalization in wood products industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theory of Planned Behavior (TPB, PBC)</td>
<td>Fishbein &amp; Ajzen 1975</td>
<td>What are the barriers of adoption? Are they related to the lack of knowledge, attitudes of management, resources, distribution, value chain or customers’ preferences? Which kinds of technology are staff and clients willing to apply?</td>
</tr>
<tr>
<td>Technology Acceptance Model (TAM)</td>
<td>Davis, 1989</td>
<td>Which kinds of benefits do companies perceive from the digitalization? How could the easiness of usage be facilitated? Which platforms do clients prefer?</td>
</tr>
<tr>
<td>Adoption and Diffusion of innovations</td>
<td>Rogers 1983, 2003</td>
<td>What is the rate of adoption of digital tools in enterprises? What are the barriers to apply? What are the impacts and consequences?</td>
</tr>
<tr>
<td>Channel of trade-offs and transaction costs</td>
<td>Kotler et al. 2009</td>
<td>How to increase the transaction costs to the client? How to increase customer loyalty? How to keep the customer in the selling channel? How could the business model of hybrid shops serve the firms and customers?</td>
</tr>
<tr>
<td>Perceived risk perspective</td>
<td>Lim 2003</td>
<td>How to reduce uncertainness and risks when transferring to the digital platforms, like in online retailing, payments securing or risks to the reputation?</td>
</tr>
<tr>
<td>Five forces and Competitive advantage</td>
<td>Porter 1985, 2001, 2015</td>
<td>How does digitalization have an effect on business environment? How do firms gain competitive advantage from digitalization? What factors effect on the position in value chain?</td>
</tr>
<tr>
<td>Disruptive innovation</td>
<td>Christensen 1995</td>
<td>How do innovations change the business models in the certain industry?</td>
</tr>
<tr>
<td>Frugal innovation, BOP innovation</td>
<td>Prahalad 2002</td>
<td>How does digitalization produce frugal innovations?</td>
</tr>
<tr>
<td>Business Model Business Model Canvas</td>
<td>Zott, Amitt &amp; Massa 2011, Osterwalder 2002</td>
<td>How does digitalization transform the business models? What are the business models of innovators and disruptors?</td>
</tr>
<tr>
<td>Open innovation</td>
<td>Chesborough 2003</td>
<td>How to create new value chains? What platforms to use for cooperation? How to implement open innovation in order to scope in the digital era? What is profitable to innovate itself and what to license?</td>
</tr>
</tbody>
</table>
Digitalization research has focused mainly on examining the phenomenon through enterprise and customer orientation (Wang & Ahmed 2009, Lee & Cheung 2004, Li, Troutt, Brandyberry & Wang 2011). The theories of adoption and co-creation are widely applied in creating an understanding about the relatively novel phenomenon. Research on staff orientation is limited, but TAM and other adoption theories explain the personnel’s process in digitalization. There is research on the network perspective, especially emerging theories like open innovation explain the crucial factors of networking in the digital era.

Although customer and supplier orientation provided interesting approaches for the study of digitalization, enterprise orientation was chosen as a starting point for this study due its crucial position in the evaluated target group, namely Finnish wood products industry. This study aims to clarify the challenges of the above mentioned industry in the framework of the adoption theory (Rogers 2003). The theory has been applied in many studies that explain technological diffusion (Kotler et al. 2009, Laukkanen & Kiviniemi 2010, Laukkanen, Sinkkonen & Laukkanen 2008, Chiang & Dholakia 2003).

To summarize the comparison of the reviewed literature from the practical viewpoint to wood products industry, it is crucial to consider the knowledge on how to turn a disrupting innovation of digitalization into a driving force for competiveness. In developing the national digitalization strategy one needs to evaluate how the adoption of the digital business can be extended in the wood products industry. The core question is, what are the factors related to the adoption of digitalization? Information is needed to estimate which enterprises need more support than others. Therefore, the theory that is capable of explaining the phenomenon as a whole needed to be selected. This is discussed in the next chapter.

2.2 Research on the adoption of innovation

The theory of adoption explores the phenomena of adoption as a social construct that moves through some population over time (Rogers 2003). This chapter reviews the previous literature on the drivers that explain adoption, in order to construct the theoretical framework for this survey.

In economics, adoption research has been applied to customer and organizational behavior by studying the factors and diffusion rate of a novelty (Rogers 2003). The adoption theory provides tools
for studying the change, the consequences of innovation and whether they are desirable or undesirable and creates an understanding for studying the organizational structures, including the factors that affect the process of diffusion (Rogers 2003, 11).

One of the key factors in diffusion is the rate of adoption, which means the share of the population whereby an innovation has been applied by members of an organization (Rogers 2003, 221). Accordingly, the internal variables that define “the rate of adoption are perceived compatibility, perceived relative advantage, perceived complexity, trialability and observability” (Rogers 2003, 222). The external variables are related to the determinants in the social system, like decision-making, communication channels, norms and change agents (Rogers 2003).

This study examined the impacts of digitalization from the perspective of the Finnish wood products industry. Rogers’s adoption theory (2003) provided the valid theoretical framework for evaluating the factors that have an effect on innovation diffusion in enterprises.

Through its theoretical perspective, it is possible to study the rate of diffusion, adoption categories, perceived benefits and internal and external barriers using both quantitative and qualitative methods. Regarding the market trends and emerging new business opportunities, the research’s theoretical framework is complemented by applying other theories to create understanding about the market situation (Porter 1985) and business models (Amitt & Zott 2001, Chesbrough 2003). The theory of competitive advantage and five forces however, describes the firm’s competitiveness, but to understand the whole environment a theory for networking and collaboration is also crucially needed. The business model theory explores, how the way of doing business has changed in the digital era.

Rogers (2003) emphasized that the consequences of innovation are crucial factors to be explored in order to understand diffusion, although he found that there is few research in this branch of adoption research. The consequences of innovation in firms or industry may be difficult to measure and they can lead to even greater inequalities in the form of wider socioeconomic gaps between early and late adopters (Rogers 2003, 471). This raised an interesting perspective for this study, that rather that studying only the factors in adoption, the perceived consequences and trends in market should also be included in the study. Thus the gained knowledge could be utilized in narrowing the gaps between companies.
Research into adoption has increased significantly, especially with regards to the topic of internet banking adoption (Hanafizadeh, Keating and Khedmatgozar 2014). Hanafizadeh, Keating and Khedmatgozar (2014) classified adoption research as descriptive, relational and comparative research.

In the internet banking research, descriptive research referred to surveys that investigate the elements and attitudes of adopters, barrier to diffusion, and the factors that lead adoption (Hanafizadeh et al. 2014). Relational studies have focused on exploring how the diverse elements interact in their influence on diffusion, while comparative research concentrated on comparisons amongst population or distribution channels (Hanafizadeh et al. 2014).

Referring to the classification of adoption (Hanafizadeh et al. 2014), this study was related to the descriptive branch, seeking to explain the phenomenon from the viewpoint of wood products industry, what are the market characteristics, the attitudes and perceived benefits.

2.3 Drivers explaining adoption

People and organization adopt innovations in different time phases. This chapter discusses about the previous research on drivers explaining adoption in order to construct the theoretical background for the data collection.

Rogers (2003, 261, 281) classified the adopter categories based on when they begin using a new idea. These rate of adopter categories follow an S-shaped curve (Rogers 2003, 282-284). Adoption categories have been studied from the viewpoint of the factors that distinguish different adopters. This stream of research has emerged alongside digitalization, especially in technology adoption, ecommerce and other digital tools.

The adopter categories found were 1) Innovators (2.5 % of population) who are the first to use the innovation; 2) Early adopters (13.5%) as opinion leaders diffuse the most suitable ideas for their networks; 3) Early majority (34 %) between early adopters and late majority providing a wide network to spread further; 4) Late majority (34%) adopt when there is economic necessity and increasing peer pressure; 5) Laggards (16%) are the latest in a society to take in usage of an innovation. (Rogers 2003, 282-284)
Adopter categories may also be dynamic in their nature in the progress of adoption (Chiu, Fang & Tseng 2010). The characteristic drivers that forecast a firm’s ability to adopt innovations are discussed below on the basis of previous research. Which are the main drivers that may indicate different adoption attitudes within firms or consumers? How are the typical adoption categories of different types alike?

**Product group**

Product group characteristics have been estimated to be one factor that drives consumer adoption of online shopping, while convenience characteristics of shopping channels and perceived price of the product were important as well (Chiang & Dholakia 2003).

Product group characteristics as well as the convenience of shopping channels may be related to the general factors in adoption as perceived compatibility (Rogers 2003). That may have an effect on companies operating in different product groups, as the clients may have different requirements for buying channels and preferred sales platforms.

That study was made from the consumers’ perspective, but the findings may suggest differences in the various branches in business. For example, do companies in the B2C market experience more pressure to adopt digitalization earlier than companies in the B2B market.

**Market area**

Studies on the U.S. furniture industry indicate that the market may be a relevant factor in adoption. Bullard (2002) described how domestic manufacturers suffer from the international competition of foreign producers in their home country. In scoping the digital market, Bullard (2002) emphasized the firms should actively join networks and alliances and develop strong relationships with individual consumers.

As the U.S. furniture industry has probably faced the waves of digitalization earlier than Europe or Finland, it may be relevant to cite the strategic report of Bullard and West (2002), which estimated competition between domestic and international wood products companies.

Meanwhile in the UK construction industry in 2004, the domestic-international axis was totally different. Zheng, Caldwell, Harland, Powell, Woerndl and Xu (2004) explored that online retailing
increased new competitors into domestic markets, which was creating a threat to local manufacturers. However, that time was a pre-phase of digitalization. Nowadays in the USA and the UK, ecommerce has increased the sales of the furniture industry compared with the beginning of 2000’s.

The previous research suggest that the market area may be one factor in the adoption process. The market area may be regional, domestic or international. From Finland, wood products are exported to neighbor countries, Europe, the Middle East and other countries (TEM 2015).

Size of company

Size has found to be one factor in the adoption of digital technology. Aguila-Obra and Padilla-Meléndez (2006) explored the positive dependence between the usage of digital technology and the size of an organization. The size of the company had an effect on managerial resources, thus the smaller the size of the firm, the less possibilities the firm had to utilize experts’ advices in adopting new technologies as small SMEs have less managerial resources than larger firms where more advanced technology development was recognized (Aguila-Obra and Padilla-Meléndez 2006). Pimentel, Claro & Barbosa (2016) found that firm size and firm age also increase propensity of adoption.

Zheng et al. (2004) investigated four British retail cases, namely medicine technology, building, computer trade and fashion, and they demonstrated expanding chasms between SME’s and micro firms in both investments to digital tools and strategy for the usage of ecommerce.

Zheng et al. (2004) explored that micro firms were more worried about assuming the risk that destroy their current business, as that may threaten current retail positions and sharing the risk. Online retailing has been investigated to be more developed between the large companies, which were closer to the end customers (Zheng et al. 2004).

Michaelidou et al. (2011) found that budgets in SME’s were generally low for social media marketing, with SME’s either not investing any financial resources into social media or only 1% of their budgets for that purpose. However, almost half of SME’s that currently use social media intended to spend more financial resources on social media (Michaelidou et al. 2011).
Demographic background

The personal background of respondents may impact their attitudes towards innovation, either positively or negatively, and thus on their adoption behavior. One stream in innovation adoption research is resistance to innovation. Laukkanen (2016) examined the factors of adoption barriers that influence consumer adoption in digital banking, where amongst the other factors, three demographics, namely age, gender and earnings were evaluated.

Furthermore, the other study of internet banking studied the drivers that are leading the adoption of banking services from the firm’s viewpoint (Pimentel, Claro & Barbosa 2016). Pimentel, Claro & Barbosa (2016) suggested that that firm management structure, firm’s demographics and the nature of the competitive environment play a role in the IBS adoption.

Pimentel, Claro & Barbosa (2016) stressed the importance of management board diversity in increasing adoption propensity, while firm size and firm age also increase propensity of adoption. Whether the respondents are consumers or companies, they reflect their attitudes in their answers. Thus demographics, gender, age and income are relevant factors in studying the adoption attitude.

Age was one crucial factor for adoption in internet banking research, where mature customers were more often later adopters, but education and size of household increased the rate of adoption (Mattila, Karjaluoto & Pento 2003). Gender was found to be an important driver for adoption in a study of furniture retail in the USA, in which women demonstrated higher importance to social media channels than men over the entire buying process (Lihra & Graf 2007).

Income and occupation of respondent have been found to impact their adoption attitudes. Management support behind the strategy was found to be associated with the degree of resources in support of online development by Doherty and Chadwick (2008) on ecommerce strategies in UK retailing sector. Early adopters were more influenced on boards’ support, society’s pressure and compatibility than laggards on the adoption of the e-learning (Chan & Ngai 2012). Therefore, it is important to include the investigation of age, gender and occupation of the respondent when measuring their adoption attitude.
2.4 Digitalization and emerging business models

This chapter reviews from the previous literature the identified effects of digitalization on the business environment. The impact is evaluated in the framework of business model theories. The business model is understood here as the basis of how firms implement their value-creation in the forms of revenue, clients, partnerships and distribution. First, the chapter evaluates what the business model is as a research unit and then investigates how value creation in virtual markets has an effect on firm’s business model. Then it presents one emerging business model strategy, namely open innovation.

Business model as a research unit

Business Model is a conceptual method that includes various parts and their relations that describes how the company drives its business (Osterwalder & Pigneur 2002). It can enhance the whole value of the firm, for its customers, providers, and collaborators (Amit & Zott 2000).

Zott, Amit and Massa (2010) suggested that it should provide a unit of evaluation for forthcoming studies on value creation in ecommerce. According to Zott, Amit & Massa (2010) business models attempts to investigate how the value-creation is incurring in the firm.

Easton and Araujo (2003) suggested that diffusion of technology into customers should be carefully evaluated, in ecommerce firms need to understand how it impacts to their specific business situation, not the general overview only. Analysis of the business model and the customers answers to questions such as which kinds of strategy a firm should take when considering fitting their commercializing market strategy to their business model? Does efficiency or novelty-centered strategy create more value? What kinds of position in market to pursue, e.g. cost leadership or differentiation (Porter 1985, Zott & Amit 2008)?

Zott and Amit (2008) found that business strategies that are constructing on a novel centered marketing strategies which stresses early market entry, cost-efficiency, or differentiation can improve competitiveness. They investigated that business models and market strategies were supplementary, not substitutes for other (Zott and Amit 2008).
Ecommerce companies are those who obtain a prominent or emerging share of their income from trading over the internet (Amit & Zott 2000). Amit and Zott (2001) observed that value creation in ecommerce has several special characteristics, which go beyond the traditional theories and values that can be implemented via the modification of the value chain (Porter 1985), the constitution of strategic partnerships with enterprises or the utilization of firm special core competencies. The value creation options in digital markets may derive from innovative synthesis of information, goods and services, novel constitutions of transactions, and the reformulation and integration of resources, skills, roles and partnerships amongst providers, partners and clients (Amit & Zott 2001).

Amit and Zott (2001) suggested specific drivers which characterize e-business, namely virtual markets, new value-chain, innovation, firm’s resources, strategic partnerships and transaction costs’ economics (Amit & Zott 2001). The characteristics for markets is high connectivity and virtual markets, where trade is conducted in open platforms (Amit & Zott 2001).

In their analysis, Amit and Zott (2001), Zott and Amit (2009) developed a value-drivers model, which aims to improve the value-creation in ecommerce. The sources for value-creation were named as novelty, lock-in, complementary nature and cost-efficiency. Virtual markets provide efficiency through their availability, high connectivity, and low-cost information sharing, which enhance new options for value creation by constructing the business model in a new way (Amit & Zott 2001).

Open innovation model as the source of competitiveness

The open business model has been emerging, where firms gain their innovations also from outside of the company and can share their ideas amongst the other companies (Chesbrough & Crowther 2006). The companies are progressing their product development from closed to more open ecosystems (Chesborough 2011). The open innovation model is composed upon the collective design and production of goods and knowledge, and it provides for an organization to leverage new potential for creating and capturing value (Chesborough 2006).

Chesbrough and Crowther (2006) investigated that the open innovation model is also valuable for technological innovation in traditional and mature industries. Chesbrough and Crowther (2006) identified which kinds of companies outside of high technology are early adopters in open innovation. The factors that lead the firms to agree an open ecosystem were the assumption that usage of more
technology from outside the company is crucial for profit-making growth; the outbound innovations increase product margins; to monitor potential disruptive innovations that may create a threat to current businesses or to increase the company’s ability to enter the market for launching novel products. (Chesbrough & Crowther 2006)

The next chapter discusses, what the benefits perceived by firms are once they have adopted digital business into their current business models.

2.5 Review of the suggested benefits of e-business

Firms have been challenged on the strategic and practical levels in the digital era (Lipiäinen 2014). That has required firms to modify their value creation and to integrate digital applications into their business making in order to satisfy the recent and future demands of their clients (Lipiäinen 2014).

Porter (2001) and Porter and Heppelmann (2015) analyzed the market dynamics caused by the rise of the internet and the internet of things. Porter (2001) suggested that however the market situation changes, the general strategic rules of competitors still apply as the competitive situation and rivalry between competitors has already been set, affecting the negotiation power of suppliers and buyers, new entrants and substitutes.

The market value of a firm increases and its financial performance improves, when a firm initiates e-service (Lin, Jang and Chen 2007). According to Lin et al. (2007), acquired companies, which had developed a specific technology or applied diversification expansion strategies gained increased returns.

Amongst the factors that influence SMEs’ adoption decisions, the perceived benefits is one of the key factors, along with the organizational readiness and external market pressures according to Zheng et al. (2004). The advantages that digitalization has brought to firms is reviewed based on the previous literature below.

Supports finding new customers

What are the practical advantages that increase a firm’s financial performance in general? Adelaar, Bouwman and Steinfeld (2004) suggested that the evolution of click-and-mortar ecommerce
integration over time should be studied in order to divide short-term benefits from structural strategic advantages. Click-and-mortar ecommerce has been exploited to increase relationships with current clients in geographical markets where companies are already existing (Adelaar et al. 2004). It has been found especially beneficial in serving to re-establish contact with past customers and in easing purchase decisions within a company’s current market, which may impact to bring in new clients into the market (Adelaar et al. 2004).

Adelaar et al. (2004) claimed that in opposite to the common assumptions for ecommerce, click-and-mortar ecommerce was used less to enter novel, distant geographical markets, whether they were domestic or abroad. However, that study was made in 2004, while ecommerce was quite new to companies, so it would be interesting to study how this is nowadays and especially within the wood products industries.

In Finland, the industrial report on wood products presented the benefits of digitalization as increasing cost-efficiency, opening new markets, strengthening the brand of the company, developing customer services and supporting the finding new customers (TEM 2015).

In business between British enterprises (B2B), the most popular objective for the usage of social media networks was to attract new customers (Michaelidou, Siamagka & Christodoulides 2011). However, the most of firms did not apply any visitor tracking to investigate the cost-effectiveness of the usage (Michaelidou et al. 2011).

Pires and Aisbett (2003) found that adopting ecommerce brought business the following implications: improved revenue and sales, sales tracking, closer customer relationships, creating new markets, better customer service, increased efficiency and customer satisfaction.

Zheng et al. (2004) found that the SMEs perceived the main advantages as follows: marketing opportunities such as branding and accessibility, new market opportunities, cost-efficiency, improvements to services with a rapid customer service, operational advantages and integrating stock information.

*Increases sales to current customers*

In Finnish technology firms, one aim for firms to use digital marketing tools was to improve communication with existing customers (Karjaluoto, Mustonen and Ulkuniemi 2015). Enterprises
are utilizing digital marketing tools to create brand awareness, increase personal sales and improve communication with existing customers (Karjaluoto et al. 2015).

The use of social media networks has been considered important in increasing sales from current customers by increasing awareness and communicating the brand online (Michaelidou et al. 2011).

Responds to customers demand for digital services

The emerging trend in commerce is that the channels where consumers are acquiring their information have shifted increasingly to digital channels, according to Karjaluoto, Mustonen and Ulkuniemi (2015). Karjaluoto et al. (2015) found that companies have not yet exploited digital marketing communication to its full potential, especially social media has been less utilized.

Baird and Parasnis (2011) suggested that firms should plan with a care how the company can provide an experience in social media, which is unique to their brand, creates value to clients and utilizes the social community networks.

Social media has wide potentiality for firms to achieve closer to customers and it facilitates increased revenue and cost-efficiency (Baird & Parasnis 2011). Thus, presence on the digital platforms where the customers are may be crucial for sales. For example, Puuinfo, the Finnish wood products association, provides digital platforms for Finnish companies to present their products on the common web platform. Some manufacturers have created several digital planning services to support customers with their buying decisions. Therefore, in the study it would be interesting to evaluate how common the trend is among the wood products companies.

Customers crossing over to digital channels

One typical phenomena related to digital channels has been customers crossing over channels. As it is critical to the customer loyalty, it has generated research that evaluates those critical points in e-commerce.

As there is not much previous research on the wood products industry and digitalization, it is useful to investigate parallel trends from other product-driven industry. Like the wood products industry, the British fashion industry was slower to adopt ecommerce than other industry according to Blázquez (2014), who suggest that the main reason has been the challenge of transforming the in-store customer
experience to the online retailing. Recently however, fashion has emerged the rapidly growing online sector of products as the innovative technologies have provided for consumers to assess clothing online, launching interactive customer experiences, which has had severe consequences to brick-and-mortar stores (Blázquez 2014).

Blázquez (2014) found in her study on the crossover impacts between shopping channels in the UK, that hedonic and utilitarian shopping values have an effect on the consumers’ shopping experiences and incentives to buy through various digital channels. Findings about the crossover effects stressed that there is a need to modify the in-store customer experience and create committing and interactive customer experiences between channels (Blázquez 2014).

Cao (2014) stated that majority of the previous research has evaluated on how clients respond to online strategies, while only a few surveys have clarified the challenge of cross-channel effect from the holistic business model approach. Cao (2014) examined how the elements of the business model transformed after the retailer created its cross-channel strategy. The targets for customers, the shopping experience and value chain were redefined (Cao 2014). Cao (2014) suggested that a firm moving to the cross-channel strategy should adopt the following phases, from minimal and moderate integration up to full integration and new business model. Cao (2014) found that the retail store will function as a hub which integrates various shopping channels, and he suggested that traders should enhance strengths of the physical store and develop interactive experiences with customers.

As consumers are increasingly shifting their buying decisions to digital channels (Lipiäinen & Karjaluoto 2015a), the lack of existing wood products companies on digital channels seems to be alarming. Especially when compared to the findings of Chiang and Dholakia (2003) on convenience characteristics of shopping channels.

Bilgicer, Jedidi, Lehmann and Neslin (2015) identified the factors related with the adoption of a new channel. They found that social pressure has an important role in diffusion, loyal clients are less influenced by social pressure, and social pressure has more impact in the adoption of the digital channel than becoming a customer of the bricks-and-mortar store. Bilgicer et al. (2015) suggested that marketing campaigns should enhance social networks and pressure, e.g. word-of-mouth campaigns.
Improves customer satisfaction and provides improved customer services

Opposite to the cross-over effect, customer satisfaction has been one of the key issues of loyalty in digital services. Customer satisfaction has been suggested to impact on the behavioral intentions in online retailing (Carlson & O’Cass (2011). Customer relationship management can support improving customer satisfaction on digital channels (Michaelidou et al. 2011).

Retail environment has become increasingly competitive and while customer migration costs have decreased in online retailing, customer loyalty has been a crucial goal for both brick-and-mortar and click-and-mortar merchants (Wallace, Giese & Johnson 2004). Wallace et al. (2004) investigated client loyalty in the multiple channel sales strategies, and they found that those strategies provide the holistic portfolio for the customer, thus improving customer satisfaction and loyalty.

The results suggested that multiple channel strategies for loyalty were more effective for the clients who were operating in multiple channels than for those who adopted only one channel (Wallace et al. 2004). In multiple channel retailing, it is important that online retailers meet the customers’ high expectations (Wallace et al. 2004).

Retailer’s investments into customer satisfaction payoff as clients prefer an improved portfolio of goods launched by the multiple channels, therefore their multiple needs are more likely to be satisfied with an integrated combination of services, and satisfaction leads to loyalty to the retailer (Wallace, Giese & Johnson 2004). If multiple channel clients are not satisfied and change to other digital platform, the focus is on causes such as failures in customer experience and pricing (Wallace et al. 2004). According to Wallace et al. (2004) the multiple channel strategies increase satisfaction and loyalty amongst the multiple channel customers.

Service quality had increased the online customer satisfaction in internet banking (Amin 2016). The core drivers of service quality were found the efficiency of online service, easiness to use, and personal needs in internet banking (Amin 2016).

Supports tracking customer behavior

The previous research has shown that evaluating and applying customer data on digital platforms support value-creating processes and loyalty (Saarijärvi, Karjaluoto & Kuusela 2013). The focus of
applying customer data is shifting more and more from the inner organizational use to the outside usage of customer data (Saarijärvi et al. 2013). Social media provides a digital ecosystem for customers who can interact with the firm and send feedback (Michaelidou, et al. 2011).

In tracking customer behavior, it is important to design web analytics that is related with the company’s main marketing targets, rather than apply a wide variety of general metrics (Järvinen & Karjaluoto 2015). Järvinen and Karjaluoto (2015) suggested that an important part of the data analytics is to investigate and choose firm-specific Key Performance Indicators.

**Supports in staff recruiting**

Social media is not only valuable in the business-to-consumer market, but also in the business-to-business market. Jussila, Kärkkäinen and Aramo-Immonen (2014) noticed that social media was used actively in B2B relationships such as employer branding and recruitment, communication, sales support, and co-creation with customers.

A study by Accenture (2014) on digitalization in Finnish companies proposed that significant value may be attained in recruiting by utilizing social media platforms. For example, LinkedIn, blogs and Facebook are applied to recruiting purposes in the Finnish forestry and wood products industry.

**Provides cost savings**

Cost savings has been mentioned as one advantage of the improvements to communication efficiency between customer and firm. Besides branding and visibility, Zheng et al (2004) listed the benefits perceived by SMEs to be cost savings and improvements to services and operational advantages like usage of e-tracking and sending stock information.

It would be interesting to measure how the firms’ perceive this when the manufacturers’ investments into digital channels are payed back in cost-savings.

**2.6 Emerging trends in the digitalized market**

This chapter reviews from the literature, the emerging market trends in the digital era. As there is only limited research done so far concerning the wood products industry (Bullard 2002, Bullard &
West 2002, Zheng et al. 2004), the review has been conducted from the general industrial perspective, and the analysis is later supported by the interviews of Finnish furniture retailers and manufacturers in the Chapter 3.2.1. Pre-study.

**Role of online retailing increases significantly**

Many studies, which have evaluated the various retail sectors like groceries (Doherty & Ellis-Chadwick 2009), medical technology, construction, computer consumables (Zheng et al. 2004) and fashion (Blázquez 2014, Donnell, Hutchinson & Reid 2012), have found that the role of online retailing is increasing. It is not only interesting for the business-to-consumer market (B2C), but also for business-to-business relationships (Jussila, Kärkkäinen & Aramo-Immonen 2014).

Furthermore, the SME’s willingness to invest financially into digital channels highlights the emerging importance of social media. In Britain almost half of firms, which utilized social media, had an intention to increase their marketing budget on digital channels (Michaelidou et al. 2011).

**Product information is distributed digitally to clients**

The internet has increasingly grown into a widely applied platform, where information sharing and equal access to products, prices and distribution are provided (Pires & Aisbett 2003). Bullard and West (2002) estimated that furniture marketing firms need to innovate to survive and that innovative manufacturers are replacing inventory with information.

The importance of searching for product information on the internet before making a purchasing decision has increased, motivating marketing to provide such digital content that drives potential buyers to communicate with their company, this is often referred to as ‘content marketing’ (Järvinen & Taiminen 2016).

Järvinen and Taiminen (2016) demonstrated that the usage of automation in marketing demonstrated quality sales leads by targeting and personalization the content to certain behavioral groups. The organizational stages of marketing automation were investigated as identifying and classifying contacts, nurturing and scoring marketing leads, contacting sales leads and closing the deal (Järvinen & Taiminen 2016).

Zolkiewski and Littler (2004) found that IT provides special opportunities to deepen the relation with customer through improved sharing of information, private market platforms and common
infrastructure. Pauwels, Leeflang, Teerling & Huizingh (2011) studied how information on the website impacts the company’s revenue. Pauwels et al. (2011) discovered that the impact of income of the online retailing was related on the product category and customer segment. They found that clients in certain segments were buying more expensive products, which indicated that online search and offline purchases were complementary (Pauwels et al. 2011)

Importance of branding emphasized

In the digital era, branding and brand management has become a more crucial factor for enterprises than it was before. Lipiäinen & Karjaluoto (2015) found in their case study that firms seem to benefit from a holistic branding approach, which integrates their internal functions and external communication through social media. In order to scope in high competition, differentiation and rising as an opinion leader, a firm can create relevant branding content to be distributed through different social media channels (Lipiäinen & Karjaluoto 2015b).

Social networking sites have been found to be especially efficient in B2B-business in the UK for achieving brand objectives, as many as a quarter of B2B SME’s were found to use social networking sites for this purpose (Michaelidou, Siamagka & Christodoulides 2011).

The internet and other interactive technologies have been named as effective tools to support B2B brands (Michaelidou et al. 2011). Michaelidou et al. (2011) explored SMEs and their use of social media, barriers, and measured the effectiveness of social media in the UK. They found that over a quarter of companies, operating in business-to-business market were already utilizing social media to gain brand targets, of which attracting new clients was the most common (Michaelidou et al. 2011).

Social media includes the phenomenon of brand communities, where social communication provides possibilities to exchange brand experiences (Muniz & O’Guinn 2001). Munnukka, Karjaluoto and Tikkanen (2015) found that having a Facebook brand community strengthened customers’ loyalty to a brand, by having a significant impact on community marketing behavior and a significant indirect impact on loyalty, intention of repurchasing and word of mouth (WOM). Especially the design of content by companies could influence the members’ emotions toward the brand and fostering participation and interaction was found to be the most efficient co-creation tool to impact the behavior (Munnukka et al. 2015).
Creates new information-based products by co-creation

Co-creation has emerged through value-creation of services. Vargo and Lusch (2004) introduced the theory of “New Dominant Logic for Marketing”. According to Vargo and Lusch (2004) marketing had transformed from a product-dominant perspective to emphasize services, which were not tangible and networks aroused as a central issue.

The theory of co-creation has emerged and penetrated service science, product innovation and marketing, where customers have a role as contributors to the market value (Galvagno & Dalli 2014). It has been utilized especially in service design, collaborative innovation in new product development, digital customer involvement, collaborating between firms, consumers and communities. In consumer research, co-creating value through customer experience is one of the most common themes (Galvagno & Dalli 2014).

Multi-channel retailing and direct selling from producers to end-users will increase

Digitalization has raised the trend of multi-channel retailing, where products are offered to customers through more than one sales channel, such as in addition brick-and-mortar shops online retailing is increasing (Doherty & Ellis-Chadwick 2009).

Bullard and West (2002) estimated that ITC technologies have rapidly changed furniture marketing, and the strategy for competitiveness needs to be adjusted for the manufacturer, enterprise and policy levels to ensure the long-term survival and growth of furniture enterprises. Usage of digital platforms has also made it possible to ignore the original retailer-stage, and start direct selling from producers to end-users (Bullard & West 2002).

Cortiñas, Chocarro & Villanueva (2010) studied the factors influencing multi-channel shopping in the banking sector. The findings estimated that customer acquisition for different financial services and the total number of banking services were forecasting for multi-channel behavior. This can also be explained through Rogers’ (2003) adoption theory of compatibility, where previous experiences made those customers more willing to use multi-channel retailing as they already had experiences of online retailing. Thus, trust and experience helped the multi-channel procedures. Therefore, it can be
assumed that the more customers gain experience in online shopping, the more multi-channel retailing will increase.

The web-oriented migration segment has emerged, and this group reached higher sales volume according to Ansari, Mela and Neslin (2008). Multiple channel applications were characterized by the customers’ search for information on diverse sources and the emerging need for a seamless customer experience along the entire buying process (Van Bruggen, Antia, Jap, Reinartz & Pallas 2010).

Van Bruggen et al. (2010) identified the following market operation criteria that are leading channel multiplicity and that are to be taken into account when defining channel designs: an expanded overview of goods and services, channel management, transformations in channel composition, and a broadened picture of delivery intensity.

*International competition will increase at home market and vice versa: Digitalization enables global market to small operators*

The U.S. manufacturing industry has been modified drastically in last decade (Bullard 2002), and the same trends have also become visible in Finland recently (TEM 2015). Furniture producers have confronted particularly intense competition from international traders, which has resulted in factories closures and workplace losses in many areas of the U.S. (Bullard 2002). This has caused severe risks for firms remaining on the domestic market with no intention to shape their traditional business-models (Bullard 2002). Zheng et al. (2004) explored that ecommerce introduced new competitors to enter onto what have been domestic markets, which was especially threatening to manufacturers. At present, it can also be vice versa, that small operators can enter the global markets with their diversified, narrowly specialized core competence.

Also in other industries, competitive environments influence a firm’s propensity to adopt digital services, like in internet banking (Pimentel, Claro & Barbosa 2016). They suggest that it is not the direct overall competition, but more a question of benchmarking; competitors may have invested in financial process automation to gain business efficiency, or the firm learns how competitors are coping with the implementation of new technologies, also the digital platform providers may proactively spread the experience of firm users with others as best practice sharing (Pimentel, Claro & Barbosa 2016). Therefore in this study, competitive environment was chosen as one factor for
evaluating the trend of “International competition will increase” and the firm’s position in market, whether firm’s sales is focusing on domestic or international markets.

2.7 Summary on the factors in digitalization

The aim of this study was to examine the factors that explain the willingness of enterprises to adopt or postpone innovations. Rogers (2003) and other adoption researchers have extracted internal, firm-specific factors for investigating adoption. Furthermore, Doherty and Ellis-Chadwick (2009) provided an important insert to this study, as they explored the drivers of scope of internet adoption in firms by analyzing the potential benefits, perceived risks and facilitators that determined the adoption in the British retail. Therefore, internal, firm-specific factors and external factors, like perceived benefits and trends were selected to be evaluated in order to investigate the Finnish wood products companies’ willingness to adopt digital innovations.

Factors in Adoption categories

Based on the Rogers (2003) theory of adopter categories, the factors for forecasting the degree of adoption was to be explored. The factors can be divided as firm-specific factors and demographic factors. Previous marketing literature has found coincidence between adoption and product group orientation (Chiang & Dholakia 2003). A product group can be related to the consumer market, like furniture, kitchen and outdoors or to the B2B market, like sawn products, houses and building structures.

The second factor was market orientation to domestic and international markets. As digitalization has the tendency to increase international competition on the domestic market (Bullard 2002, Bullard & West 2002, Zheng et al. 2004), it is interesting to study whether there is a difference in adoption between companies that are oriented to the domestic market or to the international market.

Earlier literature has proposed that the size of the company affects adoption behavior in enterprises (Aguila-Obra & Padilla-Meléndez 2006; Pimentel, Claro & Barbosa 2016; Zheng et al. 2004; Michaelidou et al. 2011). Thus the size of the enterprises in terms of annual turn-over and number of staff has been taken to be an indicative factor in this study.

Demographic factors, often suggested by previous adoption research, can be e.g. age (Pimentel, Claro & Barbosa 2016; Mattila, Karjaluoto & Pento 2003), gender (Lihr & Graf 2007, Laukkanen 2016)
or occupation (Doherty & Ellis-Chadwick 2008; Pimentel, Claro & Barbosa 2016). Therefore, these factors were evaluated in this study as the respondent’s background information in contrast to their adoption attitudes.

**Benefits gained from adoption**

As suggested by Doherty & Ellis-Chadwick (2009) and Zheng et al. (2004), among the factors that influence the SMEs’ adoption decisions, perceived benefits are a key factor along with organizational readiness and external market pressures.

Following the previous studies, this study chose to measure perceived benefits from the following factors, as attracting new customers (Adelaar, Bouwman & Steinfield 2004; Michaelidou et al. 2011; Pires & Aisbett 2003; Zheng et al. 2004); customer’s crossover effects between shopping channels (Blázquez 2014; Cao 2014; Karjaluoto & Lippiäinen 2015a; Bilgicer, Jedidi, Lehmann & Neslin 2015); increasing sales to current customers (Karjaluoto, Mustonen and Ulkuniemi 2015; Michaelidou et al. 2011), responding to customer demands for digital services (Karjaluoto, Mustonen & Ulkuniemi 2015; Baird & Parasnis 2011); improving customer satisfaction and providing improved customer services (Carlson & O’Cass 2011; Michaelidou et al. 2011; Wallace, Giese & Johnson 2004; Amin 2016); tracking customer behavior (Saarijärvi, Karjaluoto & Kuusela 2013; Michaelidou et al. 2011; Järvinen & Karjaluoto 2015); in recruiting (Jussila, Kärkkäinen & Aramo-Immonen 2014) or cost savings (Zheng et al. 2004).

In evaluating the consequences of digitalization on firms (Rogers 2003), it was assumed that similar forces to what Porter and Heppelmann (2015) determined also applied to the Finnish wood products industry, when facing the market situation due to the digitalization. Thus Porter’s (2001) theory of market dynamics was applied as a basis, when inquiring about the impacts of digitalization on the firms’ business. The impacts were formulated as opening new markets, supporting in defending current markets and hindering a firm’s position in the market in the questionnaire.

**Trends summarized**

The following seven market trends were explored from the previous research on digitalization as presented in the Table 2:

Product information is distributed digitally to clients (Pires & Aisbett 2003; Bullard & West 2002; Järvinen & Taiminen 2016; Zolkiewski & Littler 2004; Pauwels, Leeflang, Teerling, & Huizingh 2011)

The importance of branding emphasized (Lipiäinen & Karjaluoto 2015; Michaelidou et al. 2011 Muniz & O’Guinn 2001; Munnukka, Karjaluoto & Tikkanen 2015)

Creation of new information-based products is done by co-creation (Vargo & Lusch 2004; Galvagno & Dalli 2014)

Multi-channel retailing and direct sales from producers to end-users will increase (Doherty & Ellis-Chadwick 2009; Bullard & West 2002; Cortiñas, Chocarro & Villanueva 2010; Ansari, Mela & Neslin 2008; Van Bruggen, Antia, Jap, Reinartz & Pallas 2010).

International competition will increase on the home market and vice versa: Digitalization enables global market entry for small operators (Bullard 2002; Zheng at al. 2004; Pimentel, Claro & Barbosa 2016)

Hypotheses development based on the literature was further integrated into the preliminary research questions in Chapter 3. Materials and Methods.
Table 2. Summary of the drivers effecting on adoption in companies.

<table>
<thead>
<tr>
<th><strong>External drivers in companies</strong></th>
<th><strong>Source</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adopter categories</strong></td>
<td>(Rogers 2003)</td>
</tr>
<tr>
<td><strong>Product group</strong></td>
<td>(Chiang &amp; Dholakia 2003)</td>
</tr>
<tr>
<td><strong>Size of company</strong></td>
<td>(Aguila-Obra &amp; Padilla-Meléndez 2006; Pimentel, Claro &amp; Barbosa 2016; Zheng et al. 2004; Michaelidou et al. 2011)</td>
</tr>
<tr>
<td><strong>Demographic factors</strong></td>
<td>(Pimentel, Claro &amp; Barbosa 2016; Mattila, Karjaluoto &amp; Pento 2003)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>(Lihra &amp; Graf 2007, Laukkanen 2016)</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>(Doherty &amp; Chadwick 2008; Pimentel, Claro &amp; Barbosa 2016)</td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
</tr>
<tr>
<td>Supports in finding new customers</td>
<td>(Karjaluoto, Mustonen &amp; Ulkuniemi 2015; Michaelidou et al. 2011)</td>
</tr>
<tr>
<td>Increases sales to current customers</td>
<td>(Blázquez 2014; Cao 2014; Karjaluoto &amp; Lipiäinen 2015a; Bilgicer, Jedidi, Lehmann &amp; Neslin 2015)</td>
</tr>
<tr>
<td>Responds to customer demands for digital services</td>
<td>(Carlson &amp; O’Cass 2011; Michaelidou et al. 2011; Wallace, Giese &amp; Johnson 2004; Amin 2016)</td>
</tr>
<tr>
<td>Customers crossing over to digital channels</td>
<td>(Saarijärvi, Karjaluoto &amp; Kuusela 2013; Michaelidou et al. 2011; Järvinen and Karjaluoto 2015)</td>
</tr>
<tr>
<td>Improves customer satisfaction and provides improved customer services</td>
<td>(Jussila, Kärkkäinen &amp; Aramo-Immonen 2014)</td>
</tr>
<tr>
<td>Supports tracking customer behavior</td>
<td>(Zheng et al. 2004)</td>
</tr>
<tr>
<td>Supports the recruitment of staff</td>
<td></td>
</tr>
<tr>
<td>Provides cost savings</td>
<td></td>
</tr>
<tr>
<td>Role of online retailing increases significantly</td>
<td>(Pires &amp; Aisbett 2003; Bullard &amp; West 2002; Järvinen &amp; Taimen 2016; Zolkiewski &amp; Littler 2004; Pauwels, Leeflang, Teerling &amp; Huizingh 2011)</td>
</tr>
<tr>
<td>Product information is distributed digitally to clients</td>
<td>(Lipiäinen &amp; Karjaluoto 2015; Michaelidou et al. 2011Muniz &amp; O’Guinn 2001; Munnukka, Karjaluoto &amp; Tikkanen 2015)</td>
</tr>
<tr>
<td>Importance of branding emphasized</td>
<td>(Vargo &amp; Lusch 2004; Galvagno &amp; Dalli 2014)</td>
</tr>
<tr>
<td>Creates new information-based products by co-creation</td>
<td>(Doherty &amp; Ellis-Chadwick 2009; Bullard &amp; West 2002; Cortiñas, Chocarro &amp; Villanueva 2010; Ansari, Mela &amp; Neslin 2008; Van Bruggen, Antia, Jap, Reinartz &amp; Pallas 2010).</td>
</tr>
<tr>
<td>Multi-channel retailing and direct selling from producers to end-users will increase</td>
<td>(Bullard 2002; Zheng at al. 2004; Pimentel, Claro &amp; Barbosa 2016)</td>
</tr>
</tbody>
</table>
3. MATERIALS AND METHODS

3.1 Selection of methods

Research methodologies are generally divided into quantitative research and qualitative research (Bryman 2008, 35). “Quantitative research can be defined as a research strategy that stresses quantification in the data collection and analysis, while qualitative research emphasizes words and an inductive approach rather than the deductive” (Bryman 2008; 35-36). Mixed methods research is also increasingly applied by combining the previously mentioned approaches (Bryman 2008; 37).

The adoption theory enables the collection of qualitative or quantitative data, and the adoption research has been carried out using multiple methodological approaches (Rogers 2003). Statistical methods enabled to clarify the interconnections between phenomena and to distinguish them from each other (Metsämuuronen 2007, 25). The essential phases in quantitative research are setting hypothesis, defining concepts, selecting subjects, data collection, processing data, analyzing data and defining the conclusions (Hirsjärvi, Remes & Sajavaara 2006, 131; Bryman 2008, 161). Statistic inference can be applied to generalize the results of the survey to larger population (Metsämuuronen 2007, 25).

The research strategy of this study was to combine quantitative and qualitative research approaches. The subscriber of this study, the Natural Resources Institute Finland was interested in collecting nation-wide data from the wood products industry. Thus based on the above-mentioned research interests, the quantitative questionnaire method was selected for conducting the study. The questionnaire for the wood products companies enabled collecting data on the present state and from a wider perspective than a mere interview would have been able to survey.

The questions and answering alternatives were constructed with the help of a literature review and pre-interview. They included structured answer options, in order to simplify the analysis. The aim was not only to study the opinions of companies, but to produce valuable information to support the competitiveness of the industry. The triangulation approach in the research aimed to produce information on the relevant tools for digitalization.
The sample was small, which caused some limitations to the statistical analysis. The analysis started with the arranging of the data into the excel-program in order to evaluate the gathered information. The figures were drawn to summarize the tendencies in the answers and to help with grouping the data for further statistical analysis.

Furthermore, it was not only the size of the sample that limited the statistics, but also the scale of the ordinal and nominal variables had an impact on the selection. The scale of indicators limits further statistical analysis, as most of the variables were in either the nominal or the ordinal scale. Thus medians were more useful than means when describing the frequencies, although means are better established in marketing research to showing the profiles of the variables according to Holopainen and Pulkkinen (2002, 282).

For the selection of statistical tools, the normality test of the distribution of the main variables of adopter categories was conducted using the Shapiro-Wilk-test (sample size <50), as many parametric tests expect the distribution of the variable to follow the normal distribution. The normality test has the value of 0.788 with significance p=.000. The null hypothesis that the variable’s distribution follows the normal distribution was rejected, as the distribution of the sample did not follow the normal distribution.

Metsämuuronen (2009; 944) divided the application of various statistical analyses based on the following criteria: sample size, normal distribution and type of variables. Parametric methods are more exact in analysis, but they require larger sample sizes and hypothetical populations which have normal distributions. Nonparametric analyses were selected in this study, as it had small sample size, both nominal and ordinal variables, and its distribution did not follow the normal distribution.

The variables were first analyzed by a descriptive statistical analysis of frequencies, based on the methods of descriptive analysis (Burns & Bush 2010). Then, the test strategy was to use Pearson Chi square test for the similarity of the distributions of two variables. The Chi square test means that two variables are analyzed in a cross tabulation table (Kananen 2011), like gender and adoption category. This was to test whether variables were correlating within their scale or their order. As the sample size in some cross tabulation rows was less than five, Fishers’ Exact test was applied to increase the reliability (Metsämuuronen 2009). No correlation is observed in the null hypothesis. While most of the variables are ordinal or even nominal, the interest was to see if the grouping of the observations had an impact on the observed distribution of other variables that were considered dependent.
Equality of distribution of dependent variables between two groups was tested using the Mann-Whitney U-test and likewise between multiple groups using Kruskall-Wallis test (Metsämuuronen 2009, 1116). Both tests are nonparametric tests of the null hypothesis, Mann-Whitney compares the two pairs while Kruskall-Wallis multiple groups (Metsämuuronen 2009). In both cases, the null hypothesis is the equality of medians between the grouped observations. Table 3, presents the applied research methods to the specific research questions.

Table 3. Research questions and applied analysis methods.

<table>
<thead>
<tr>
<th>RESEARCH QUESTION</th>
<th>METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How has the adoption of digitalization been proceeded in Finnish wood products companies? <em>(Rate of adoption in applied tools, budget, information channels)</em></td>
<td>Frequencies, mean, mode, median, standard deviation</td>
</tr>
<tr>
<td>1.1. Which factors impact adoption behavior? Are adoption categories dependent on variables of size, product group, market area, occupation, age or gender? <em>(Adopter categories)</em></td>
<td>Chi Square, Mann-Whitney U-test, Kruskall-Wallis test, Spearman</td>
</tr>
<tr>
<td>2. What kind of impacts have firms perceived due to digitalization? Are perceived impacts dependent on categories or other variables?</td>
<td>Chi Square, Mann-Whitney U-test, Kruskall-Wallis test, Spearman</td>
</tr>
</tbody>
</table>
| 3. Which benefits have firms perceived from digitalization? Are perceived benefits dependent on adopter categories or other variables? | Frequencies, mean, mode, median, standard deviation  
Chi Square, Mann-Whitney U-test, Kruskall-Wallis test, Spearman |
| 4. How important do firms perceive different digitalization related trends in B2C and B2B market? Is the importance dependent on the adopter categories or other variables? | Interviews in the pre-study. Frequencies, mean, mode, median, standard deviation  
Chi Square, Mann-Whitney U-test, Kruskall-Wallis test, Spearman |

The variables were grouped according to the adopter groups and the correlation between them was studied with the Spearman’s test.

The reliability of the survey has been taken into account during the data collection phase. Due to the limited sized size of the sample, it was not relevant to conduct factor or regression analyses.
3.2 Collection of the material

The survey consisted of two parts, the pilot interview study and the questionnaire. The data was collected from the interviews (N=13) and the online survey (N=31), to which qualitative and non-parametric statistical analyses were applied. As the phenomenon of digitalization is transforming rapidly, research triangulation was applied to provide an in depth understanding of the emerging situations in firms.

Triangulation was chosen as a method in order to clarify the valid variables on impacts, benefits and market trends. Based on the literature review in Chapter 2, it was possible to create the main themes of the questions. In order to formulate the relevant answering alternatives from the viewpoint of wood products industry, a pilot interview study was made to clarify the main impacts and trends to be tested in the questionnaire.

3.2.1 Pre-study

During the first phase, an interview survey was conducted in order to complement the questionnaire, as the measurable factors needed to be tailored to the specific industry in question, not a general one. The quantitative methods supported the finding of the factors to be measured. The structure of the questionnaire was based on interview survey methods (Koskinen, Alasuutari & Peltonen 2005, Puusa & Juuti 2011). A semi-structured interview questionnaire was applied.

The interviews were conducted in situ at the National Fair, organized by AFWFI – The Finnish woodworking association in the 27th of March 2015 in Lahti. The thirteen interviewees were selected at random from the participants of representatives of the Fair. The majority of the respondents were manufacturers, managers, logistic companies and other developers in wood products industry.

Each interview was written up later from minutes, based on the order of answers. The respondents were free to add to the subjects and also to explain their opinions on matters not included in the questionnaire.

For further analysis, the thirteen interviews were divided into four main groups: producer, logistics, retailer and developer. The distribution of the respondents in the various classes is shown below in the Table 4.
Table 4. Distribution of the interviewed in the different groups. The table shows the share of interviewees between the various operators in value-chain of wood products industry.

<table>
<thead>
<tr>
<th>Producers (6)</th>
<th>Logistics (2)</th>
<th>Retailers (3)</th>
<th>Developers (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>L1</td>
<td>R1</td>
<td>D1</td>
</tr>
<tr>
<td>P2</td>
<td>L2</td>
<td>R2</td>
<td>D2</td>
</tr>
<tr>
<td>P3</td>
<td></td>
<td>R3</td>
<td></td>
</tr>
<tr>
<td>P4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P6</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results of the questionnaire are described below.

The results of the interview

The interviewees were asked to describe the recent situation of the wood products industry. Furthermore, they were asked if digitalization has had some impact on business in industry, and if there had been challenges or new opportunities.

According to the interview, digitalization has brought the following changes to the market from the perspective of Finnish wood products companies.

1) *Emerging market situation due to foreign manufacturers and stores was mentioned the biggest challenge.*

Large furniture halls have declined, because client preferences have changed, and they did not prefer shop there any longer (P1). That has caused the failure of many retailers and producers (L1). Large international competitors have entered the domestic market directly either via retails or online stores (P4). The supply of dominating retailers, who can manage all the value chain from brick-and-mortar to digital variety, exceed the possibilities of individual producers. Retailers buy much of their furniture from abroad. Due to the digitalization, it is does not matter to the retailer if they buy their products from a local producer or from the other side of Europe. Since 2008, the industry has been in a strong downfall, as demand for furniture has collapsed. This has caused a wide failure in producers and retailers (P4). Market differentiation has been seen as one asset to help cope with the emergent market situation, as one manufacturer has specialized in producing furniture to hospitals and health care (P2).
2) **Digital marketing is opening the internal market of the EU.**

Due to digital platforms, Finnish producers have better possibilities to increase awareness of their products amongst buyers and consumers across the whole EU. Although the competition increases and the buyers are relatively sparser, enlarging the potential market area creates new possibilities. Online retailing offers a possibility to export, but freight costs may form a barrier to international trade (P1).

3) **Need for the product information increases.**

Especially in interior design and direct sales to end-consumers, digitalization has set new requirements on producing digital information about a product, its qualities and usage (P4). Selling was mentioned to be focused on brands and the producers expect retailers to stock the products. Logistic flows are very specialized and based on the digitally operating systems (L1).

4) **Consumer and organizational buying behavior changes.**

The revolution of digital commerce effects all market areas and the trend has increased the importance of customer experience, branding and social communities. Thus B2B marketing has been externalized to marketing agencies even though some parts of social media marketing, such as Facebook, is undertaken by the company itself (P3). For many companies, digital marketing is in its preliminary phase, only e.g. receiving orders are managed digitally (P4, P6). Opportunity for direct selling attracts new operators and innovation development (P6). The firms’ own internet pages are applied to brand their products. Digitalization creates complexity for closing deals (P6). Some producers were very pessimistic about the development of digital commerce, believing that it may take 10-15 years before online retailing is a common practice (P4, P5). Digitalization changes the revenue models between producers and retailers in sales (P1) and reclamation (P4). Digitalization brings in customers and helps to find retailers for new products and to launch new products (P1, P6).

5) **Barriers to digitalization.**

Direct selling from producer to end-customers would mean competing with retailers over clients. If the same products are sold in the retailers’ brick and mortar-shops, they may end their retailing contracts (P1, D1). Retailers also prefer to manage all of the marketing (P5), which may reduce the producer’s interest or ability to market products digitals. The main barriers to adoption of digitalization were noted to be the retailer’s crucial role in between manufacturers and customers,
perceived less efficiency, lack of benchmarking, scarce resources and difficulty in creating value-added for the customer (D1, D2). The main development needs were noted to be the development of online marketing, internet-pages and selection of ecommerce tools (D1, D2).

Summary: Emerging trends and impacts on digitalization to the wood products industry

The results of the interviews were linked to the business environment in the Figure 1. and analyzed from the perspective of the Five Forces analysis by Michael Porter (1985). The emerging trends and impacts can be assessed from the viewpoints of rivalry amongst existing competitors, barriers to entry, threat of substitute products, bargaining power of suppliers and buyers according to Porter (2001).

The importance of the operators’ network emerged in the interviews. In the wood products industry, there are few large enterprises, but because the entry barrier is relatively low, new operators are entering the market, where they are searching for a strategic position based on inexpensive pricing in order to enter the market. Digitalization has supported gaining the new position and improved competitiveness by strengthening the brand and widening the contacts with potential clientele.

The wood products industry has a tendency towards long chains in their sub-contracting industrial sector, where the number of operators and their capacity reduces the bargaining power of suppliers. Especially in the current low growth phase, an oversupply in production capacity may occur.

General economic trends affect buyers’ consumption behavior. The main threat of substitute products is that Finnish wood products, especially furniture is being replaced by imported goods. Among others, IKEA is a big competitor with its very advanced digital marketing channels and inexpensive prices.

The risk of direct exposure to competition in the same consumer segment with the same competitive factors is high, because Finnish production is not much differentiated. Therefore, in a situation of similarity of product variety the determining driver of purchasing is the price.
51

Figure 1. How does digitalization affect the market of the wood products industry? The figure has been adapted based on the interviews from the original picture of Porter (2001).

### 3.2.2 Development of the questionnaire

This chapter describes the development of the quantitative questionnaire. The structure of the survey and the answering options were based on the previous literature and the pre-study.

*Applying the results of the interview into the construction of the quantitative questionnaire*

The results of the interview supported the formulation of the questions for a nationwide online survey, as digitalization is a rapidly transforming phenomenon and there is only limited research on the Finnish wood products industry and the impact of digitalization, which was the scope of this study.
The main measured variables were derived from the literature survey, but the alternative options were gathered from the interview. The qualitative results were crucial in constructing the alternatives to the questionnaire.

The results of the interview were applied to the following questions:

- Creation of product groups (Q1) in B2C and B2B-commerce
- Market areas (Q4): Domestic and export
- Division of impacts such as opening markets, defending or hindering business (Q5)
- Applied digital tools (Q6): digital marketing, financial management, production
- Perceived benefits of wood products companies (Q7)
- Trends in B2C market for wood products companies in the era of digitalization (Q11)
- Trends in B2B market for wood products companies in the era of digitalization (Q12)

Table 5. The relationship between the applied theory, research questions and practical questions in the questionnaire. The whole questionnaire is presented in the Appendices 1.

<table>
<thead>
<tr>
<th>THEORY</th>
<th>RESEARCH QUESTIONS</th>
<th>QUESTIONS IN QUESTIONNAIRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Adoption (Rogers 2003)</td>
<td>1. How has the adoption of digitalization been proceeded in Finnish wood products companies?</td>
<td>Use of digital tools What digital tools are applied in your firm? (Q6) Yearly digital marketing budget (Q8) How share of digital marketing compared to turnover will develop in your firm in 2 yrs? (Q9) Information channels applied (Q10)</td>
</tr>
<tr>
<td>Consequences of innovation (Rogers 2003) Five forces (Porter 2001, 2015)</td>
<td>2. What kind of impacts have firms perceived due to digitalization? 2.1. Are perceived impacts dependent on categories or other variables?</td>
<td></td>
</tr>
</tbody>
</table>

...

Increases sales to current customers
(Karjaluoto, Mustonen and Ulkuniemi 2015; Michaelidou et al. 2011)

Customers demand for digital services
(Karjaluoto, Mustonen & Ulkuniemi 2015; Baird & Parasnis 2011)

Crossing over to digital channels
(Blázquez 2014; Cao 2014; Karjaluoto & Lipiäinen 2015a; Bilgicer, Jedidi, Lehmann & Neslin 2015)

Customer satisfaction and improves customer services
(Carlson & O'Cass 2011; Michaelidou et al. 2011; Wallace, Giese & Johnson 2004; Amin 2016)

Tracking customer behavior
(Saarijärvi, Karjaluoto & Kuusela 2013; Michaelidou et al. 2011; Järvinen & Karjaluoto 2015)

Recruiting (Jussila, Kärkkäinen & Aramo-Immonen 2014)

Cost savings (Zheng et al. 2004)

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Which benefits have firms perceived from the digitalization?</td>
<td>How the following claims describe utilization of digital tools in your company? (Q7)</td>
</tr>
<tr>
<td>3.1 Are perceived benefits dependent on adopter categories or other variables?</td>
<td></td>
</tr>
<tr>
<td>4.1. Is the importance dependent on the adopter categories or other variables?</td>
<td>How the B2B-commerce will transform in digital era? (Q12)</td>
</tr>
</tbody>
</table>


**Justifications for the choice of research questions**

After the frequencies of variables were explored, the further statistical analyses were conducted in order to find out whether there are differences between the variables. Studying the dependence on
different variables and adopter categories supports the identification of companies that may need counselling to help develop their businesses to meet the new challenges of digitalization. In creating a national industrial strategy for utilization of digitalization, it is beneficial to narrow the gaps between various adopter groups according to Rogers (2003).

3.3 Description of the collected data

The online survey was arranged in the spring of 2015 by direct email invitations, announcements in professional journals, internet pages and Facebook. The questionnaire was divided into four parts: collecting enterprise data (I); the rate of adoption of digital tools (II); perceived benefits and perspectives for new business models (III); impact on digitalization in business-to-consumer (B2C) and business-to-business markets (B2B) and the barriers of adoption (IV).

The survey was constructed using the web platform called Webropol and launched on the 25th of May and was open until the 18th of June 2015 through the email lists of the National Finnish Forest Centre (sent to approximately 650 email addresses), AFWFI - Finnish woodworking association (in July and September) and the Natural Resources Institute Finland (in May). Furthermore it was promoted in Puumies-professional journal for the wood products industry (with a distribution of 3300 copies) in May and on the internet pages of the Natural Resources Institute Finland and the Association of Finnish Wood Industry Technicians and Engineers.

The first round of inquiry gathered only 18 responses despite the wide distribution. In order to raise the reliability, a second round was arranged in September 2015 via Webropol and a paper survey, which was distributed personally to potential participants in the Wood Fair in Jyväskylä on the 3rd and 4th of September 2015. The final response amount was 31.

Descriptive data of respondents

A quantitative questionnaire was constructed on the basis of the above mentioned interviews and the previous research on digitalization as presented in Chapter 2. The companies were asked for background information on their enterprises and about themselves. The enterprise-specific data was divided according to the information on product categories, amount of staff, annual turnover and the market focus of the company. The respondents were asked for their gender, age and occupation in the enterprise.
The table below describes the enterprise-specific background information of respondents who answered the survey. The frequencies and valid percentages of the evaluated factors are presented. Because the input was missing in some categories, the frequency of missing answers is shown, as it may have an effect on the reliability of further statistical analyses.

Table 6. Background information on the respondents’ companies. The numbers of answers and missing answers per question are shown below. The valid percentage is used in the analysis.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total frequency</strong></td>
<td>31</td>
<td></td>
</tr>
<tr>
<td><strong>Product group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawn, Planer, Houses &amp; Building structures</td>
<td>16</td>
<td>53.3 %</td>
</tr>
<tr>
<td>Furniture, Kitchen &amp; Outdoors</td>
<td>8</td>
<td>26.7 %</td>
</tr>
<tr>
<td>Services &amp; Others</td>
<td>6</td>
<td>20 %</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Staff</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 10</td>
<td>20</td>
<td>71.4 %</td>
</tr>
<tr>
<td>≥ 10</td>
<td>8</td>
<td>28.6 %</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Annual turnover</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 2 mm. euros</td>
<td>16</td>
<td>66.7 %</td>
</tr>
<tr>
<td>&gt; 2 mm. euros</td>
<td>8</td>
<td>33.3 %</td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>Market area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Domestic market</td>
<td>23</td>
<td>82.1 %</td>
</tr>
<tr>
<td>Export</td>
<td>5</td>
<td>17.9 %</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

The majority of respondents (53.3 %) represented the product group of “Sawn industry, Houses and Building structures”, which produces sawn products, planer woods, timber frame houses and components for building and operating with B2B timber traders. The “Furniture, Kitchen and Outdoors’’ product group with a B2C-orientation represented a 26.7 % share of respondents. The “Services and Others” group presented a 20 % share of the respondents. When looking at the median and mode of the estimates, they both refer to the category of “Sawn, Planer, Houses and Building structures”. However, the distribution of the estimates showed a left-skewed and a flat-shaped curve (sd = 0.802, skewness = 0.700, kurtosis = -1.062), which did not follow the normal curve.

The respondents’ company size was mainly micro enterprises, as 71.4 % of respondents were from the companies that employed less than 10 members of staff and 66.7 % were from companies whose annual turnover was less than 2 mm. euro. The share of larger firms with more than ten people was
28.6 %, while annual turnover represented 33.3 %. For seven respondents the annual turnover was difficult to estimate, which meant that 22.6 % of the answers were missing. Therefore, the annual turnover was a less reliable indicator in measuring the size than the amount of staff. The distribution of the answers was focused on the smallest categories (Mo=1, Md=1), while the standard deviation was 0.460 in amount of staff and 0.482 in annual turnover.

The market focus of the company may have had an effect on its adoption behavior. The respondents were asked to estimate the share of their sales to the local and domestic market, the Nordic countries, Europe and elsewhere in the world. As there was not much distinction between the export market areas, Nordics or the rest of the world, the export categories were unified into one exporter category in this analysis. Five of the respondent companies had more than 50 % of their market share from exports, thus they were categorized as exporting firms.

Regarding the market areas, the respondent companies mainly operated on the domestic market (82.1 %) and only 17.9 % focused on exports. The parallel trend was reflected in other averages (Mo=1, Md=1) while the standard deviation was 0.390. The distribution curve was strongly left-sided with a distinctive peak (S=1.775, K=1.234).

**Respondent data**

The survey provided an interesting viewpoint to compare the opinions of owners and staff, as almost two thirds of the respondents (64.3 %) were owners or enterprises themselves and one third (35.7 %) were staff, in positions relating to production, marketing or product development. Doherty and Chadwick (2008) found that occupation or position in the company may have some effect on the rate of adoption.

Age is one indicator when assessing the adopter categories. While analyzing the demographic information, 66.7 % of the respondents were more than 50 years old. 33.3 % of respondents were younger than 50 years old. The majority of respondents were male, while only 6.9 % were women.

More specific analysis of the modes and distribution of the answer group shows that the majority of respondents were more than 50 years old and male as well as in the leading position in their companies. As the skewness and kurtosis of the distribution in gender was relatively focused (S=-3.591, K= 11.695), the reliability in the sample for further statistical analysis was not high in those estimates. Age has fewer responses, as four persons did not answer that question. Meanwhile
the respondents were mainly over 50-years-old (sd=0.480), with the skewness and kurtosis at quite high peaks, the distribution did not followed the shape of a normal curve. In occupation, standard deviation was 0.488, which provided an analyzable distribution curve (S=0.631, K -1.732).

Table 7. Demographic information about the respondents. The valid percentage is used in the analysis.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Valid Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total responses</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>Age (Years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 50</td>
<td>9</td>
<td>33.3 %</td>
</tr>
<tr>
<td>≥ 50</td>
<td>18</td>
<td>66.7 %</td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>2</td>
<td>6.9 %</td>
</tr>
<tr>
<td>Man</td>
<td>27</td>
<td>93.1 %</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner &amp; Entrepreneur</td>
<td>18</td>
<td>64.3 %</td>
</tr>
<tr>
<td>Staff</td>
<td>10</td>
<td>35.7 %</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

To summarize the gathered data, most of the respondents were from micro companies or SMEs, which had less than 2 million in turnover and sold to the domestic market. When product groups were compared with the size of companies, it showed that the majority of respondents were micro size enterprises. The dispersion may indicate that for a micro sized firm, versatility may be crucial to their business.

3.4 Reliability and validity

When the reliability of the research is being evaluated, the concepts of validity and reliability are applied (Metsämuuronen 2009). Validity means research’s ability to explore the relevant issues from the viewpoint of targets (Hirsjärvi et al. 2006, 216, Kananen 2011, 118). Validity can be distinguished into external and internal validity. External validity investigates the reliability of the research and external validity describes how generalized the results are. (Metsämuuronen 2009).

Validity of the research can be improved by using a careful research design, defining concepts well, deriving theory from previous research and implementing sampling well (Metsämuuronen 2009).
the quantitative survey, the validity of sampling affects the validity of the research remarkably (Metsämuuronen 2009). The meter should contain the relevant issues from the viewpoint of the studied concept. The questionnaire should be designed beforehand so that it measure the right topics for the phenomenon. (Kananen 2011)

Reliability means the repeatability of the results, meaning the ability to produce results that are not random (Hirsjärvi et al. 2006, 216). In measuring attitudes there is the possibility of random errors, even the mental mode may have an effect on random errors (Alkula, Pöntinen, Ylöstalo 1994, 94). The strict and critical attitude of the researcher affects reliability. In order to increase the reliability, similar topics were asked in several questions, like in Q5 and Q7 concerning impacts, or in Q11 and Q12 referring to trends, in order to ensure some overlap. Alkula et al. (1994, 94) stated that measuring the concept through several questions supports getting more exact results and reduces random errors. According to the feedback of responders, the questionnaire was challenging because the theme was perceived novel or unknown.

This research studied the phenomenon, which is rapidly emerging and developing. Therefore, as reviewed in Chapter 1.5. Concepts, it has not been clearly defined in research and its definition ranges from digital marketing to the general ICT in firms. This may have caused confusion among the potential respondents as the rate of received answers was low. Räsänen and Sarpila (2013) mentioned that in general the rate of response has decreased significantly in the 2000’s. Attempts were made to increase the sample size after the first unsuccessful online inquiry, during which the sampling was conducted by sending direct emails.

Thus the questionnaire was shortened by leaving open questions out and it was distributed as a paper version. Two researchers attempted for two days to collect the answers at the National Wood Products Fair. The feedback from non-responding people was that digitalization or digital commerce does not interest them at all as they are manufacturers and not retailers. There may have been an assumption that manufacturers, who were selected as the main target group of this study, have an idea of digitalization as something external or outside of their business. In the pre-interview, some furniture manufacturers mentioned that their retailers manage all the marketing activities, and therefore they do not have anything to do with digitalization.

The validity of the survey was developed by conducting a pre-interview in order to tailor the evaluated topics and answering alternatives so that they are relevant and in the same language as the entrepreneurs use. The concepts were explained in the questionnaire in order to avoid misunderstanding and to ensure that the right issues were measure. The questionnaire was pre-tested
by the experienced researchers at the Natural Research Institute and the staff from development agencies. After pre-testing, some of the questions were clarified, some words were changed and the visual layout was modified. The questionnaire was designed in three parts to give a better overview to respondents. The estimated questionnaire completion time of 15-20 minutes was told to respondents at the beginning of the invitation.

In spite of the customized design, only 18 answered in the first round of the survey, which was sent by direct email to 639 enterprises. However, 66 opened the online survey although they did not sent their answers. Interest in the subject raises the rate of answering. As Doherty and Ellis-Chadwick (2008) faced the similar low response rate of 10% and referred to previous surveys that had similar problems, the lack of responses is not surprising in this survey either. The fear of giving data of a commercially sensitive nature may be one explanation for the lack of answers according to Doherty and Ellis-Chadwick (2008).

Maybe the low rate suggests that digitalization is not, or yet, a topic that the firms are concerned about. However due to the novelty of the subject, it may have been perceived as such a difficult thing, that respondents may have felt that they did not have enough expertise to answer the questions.

The survey was shortened and only the most important questions were left. However, the comparability was retained by saving the similar alternatives and analysis was done by focusing on the smaller supply of the answers.

The questionnaire was formulated so that it was possible for the respondent to proceed further in the webpage without answering all of the questions, and no question was as obligatory to be answered. This reduced the validity, but it was estimated that that more responses could be gained this way.

Based on the low rate, it was supposed that the questionnaire was too long. The increasing amount of missing answers by the end of the survey also indicate this fact. The first questions concerning the company data (1-4) and respondent’s own background information (17-19) were answered quite frequent. Question 5 about the impact of digitalization was well answered, with only two missing answers. Question 6 on the assessment of applied digital tools had nine missing answers as the preset answers was divided into the four categories of “in use”, “not in use”, “coming” and “mobile”. It seems this was somewhat too difficult. Also the marketing budget questions (Q8 and Q9) received a lot of answers and the respondents were offered the alternative of “don’t know”, but they estimated budgets quite well.
The perceived benefits of digitalization (Q7) were tested in an open question, by presenting assumptions to which respondents gave their ratings based on the Likert-scale. Maybe the question was easy to answer and practical enough, as it received very few missing answers.

Evaluating the trends (Q11 & Q12) were not that easy, as respondents were asked to place their assumptions on the grid scaled from 0 to 100 for its probability and importance to firm’s business. As the respondents were asked to evaluate to either B2C or B2B market, almost half of the answers were missing. Thus, the reliability of the estimated trends is lower than the other answers, but as even that amount produced interesting findings in the direction of the trends.

The question (Q13) concerning adopter categories asked respondents’ to describe their company as an adopter of new issues, and faced nine missing answers. The question was on the last page, and it was among the last questions, where the frequency of missing answers was quite high. It is also possible that the question itself was difficult, with respondents finding it hard to estimate and distinguish the various choices from each other.

Among the last questions, there were also three questions about the barriers of adoption, but due to the number of the missing answers these questions had such low validity that they were not further analyzed. Although the topic of barriers is very crucial for diffusion, it was left for future studies to be studied more specific.

To summarize the evaluation of the reliability and validity, despite the low rate of respondents the results can be considered to provide weak signals and directions for the development of wood products companies and their progress. The study provides insights into the process of diffusion of digitalization, its impacts and benefits in micro firms and SMEs. Furthermore, it also suggests which kinds of companies would need support to progress further.
4. RESULTS

4.1 Characteristics of adopter categories

Diffusion of innovation through a population has been surveyed by studying various adopter categories and measuring the rate of adoption (Rogers 2003). This chapter describes the adopter categories found in the study and analyses their specific characteristics, about which factors are related to the certain categories, for example do exporters have a tendency to behave more like early adopters than companies that operate on the domestic markets, or is there relationship between the adopter categories and the size of the company.

In this research, the adopter categories were evaluated by inquiring respondents to describe their perception of the innovation-orientation of their companies in general. Based on the Rogers (2003) diffusion theory, five alternatives were created.

The original alternatives of adopter categories were formulated as follows:

- “We are among the first ones testing innovations, although success is not guaranteed.” (Innovators)
- “We are not among the very first ones in testing new innovations but we test new ideas with pleasure if we perceive it to be sensible” (Early adopter)
- “We try new things when they start to generalize and some experience has already been gained for their usage” (Majority)
- “We adopt a new practice after long consideration and often later than others” (Late Majority)
- “We adopt a new practice only when it is an absolutely must” (Laggards)

Due to the limited amount of observations, the full range of the original five categories was condensed into three categories for further statistical analysis. The innovators and early adopters were integrated into the Early adopters, the Majority category was sustained, while the Late majority and Laggards were integrated as Laggards.

Most of the respondents perceived that their company had the Early adopters attitude (40.9%, N=9) for adoption of innovations. More than one third (31.8 %, N=7) estimated that their companies belong to the Majority and a bit less than one third (27.3 %, N=6) answered that their companies are Laggards, adopting innovations at a later stage. It must be also noted that nine respondents expressed no opinion as an answer.
As most of the observations were focused on the first category (Early adopters), the standard deviation (sd=0.834) showed that the shape of the distribution curve was left-skewed (S=0.274). Thus the shape of the distribution curve differed from the S-shaped adopter curve by Rogers (2003). This was probably affected by the small amount of observations in this study.

The dependence of respondents’ background information on their orientation to adopter categories was compared in order to find out which variables may have had an effect on the innovation adoption-attitude. The study measured whether there were differences between the various adopter categories (Early adopters vs. Majority vs. Laggards) in their variables of product categories, size, market area and in personal variables of gender, age and occupation. The cross-tabulation between variables and adopter categories was conducted using the Chi-Square test. As some cross-tabulation rows showed the amount of observations to be less than five (< 5), the reliability of the test was supplemented with Fisher’s Exact Test. The confidence interval used was that counts less than 0.1. were significant.

### 4.1.1 Product group

The study evaluated whether the product group of the firm had an impact on the firm’s adoption behavior. In order to test the dependence on adopter categories, product groups were rearranged into three main groups to increase the number of observations in the cross-tabulation analysis. The division was based on their primary focus on either the building value-chain (B2B market) or the consumer products (B2C market). There were also some responses from the service providers, wood machinery and education groups.

The “Sawn, Planer, Houses & Building structures”- product group seemed to be earlier in adopting innovations (Early adopters 18.2 % of total respondents) than “Furniture, Kitchen & Outdoors”-product group (Laggards were 13.6 % of total respondents). The “Services”-product group seemed to be the most innovation-oriented with 60 % of respondents inside the services group. However, nine cells had less than five observations. Therefore, in the Furniture and Services-groups the difference between counts was so small that the results in those categories should be considered with reservations.

In Fisher’s Exact test, the differences between the product groups were not significant (p=.631). Thus the null hypothesis of the independence of product and adopter groups was not rejected. As no support was found for their dependence over the whole range of observations during the cross-
tabulation, the medians of adopter classes were tested between different product groups to test if they were equal.

Alternative binary groupings of the product categories also did not result in any statistically significant differences in adopter categories in the Mann-Whitney test. In Kruskall-Wallis test, the difference between the three product groups and adopter categories was 1.255. With the degree of freedom (df 2) its probability was 0.534, which indicated that the distributions of adopter categories between the groups were not statistically different. As no correlation was observed, the adopter strategy was quite similar for the tested companies.

However, when tested by the Kruskall-Wallis test, the statistics showed a significance between product groups and staff (p=0.086), annual turnover (p=0.040), firm level market impact (p=0.071) and occupation (p=0.007). That difference suggests that if the companies from different product groups appeared to be of different sizes, the impact of digitalization on business was different and the respondents were from different occupation levels.

4.1.2 Market area

The study tested if the market area of a company has an effect on the attitude of adoption for digitalization. The explanatory variables were divided into the domestic market and export markets, which explained the dependent variables of adopter categories.

In total, early adopters (38.1 %) were the biggest group. In the domestic market, the companies did not differ at all, showing equally distributed observations in the adopter row-variables. In the cross tabulation test, there was no difference between the adopter category and the companies operating on the domestic markets.

Within exporters, there was a slight emphasis on behaving as early adopters, but as the sample was small this weak signal may appear as a coincidence. Because of a lack of exporters, there were only three respondents in this category, and the three cells had less than five observations, making the results less reliable.

The similarity of distribution for the market areas in their adoption categories was also confirmed in the Fisher’s Exact test, which showed that there was no difference in the adopter categories between market areas (p= .747). Neither did the Mann-Whitney U-test show any statistical significant
differences between adopter categories and the market areas (p=.189), nor did the Kruskall-Wallis test (p=.200).

4.1.3 Size of the company

The only variable in the study, which showed a weak dependence between the adopter categories was the size of the company. The size was measured through two variables, namely the amount of staff and the annual turnover. Micro companies (with less than 10 employees) seemed to have a tendency towards adopting new innovations later than larger companies. According to the data, 40% of micro enterprises considered themselves as laggards, while 33.3% as Majority and only 26.7% as Early adopters. However, 66.7% of companies with more than ten employees claimed themselves to be Early adopters, and 33.3% Majority.

The Chi-Square test and the Fisher’s test ($\chi^2=3,947; p=.158$) showed weak evidence of a dependence between the amount of staff and the adopter category. The annual turnover reflected a similar tendency. Almost half of the firms (46.2%) with a turnover of less than 2 mm. euros, perceived themselves as laggards, while two thirds of SME’s (66.7%) with a turnover of more than 2 mm. euros perceive themselves to be Early adopters.

Chi and Fisher’s Exact test showed a weak significance between annual turnover and adopter category ($\chi^2=4,597; p=.109$). However annual turnover was more difficult to estimate amongst the respondents from the larger firms. The Mann-Whitney U-test showed more statistical significance for the comparison between adopter categories and the size of staff ($U=21,000, p=.041$) and annual turnover ($U=16,000, p=.029$). The Kruskall-Wallis-test showed significant dependence between adopter categories and the amount of staff ($p=.047$) and between annual turnover ($p=.032$).

A correlation between adopter categories was tested by Spearman's rho. The only variable in which statistical significance was observed was size. Adopter categories differed by the variables of staff (-.444, $p=.044$) and annual turnover (-.504, $p=.028$).

Size was also an important factor in opinion-forming on the firm’s level of market impact ($p=.016$), verified by the Kruskall-Wallis-test.
4.1.4 Age

In the survey, the respondents were asked for their age to analyze whether age has some dependence with adopter categories. Almost half of the respondents (44.4%) that were younger than 50 years old considered themselves Early adopters, while 85.7% of persons older than 50 years of age perceived themselves as Majority.

In this survey, the age of the respondents did not significantly impact the categories (F= 1.650; p=.449) nor did they using the Kruskall-Wallis test (p=.523). It must noted that as many as nine persons left no answer to this questions, affecting the reliability of the results.

4.1.5 Gender

In the survey, almost all of the respondents (95.5%) were male. Adopter categories did not differ significantly according to gender (F=1,513; p=1.000), nor when using the Kruskall-Wallis test (p=.275). However, one reason for this may be that most of the respondents were male and more than 50 years old, so the distribution (skeweness and curtosis) was strongly concentrated on a left-sided curve.

The share of gender in the wood products industry is general dominated by men. Due to the high difference in the observation sample groups of male and female respondents that is parallel to the evaluated industry, the variable of gender was not further analyzed in this statistical analysis.

4.1.6 Occupation

The survey also studied, if occupation or position within the firm had an effect on adoption behavior. Although the Fisher’s Exact test found no statistically significant link between the adopter categories and occupations (p=0.554), the cross tabulation table showed some weak differences in adoption behavior. Most of the owners and entrepreneurs perceived that their companies followed the Majority behavior (38.5 %), while more than half of staff perceived their companies to be Early adopters (55.6 %). That may suggest a weak tendency for owners to be slightly more conservative in introducing innovations in their companies than their staff, who found their companies to be early adopters.
It is difficult to evaluate if this finding was more a coincidence, but the distribution of observances was spread in the range of the alternatives in this case. The dependence of size was verified by the Kruskall-Wallis-test, where the size had a significance in occupation (p=0.007). The correlation between occupation and the size of the firm shows that the owners were more from the micro companies, while the staff answering the questions were more from SMEs or from larger companies. This fact may alter the statistical reliability and significance of this finding.

4.2 Adoption of digital marketing

4.2.1 Applied digital tools

The survey asked respondents which digital tools their companies use in business to investigate how digitalization has been adopted in the wood products companies. Furthermore, the frequency of the applied tools was measured in order to estimate the rate of adoption of each tool.

The digital tools, which were presented to respondents, were integrated with marketing, ecommerce, financial management and production. The amount of answers picked was not restricted and respondents were free to select as many digital tool alternatives as were used by their companies. The share of alternatives are shown in the Figure 2.

In the study, the most applied digital tools were related to digital marketing. According to the results of the survey, 20 % had their own internet pages, and 6.4 % were present on joint digital marketing platforms. Visitor tracking of internet pages or online shops was common for 11.8 % and search engine optimization for 7.3 %. Direct marketing through sms and online newsletters were applied by 4.5 %. Service messages to clients were provided by 5.5 % of companies. Social media or blogs (Facebook, LinkedIn, YouTube) were applied in 8.2 % of companies. Only 0.9 % of wood products companies bought digital advertising, like banners from web platforms, but eDirectories were common for 7.3 % of respondents.

Ecommerce was less applied as a sales channel for wood products companies, from sawn to log houses and customer-centric products like furniture. Only 4.5 % of companies had own online shop, and even less (0.9 %) sold their products through independent online retailers. The use of digital tools in production was also surveyed, finding that only 4.5 % of companies applied real-time tracking of orders and 5.5 % used spatial information for their clients. In financial management, E-payments and online invoicing were applied by 12.7 % of respondents.
Figure 2. Applied digital tools in respondents’ companies.

Frequency of applied tools

The range of applied digital tools were grouped in three categories according to how many tools the company applied. The groups were one-to-three (1-3), four-to-seven (4-7) and eight-to-eleven (8-11) tools applied. The average of the tools applied was 1.91 with a standard deviation of 0.881. The median group was 4-7 digital tools applied by a company.

The amount of applied digital tools was tested with the adopter categories. In the cross tabulation, most of the users that used digital tools the least (1-3 items) perceived themselves as the Majority (75%) in their adoption category, while medium users (4-7 items) grouped themselves as Early adopters. The differences between the groups did not differ significantly (F=4.471, p= 0.432). The reliability is limited by the fact that nine cells had counts of less than five.

In the Mann-Whitney U-test, differences were observed between the digital tools and adopters of the Majority and the Laggards (U=3,500, p=.062), but when multiple variables were tested by the
Kruskall-Wallis test, no statistical significance was found between adopter categories and digital tools (p=.567).

When applied tools were tested with the variable of market area, the domestic and export marketers differed significantly in the amount of applied digital tools (F=5.220, p= .045). Exporters seemed to apply fewer tools compared to companies that operate in domestic market. This was also verified in the Mann-Whitney test, where the applied amount of digital tools differed significantly with the market areas (U=22,5, p=.039). However, that may be due to the lack of frequency of exporters. Between product groups there was no variation between the amount of applied digital tools.

4.2.2 Share of digital marketing budget

Respondents were asked about recent and future budgets for digital marketing. Regarding to the present digital marketing budget, the majority (66.7 %) answered that their budget to be less than 200 euros, while 11.1 % estimated it to be between 2000-4999 euros. As many as 14.8 % answered that they did not know their company’s digital marketing budget. Spending on digital marketing did not differ within adopter categories (F=8,540, p=.304), and there were 15 cells where counts were less than five.

A comparison of the estimated future budget with the adoption behavior and the emerging trend of digitalization showed contradictory findings. Almost half of the respondents (46.4 %) estimated that their company’s budget would remain unchanged for coming next two years. Some 39.5 % were of the opinion that it would reduce. Only 7.1 % estimated that the future budget will double from the present budget. Adopter categories did not differ for the share of digital marketing budget in the future in the cross-tabulation (χ2=5,738; p=.431). However, there may be one error in the question-setting, as there was no alternative offered for “increasing” and the option “will double” may have been too much for micro enterprise, possibly raising the amount of “remains unchanged” responses. Furthermore, 11 cells had counts of less than 5, which affected the reliability.

The digital marketing budget was also statistically analyzed in comparison with the other variables, like occupation, product groups, annual turnover and market areas. The attitudes of owners and staff varied significantly for the present digital marketing budget (χ2=11,700; Exact Sig. (2-sided) p=.003). Some 83.3 % of owners said the budget is less than 2000 euros in their companies, while
the majority of staff estimated it to be higher in the 2000-4999 category. However, 14.8% of staff answered that they did not know the company’s budget.

With regards to the future marketing budget, opinions between owners and staff differed and had statistical significance ($\chi^2=6.329, p=.050$). Most of the staff (61.5% of staff) answered that the budget will remain unchanged, while 81.8% of owners were of the opinion that their future digital marketing budgets will reduce in size. This finding was contradictory to the furthering of digitalization, as the present budget for digital marketing was stated at less than 2000 euros, and more than three thirds of entrepreneurs were of the opinion that it will decrease further in future. Either the respondents did not see the benefits of the already spent resources or this may be a signal for the future expectations of micro firms. In the Mann-Whitney U-test, a statistical dependence was observed between Early adopters, the Majority and the size of digital marketing budgets in the future ($p=0.047$).

Annual turnover was significant for the present digital marketing budget ($\chi^2=9.036, p=.020$). Most of the smaller companies (81.3%) answered that the budget was less than 2000 euros, while larger companies had more variation in their budgets. When tested with multiple variables by Kruskall-Wallis, a statistical significance was found between future digital marketing budgets and product groups ($\chi^2=8.468, \text{ df}=3, p=.028$). With other variables like market areas, there were no difference between applied budgets.

4.3 Information channels

Information distribution and change agents have an impact on the adoption of digitalization (Rogers 2003). The study inquired what the main information channels were from which the respondents had received information about digitalization. Figure 3. described the share of applied information channels.

Media was the most commonly mentioned information channel (33%). The importance of the change agents was raised amongst the respondents, as 22% of them had received information on the subject from external experts and consultancy firms. Industrial associations and professional magazines (17%) provided an important information channel as well.

One interesting finding was that partner networks only played a minor role in learning about digitalization, as the partners from same industry (7%) and training of staff and recruitments (7%)
were less valued sources of information. The lack of benchmark cases or learning through a partner network may tell something about the low rate of adoption of digitalization in the wood products industry, in that the early adopters as the main group of respondents in this survey, were mainly learning from external media sources. Even the clients, who may have their own requirements for sales-decisions, were not seen as a notable information source (10%). This may also tell us about the lack of co-creation or understanding of client needs, as online retailing is emerging rapidly in furniture retailing and in other industries. Learning from the competitors was notably low in this study, with only 4% using it as a source of information, although tracking competitors’ choices would provide a fast track for learning on the market.

4.4 Impact on the firm’s business opportunities

The digitalization may have many consequences on the firms’ business, both positive and negative (Rogers 2003). The impact of digitalization on the respondents’ businesses was asked by setting different answering alternatives. The frequencies of various types of impacts were measured and the differences between adopter groups were analyzed.

Digitalization was considered to open new markets for more than half of the respondents (55.2 %). Almost one third (24.2 %) felt that digitalization had supported them in defending their current market position. Only a small amount (6.9 %) were of the opinion that the phenomenon has hindered their firm’s current market position. More than one tenth (13.8 %) said that they did not know the impact it had had on their firms business opportunities. The mean was 1.79 referring to the “opening new markets”, standard deviation was 1.082.

Most of Laggards (83.3 %) and Majority (66.6 %) felt that digitalization has opened new market opportunities, while Early adopters’ responses where distributed between all of the alternatives. One third of Early adopters (33.3 %) felt that digitalization has supported them in defending their current market position, while almost half of them (44.4%) were of the opinion that it has opened new markets. In cross tabulation, the adopter categories did not differ between firm level market impact ($\chi^2=4,9222; p=.647$), so there was no statistical evidence that the perceived impacts were related to the tendency to adopt innovations.
In the Mann-Whitney U-test, it was observed that opinions varied between Early adopters and Laggards almost significantly on perceived impacts (p=0.105), but not between other adopter pairs.

When compared with product groups, the Kruskall-Wallis-test showed that opinions varied statistically significantly between different product groups (p=.071).

Open responses to the survey explained more about how digitalization was perceived to have opened new markets for the companies. It was mentioned to have enlarged the retailing area, to bring in new customer groups and to improve interaction with clients. There were some product groups which were particularly thought to benefit from ecommerce, such as special wood structures, yard construction and log houses.

It had also supported firms in defending their market positions. It had increased growth, facilitated an easy channel for retailing and increased visibility and accessibility. Furthermore, cost reduction was said to be achieved through minimizing commissions for intermediators.

### 4.5 Perceived benefits

Rogers (2003) mentioned the perceived benefits as one key factor for the adoption of innovations. The hypothetical benefits were created on the basis of the pre-study, which interviewed entrepreneurs in the wood products industry. The alternatives were set in a Likert scale. The mean, median, mode and standard deviation were calculated. The alternatives were analyzed, not only by their means, but also by the share of frequencies, that sometimes even showed contradictory viewpoints (Figure 3).

The most important benefit of digitalization was perceived to be that it is “bringing new customers” in (M=1.66). Almost half of the respondents (48.3 %) agreed strongly and 44.8 % agreed on that assumption. Only a few (3.4 %) strongly disagreed with the assumption. The low standard deviation (sd 0.857) expresses that the observations are focused around mean. Significance (p=.307) in the Kruskall-Wallis test also confirms the interdependence.

The second important benefit was “providing improved customer services” (M=1.86, sd 1.044), with which 39.3% of respondents strongly agreed and 50 % agreed. Only 7.1 % of respondents disagreed strongly.
“Improving customer satisfaction” was valued to the third position, its mean was 2.14 and standard deviation 1.187. One third (31 %) strongly agreed and 48.3 % agreed with the assumption, but also the frequency of disagreement emerged with 10.3% disagreeing and 10.3 % strongly disagreeing.

More than two thirds (71.4 %) of respondents agreed digitalization was “responding to customers demand for digital services” (M=2.21), but 21.4 % of the answerers disagreed that such demands where made by their clientele. Standard deviation (sd 1.287) showed that the answers are distributed in a wide range.

“Providing cost savings” (M=2.25, sd 1.143) and “increasing sales to current customers” (2.28) were valued quite similarly. In cost savings, the value was lowered by the high amount of non-opinion formers (25 %), although 64.3 % agreed the claim. In “increases sales to current customers” the answers were dispersed, as two thirds 69 % agreed while a high amount (24.1 %) disagreed with the assumption. The standard deviation (sd 1.386) indicated the fact as well.

In “staff recruitment” (M 2.36, sd 0.911) the value of benefit was seen as moderate, as only 50 % agreed with the claim. Some 42.9 % answered that they did not know.

The least important benefits was perceived to be in “customers crossing over to digital channels” (M 2.57, sd 1.136) and “supports tracking customer behavior” (M 2.64, sd 1.193). More than half (57.2 %) were of the opinion that their customers were already shifting to digital channels, while 21.4 %
disagreed and 21.4% did not have an opinion. In supporting the tracking of customer behavior, only 53.6% agreed with the claim, 21.4% disagreed and 25% did not know.

To summarize the estimated benefits, the means are listed below in order of the scoring. The lower the mean, the higher it was valued.

1. Brings in new customers (1.66)
2. Provides improved customer services (1.86)
3. Improves customer satisfaction (2.14)
4. Responds to customer demands for digital services (2.21)
5. Provides cost savings (2.25)
6. Increases sales to current customers (2.28)
7. Supports staff recruitment (2.36)
8. Customers crossing over to digital channels (2.57)
9. Supports tracking customer behavior (2.64)

Chi Square-test and Fishers Exact test were conducted in order to find out if the perceived benefits were dependent on the different adopter categories. The significances are presented in the Table 8.

The adopter categories differed significantly in “responding to customer demand for digital services” ($\chi^2=13.258$, p=.028). Early adopters agreed more that their customers demanded digital services, while half of the Majority did not agree with this option. Half of the Laggards answered that they do not know. The dependence was also verified by the Kruskall-Wallis test with statistical significance (p=.057).

In “increasing sales to current customers”, opinions of the different adopter categories varied significantly ($\chi^2=11.118; p=.051$). Especially Early adopters agreed with the opinion, while the Majority’s opinions were distributed across the whole range of scale. In order to increase the reliability, adopter categories and benefits were tested by a T-test. Although they are more reliable to parametric analyses, it gave parallel statistically significant results for the dependence for the following two benefits: responds to customers demand for digital services (p=.000) and increases sales to current customers (p=.010).
Adopter categories were dependent on the benefit of “provides improved customer services” with the statistical significance (p=.085) in the Kruskall-Wallis test. However similar dependency was not found for “improving customer satisfaction” ($\chi^2= 6.590; df=6 ; p=.360$).

Table 8. The benefits were tested for their dependence with the variables by Fishers Exact test (2-sided).

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>p-value ($\chi^2$: Adopters)</th>
<th>p-value Product group</th>
<th>p-value Market area</th>
<th>p-value Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responds to customers demand for digital services</td>
<td>2.21</td>
<td>1.287</td>
<td>.028</td>
<td>.729</td>
<td>1.000</td>
<td>.685</td>
</tr>
<tr>
<td>Increases sales to current customers</td>
<td>2.28</td>
<td>1.386</td>
<td>.051</td>
<td>.812</td>
<td>.326</td>
<td>.061</td>
</tr>
<tr>
<td>Provides improved customer services</td>
<td>1.86</td>
<td>1.044</td>
<td>.252</td>
<td>.388</td>
<td>.756</td>
<td>1.000</td>
</tr>
<tr>
<td>Improves customer satisfaction</td>
<td>2.14</td>
<td>1.187</td>
<td>.471</td>
<td>.600</td>
<td>.895</td>
<td>.808</td>
</tr>
<tr>
<td>Brings in new customers</td>
<td>1.66</td>
<td>0.857</td>
<td>.819</td>
<td>.251</td>
<td>.237</td>
<td>.367</td>
</tr>
<tr>
<td>Customers crossing over to digital channels</td>
<td>2.57</td>
<td>1.136</td>
<td>.941</td>
<td>.903</td>
<td>1.000</td>
<td>.687</td>
</tr>
<tr>
<td>Supporting to track customer behavior</td>
<td>2.64</td>
<td>1.193</td>
<td>.683</td>
<td>.253</td>
<td>.928</td>
<td>.122</td>
</tr>
<tr>
<td>Provides cost savings</td>
<td>2.25</td>
<td>1.143</td>
<td>.851</td>
<td>.972</td>
<td>1.000</td>
<td>1.000</td>
</tr>
<tr>
<td>Supports staff recruitments</td>
<td>2.36</td>
<td>0.911</td>
<td>.408</td>
<td>.436</td>
<td>.425</td>
<td>.710</td>
</tr>
</tbody>
</table>

The alternative adopter categories did not differ significantly in the cross tabulation, as summarized in the Table 8. above. However, in a pair-wise comparison of the Mann-Whitney test, Early adopters and the Majority differed significantly in their opinion on the benefits of supporting staff recruitment (p=0.039). Between the Majority and the Laggards, there was a significance in the benefit for supporting staff recruitments (Mann-Whitney (U=8) the significance of Exact Sig. (1-tailed) was 0.041).

Benefits were also tested with product groups, market area and occupation to see if there were differences between the adopters. In the Kruskall-Wallis-test, it was observed that product groups had significance in “Supporting tracking customer behavior” ($\chi^2=12.047$, df=3, p=.003) and weak significance in “Provides cost saving” (p=.074).
The benefits did not vary between market area focus much, and the only weak tendency was found in the cross tabulation table of “Brings in new customers”, where especially domestic enterprises agreed more than exporters. This was verified in the Mann-Whitney test, market areas varied significantly in benefiting “Increases sales to current customers” (U=35,500, p=. 088). The same trend was also incurred between occupation groups in which a difference was observed in the Fisher’s Exact test, that the owners disagreed more with the claim “increases sales to current customers” than the staff, with the statistical significance of 0.61.

The amount of staff had some statistical significance, also in the Kruskall-Wallis test where opinions and the amount of staff varied significantly for the benefit of “improves customer satisfaction” (p=.029).

4.6 Trends in B2C and B2B market

The emerging trends were assessed by presenting eight different assumptions to the respondents. The assumptions were presented separately for consumer retailing (B2B) and business between enterprises (B2B). The respondents were asked to select the market group where they had experience or to answer both alternatives. The number of answers related to B2C market was 14-16 to each assumption, and 15-17 for the B2B market to each assumption. Ten respondents did not answer these questions at all.

The respondents estimated how digitalization will impact the market in the future, especially for the wood products industry. The trends were evaluated and ranked in order according to their importance to business and the probability of realization.

*Probability and importance in B2C market*

Table 9. below presents the probability of the trend and its importance to a firm’s business in the B2C market. The trends were ranked according to their mean value in probability. The higher the mean, the more probable or important the trend. Standard deviation describes the distribution of the answers. The lower the standard deviation, the more focused the answers to the assumption, the higher the value, the more contradictions are included to the assumption.

In B2C business, the five most probable and important trends were the following:

1. Product information will be distributed directly to customers via digital channels.
2. Co-creation with clients will be emphasized.
3. Digitalization enables international markets for small SMEs as well.
4. International competition will increase on the domestic market.
5. The role of online retailing will increase significantly.

Table 9. The probability of the trend and its importance to a firm’s business in B2C market listed in order of the value of mean in probability.

<table>
<thead>
<tr>
<th>Trend</th>
<th>Mean of Probability</th>
<th>Sd of Probability</th>
<th>Mean of Importance</th>
<th>Sd of Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product information is distributed digitally to clients</td>
<td>77.50</td>
<td>25.95</td>
<td>63.75</td>
<td>36.96</td>
</tr>
<tr>
<td>Co-creation with clients will be emphasized</td>
<td>71.29</td>
<td>16.78</td>
<td>57.47</td>
<td>22.62</td>
</tr>
<tr>
<td>Digitalization enables global markets to small operators</td>
<td>69.53</td>
<td>28.79</td>
<td>66.20</td>
<td>27.01</td>
</tr>
<tr>
<td>International competition will increase at domestic market</td>
<td>67.86</td>
<td>28.12</td>
<td>60.07</td>
<td>31.66</td>
</tr>
<tr>
<td>Role of online retailing increases significantly</td>
<td>64.31</td>
<td>29.91</td>
<td>66.94</td>
<td>31.45</td>
</tr>
<tr>
<td>Importance of brands emphasized</td>
<td>63.63</td>
<td>27.11</td>
<td>55.19</td>
<td>29.67</td>
</tr>
<tr>
<td>Direct selling from producers to end-users increases</td>
<td>63.00</td>
<td>33.19</td>
<td>59.07</td>
<td>33.87</td>
</tr>
<tr>
<td>Multi-channel retailing will increase</td>
<td>56.23</td>
<td>33.66</td>
<td>48.20</td>
<td>31.46</td>
</tr>
</tbody>
</table>

The respondents stressed the probability of distribution of product information directly to clients via digital channels (77.5). This requires digital platforms with easy access to clients and skills in digital marketing. The second most probable trend in customer market was increasing co-creation with clients (71.29), although its importance was lower (57.47), the standard deviation verifies the focus of the answers. Both of the major trends create many new opportunities for a firm’s business models. Redirecting the product information to digital channels and applying them to co-creation can increase their sales.

New opportunities were also discovered from the international markets, as digitalization was seen to also enable international sales for small SME’s (69.53). International competition has entered the domestic markets as well (67.86). Online retailing plays a moderate role in increasing business, with the mean value of 64.31 in probability, but its importance to business (66.94) was seen as quite high.

The least probability was seen in the importance of brands, increasing direct selling from producers to end-users or multichannel-retailing. The respondents perceived the rise of multiple retailing
channels and new cooperation models between traditional brick-and-mortar and online shops unlikely in B2C commerce of wood products, like furniture, kitchen, outdoor and building supplies.

**Probability and importance in B2B market**

In B2B market, the list of the five top trends prior to their probability and importance differed from the B2C market in the following way:

1. Product information will be distributed directly to customers via digital channels.
2. Direct selling from producers to end-users increases
3. International competition will increase at home market.
4. Digitalization enables international markets for small SMEs as well.
5. Co-creation with clients will be emphasized.

Table 10. The probability of the trend and its importance to a firm’s business in B2B market.

<table>
<thead>
<tr>
<th>Trend</th>
<th>Mean of Probability</th>
<th>Sd of Probability</th>
<th>Mean of Importance</th>
<th>Sd of Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product information is distributed digitally to clients</td>
<td>77.41</td>
<td>26.49</td>
<td>77.47</td>
<td>25.34</td>
</tr>
<tr>
<td>Direct selling from producers to end-users increases</td>
<td>73.88</td>
<td>24.10</td>
<td>74.18</td>
<td>24.71</td>
</tr>
<tr>
<td>International competition will increase at home market</td>
<td>73.06</td>
<td>25.17</td>
<td>72.94</td>
<td>20.88</td>
</tr>
<tr>
<td>Digitalization enables global markets to small operators</td>
<td>71.24</td>
<td>30.46</td>
<td>57.06</td>
<td>32.32</td>
</tr>
<tr>
<td>Co-creation with clients will be emphasized</td>
<td>70.71</td>
<td>22.28</td>
<td>59.41</td>
<td>26.33</td>
</tr>
<tr>
<td>Importance of brands emphasized</td>
<td>68.24</td>
<td>26.52</td>
<td>69.12</td>
<td>23.61</td>
</tr>
<tr>
<td>Role of online retailing increases significantly</td>
<td>65.28</td>
<td>29.22</td>
<td>63.61</td>
<td>23.03</td>
</tr>
<tr>
<td>Multi-channel retailing will increase</td>
<td>57.41</td>
<td>27.24</td>
<td>49.47</td>
<td>27.30</td>
</tr>
</tbody>
</table>

Sharing product information with customers via digital channels seemed to be even more important for the B2B market, as the probability of the trend is equal but the importance is more than ten degrees higher. Direct selling to professional buyers was also much more probable (73.88%) and important (74.18%) than in the consumer market. International competition on the domestic market seemed to be more crucial than the consumer market, by as much as ten degrees higher, and the import of wood products was estimated to increase as a result of digitalization as well. Co-creation was a bit less probable and important than for the consumer market.
Although a less probable trend in general, when compared to the B2C market, the value of the brand was more highlighted in the digital B2B market. Likewise, the respondents representing the B2C market supposed that digitalization is unlikely to impact retailing trends so that the online or multi-channel retailing would increase in B2B-business.

*Differences between B2C and B2 markets*

In the survey, the respondents were inquired to position their assumption of the trend on a grid, which was scaled from 0-100. The average amounts were calculated from the entire sample, and are presented in Figures 4 and 5. The figures show estimated position of the trend, but the hand-drawn responses reduce the reliability of the figure. The results can be reviewed only from the order of the assumptions and shape of the curve.

**B2C market**

![Figure 4](image-url)  
*Figure 4. The evaluated trends how the business will change in B2C market based on the importance to business and probability of the trend.*
In the Figure 4, the most of the observations were located in the upper right, meaning that many assumptions were considered to be quite probable and important for business. At the head of the curve, there is the distribution of the information direct to client through digital channels, enabling global markets, co-creation, increased international competition and role of the online retailing. As seen in the Figure 4, the importance of brands, direct selling and multi-channel retailing were valued as lowest approved assumptions.

**B2B market**

![B2B market diagram]

- Role of online retailing increases significantly.
- Product information is distributed digitally to clients.
- Importance of brands will be emphasized.
- Multi-channel retailing will increase.
- Direct selling from producers to end-users increases.
- International competition will increase at home market.
- Digitalization enables global markets to small operators.
- Co-creation with clients will be emphasized.

Figure 5. Estimated trends in the B2B market based on the importance for businesses and the probability of the trend.

The shape of the curve is a bit different for the B2B market. It shows that the importance of the assumptions were evaluated higher on average than in the B2C market. Only multi-channel retailing was located separately at the end of the curve.

The variation between markets is described in Figure 6. below. The importance of digital selling platforms can be seen in both business environments. In the consumer market, the role of online
retailing was assumed to increase. It is interesting that respondents considered multi-channel retailing and integrating brick-and-mortar and online shops significantly less of a change factor. However, the distribution of the estimated importance is quite high, especially in B2B-answers.

![Diagram showing trend probabilities in B2C and B2B markets.]

**Figure 6.** Comparison of the probability of trends in B2C and B2B markets. The higher is value, more probable it was perceived.

**Variation between adopter categories**

The perceived trends were analyzed by the Chi and Fisher’s Exact Test from the adopters’ viewpoints, to see whether there are differences in the adopter categories in observing market trends. Statistical significance was discovered only between adopter categories and the trend of “Product information will be digitally distributed to clients” related to its meaning in the consumer market (B2C) (p=.083) and in the B2B market (p=.023). However, the result is slightly contradictory, as in the B2C markets the Early adopters valued the meaning lower than the Majority and the Laggards, while in the B2B markets Early adopters valued the meaning higher than the others. Although the T-test also showed
statistical significance for this trend in the mean (p=0.057) and the probability (p=0.015), the observance may be more random variation, as there were cells in cross tabulation where the amount of samples were less than five.

The meaning of co-creation with clients also varied in the B2B business environment between the adopter categories with statistical significance (p=0.027). Furthermore, the T-test showed that the same trend in the B2C market was significant as well (p=0.040). The Early adopters valued the meaning higher than the Laggards. The Kruskall-Wallis test, where opinions of amount of staff varied significantly in co-creation with clients (p=.025) and direct selling from producers (p=.027).

The probability of increasing international competition in the B2B markets varied according to adopter category (p=.089). Laggards observed its value higher than the Majority and Early adopters, who estimated it to show more moderate or lower values.

In the pair-wise comparison, Early adopters and the Majority varied with statistical significance (Meaning p=.008) in “Production information will be distributed digitally to clients” in B2C market. Likewise, between the Majority and the Laggards, the significance was in the mean p=.057 and in the probability p=.029.

While testing the significance between adopter categories and more than two independent variables by Kruskall-Wallis, a significance was observed in the B2C market “Product information is distributed digitally to clients” (χ²=7.243, df=2, p=.016).

In direct selling in the B2C market, opinions between Early adopters and the Majority varied significantly (p=.010) in the Mann-Whitney test, which was also significant in the B2B market (p=.069). In the Kruskall-Wallis test, the significance was observed in the B2C market “Direct selling from producers to end-users will increase” (χ²=5.567, df=2, p=.050). No other significances were found between adopter categories and trends.

Correlation between adopter categories and trends were tested with the Pearson correlation and Spearman’s rho. The only significant correlation found was in the B2B markets in “Direct selling from producers to end-users will increase” in Pearson correlation (p=.085). The low response rate reduces the reliability.
In comparison, market areas by the Mann-Whitney test showed that the Meaning of the trend in the B2C market had significance in “Role of online retailing increases significantly” (U=2,500, p=.048). Also Market areas differed significantly in the mean of trend in the B2C market in “Importance of Brands will be emphasized” (U=1,500, p=.029) and in Probability U=.000, p=.010. The same significance was observed in the B2B market in both mean (p=.045) and probability in brands (p=.068). Also the trend of “Multi-channel retailing will increase” in the B2C market (in Meaning U=2,000, p=.051) and in the B2C market probability (p=.068) and in the B2B market (p=.049). Market area also had some significance in the probability of the trend in the B2C market for “Global markets will open to small operators” (U=2,500, p=.055).
5. DISCUSSION

5.1 Results in the theoretical framework

The research explored the drivers that impact the adoption of digitalization in the Finnish wood products industry. There has been an emerging interest in digitalization in innovation research, although majority of studies have been concentrated on the large technology-intensive companies (Chesborough 2003). This survey provides insights into the factors of adoption of digitalization and emerging business models in micro companies and SMEs. It studied the factors of adoption, perceived impacts, benefits and trends in the markets.

Rogers’ (2003) diffusion theory provided a comprehensive framework for the survey. Rogers (2003) pointed out less researched areas in adoption research that should be studied, such as the impact of innovation from a future perspective. From the theoretical viewpoint, this study aimed to contribute to this part by asking the firms about the potential benefits and future perceived trends.

Digitalization encouraged companies to transform and alter their business models. This may be through either disruptive models in the business environment or small and gradual adjustments. The survey aimed to find out the factors behind adoption. The previous research on digitalization has mainly concentrated on exploring the adoption of technology. This study contributed knowledge by exploring the attitudes among the micro firms and SMEs in a product-driven industry, namely the wood products industry, and demonstrated some interesting results. Especially, this survey sheds light on the attitudes concerning the usage of digitalization in a product-driven industry.

The focus group of the study was Finnish wood products companies, for which 31 responses were received in the form of a completed online survey. The questionnaire was based on earlier adoption research and a pre-study of 13 interviews. The limited size of the sample did not allow an estimate of the general rate of adoption of digitalization in the wood products industry in Finland. The phenomenon of digitalization is continuously and rapidly developing and thus may be difficult to answer and the survey did not reach the whole industry. The study, however, gives some suggestions about the amount of applied digital tools and the attitudes of the Early adopters, the Majority and the Laggards.
In innovation management research, a qualitative methods research approach may also be needed to supplement the research (Eriksson & Kovalainen 2008), thus the approach of triangulation, pre-interviews and online survey were applied, in order to increase the reliability of the study. For modelling and outlining disruptive models, for example, case studies and interviews could be applied to deepen the understanding on the successful business model (Puusa & Juuti 2011).

5.2 Rate of adoption

The online survey explored how digitalization has been adopted in the wood products companies, and which factors effect the companies so that they are among the first ones or late ones in the adoption of digitalization. It explored, which kinds of digital tools and information channels are applied in diffusion of innovation.

5.2.1 The effect of internal variables in determining the adoption behavior

In general, most of the respondents were from micro companies or SMEs with turnovers of less than 2 million and that sold to the domestic market. More than one forth of the respondents (40.9%) were Early adopters, while one third were the Majority (31.8%) and the Laggards (27.3%). The share of respondents did not follow the Roger’s (2003) S-curve. If the data would have been less skewed, the collected sample may have had a parallel direction. Thus the study was not able to confirm the findings of the previous research by Karjaluoto et al. (2015), who stated that industrial firms are not at the forefront of adopting innovations and new digital channels.

Secondly, contradictory to the previous research (Chiang & Dholakia 2003, Zheng et al. 2004), market-orientation and product group did not explain the adoption of digitalization. Product groups or market areas did not vary according to their perceived adoption behavior. The sample size may have an effect on this, but that may form an interesting viewpoint to study in future studies with larger respondent groups.

The only variable which had an effect on adoption behavior in this study was size. Consistent with previous research on the adoption of innovations (Aguila-Obra and Padilla-Meléndez 2006), size was an important factor in determining the attitude to the adoption of digitalization. According to the results, micro size enterprises were Laggards more often than Early adopters. This results may be due to the fact that they have fewer resources for development. Especially the annual turnover showed
the most statistical significance of the variables in this sample in the relation to adoption behavior. The companies who had a turnover of less than 2 mm. euros, perceived themselves to be Laggards, while most of the SME’s considered themselves to be Early adopters. This was confirmed, not only in Fisher’s Exact test, but also in the Mann-Whitney U-test and Spearman’s correlation test, showing statistical significance in the comparison between adopter categories and the size, both in the drivers of number of staff and annual turnover.

Size was found to be the critical factor for adoption behavior. This confirmed the previous studies on the negative correlation between the size and adoption (Pimentel et al. 2016, Zheng et al. 2004). If more observations would have been reached, the result may have been statistically more significant. This finding is however important for further development in entrepreneurship counselling. Size can be related to the appropriate resources to be utilized in development. Doherty and Ellis-Chadwick (2008) did mentioned it as a key factor in the adoption of ecommerce in Britain’s retailing sector. The finding of this study points out the need to provide help and technical assistance for smaller companies so that they could reach a satisfactory level of digitalization and enable them to adopt the new tools to benefit their business.

Age and gender were not found to be significant indicators in explaining the adoption behavior of the wood products industry in the study. Contradictory to previous research e.g. findings of Mattila, Karjaluoto and Pento (2003) on age or Lihra and Graf (2007) on gender, this study was not able to confirm the importance of gender and age as a factor for predicting adoption. This was in part due to the skewness of the sample, with the majority of respondents being male and in the mature age group. Concerning the skewness in the distribution of those observations, their reliability in forecasting the behavior was weak. Especially gender, when only two women answered, was not applicable for further analyses. It must be noted that the wood products industry concerned in this survey is a male-dominated industry in general.

Third, occupation was found to play a moderate role in adoption behavior for digitalization. This strengthens the findings of Doherty and Ellis-Chadwick (2008). In comparing occupation and adoption behavior, this study showed some evidence that the owners may be more conservative in introducing innovations in their companies than the staff are, who more often felt their companies were Early adopters. Although there are restrictions in the reliability of this finding, it is an interesting phenomenon, which could be studied further. The degree of adoption of digitalization has been
associated with management support behind the strategy by Doherty and Ellis-Chadwick (2008), thus the findings of this study confirm earlier research.

Also the dependence on size was also verified by the Kruskall-Wallis-test, where the amount of staff had a significance in occupation (p=0.007). The correlation between occupation and size of the firm shows that the owners were more often from the micro companies, while the staff answering the questions were more often from the SMEs or from larger companies.

To summarize the findings of which factors effect adoption behavior, size and occupation were the only drivers which had statistic significance in adoption behavior for this study.

5.2.2 Rate of adoption of digital tools

When analyzing the findings from the perspective of the share of Early adopters (40.9% of all respondents) in this survey, the wood product companies seemed to have a low rate of usage of digital tools. Only 20% of enterprises had own internet pages and even joint-platforms were not common. Social media was applied to supplement the visibility in the netscape, but it had low frequency (8.2%), and even banner advertising on other web platforms was scarce (0.9%), although joining eDirectories was a bit more common (7.3%). The reason may be that eDirectories are actively marketed and easy to join compared to banner advertising, which requires more knowledge and resources, as well as being based on a short-term campaign rather than the permanent announcements made in eDirectories.

It was notable in this survey, although it was a question for a small sample of the wood products companies, that only a few applied ecommerce methods to increasing their sales. Only a few respondents had their own online shop or had joined a common web platform. None of the respondents retailed their products directly to the independent online shops. This may be due to the lack of suitable selling channels and the manufacturers’ pivotal positioning between brick-and-mortar and online retail. Most of the respondents were from sawn and log houses to building component companies and customer-centric products like furniture, where information sharing with customers on the variety, quality and price, might be a key advantage in sales.

Many digital tools for production and financial management, which could increase the business, were almost completely unemployed among the respondents. One reason for the low rate of adoption was that 90% of respondents were micro entrepreneurs (yearly turnover of less the 2 million euros). Thus,
entrepreneurs had less resources to get knowledge about digital solutions which would be suitable for them or to construct their own digital platforms.

In contrast to other industries, wood product companies did not invest much on the digital marketing tools. The study showed that only a few firms have identified the importance of digital marketing in enhancing sales. Furthermore, the low usage of a budget for digital marketing among SME’s confirms the findings in previous research, which explored that SME’s spend only a minor part of their budget on social media marketing (Michaelidou et al 2011). In contrast to that minor spending in present and previous studies, which found indications to invest more on digital marketing (Michaelidou et al 2011), the same tendency did not apply in this study as the companies estimated that they will spend less on digital marketing in the future. This is contradictory to the previous findings, which highlighted the increasing importance of social media in the B2B context, not only in the B2C market (Michaelidou et al 2011).

As the results suggested low rates of adoption of digital tools, a development perspective should be turned into a whole value chain. In order to utilize digitalization, development activities should be focused on developing new collaboration models. They could exist in the forms of joint-platforms or follow the open innovation model in building their networks. As the wood products industry is dominated by micro firms and SME’s, the role of industrial associations and other development organizations is crucial. The results show that micro enterprises have less capacity to join digital development on their own. Identifying barriers for adopting digitalization would also be beneficial, but this may also pose a problem to be solved in practice. Due to the nature of digitalization, different digital tools play a core role and they are developing fast. The results suggest that the companies need good practices and models for benchmarking and for information on tools. The resources are scarce in companies, thus time-saving and cost-efficient solutions are preferred. Likewise, Rogers (2003) suggested the change agents may play a beneficial role in the adoption of the digitalization in the wood products industry.

5.2.3 Information platforms in diffusion

Information distribution is the key issue in the adoption of innovations (Rogers 2003). The main information channel that wood products companies gathered their knowledge from was the media. The study also raised the importance of the change agents, as more one fifth had received information
about digitalization from external experts and consultancy firms. Industrial associations were in third position in provided information.

The results suggest the importance of sharing the information through the media and professional magazines in order to raise interest and spread good benchmarking models. Then change agents such as consultants and industrial associations can also learn more specific information about suitable options for own purposes.

One alarming finding was the minor role played by partner networks in learning about digitalization, although Rogers suggest peer-learning to be important in diffusion. Thus the industrial associations could support the diffusion and competitiveness of wood products companies by creating opportunities for joint-learning platforms for partners from same industry. Lack of benchmarking cases or learning in a partner network may tell something about the low rate of adoption of digitalization in wood products industry, or the Early adopters as the main respondent group in this survey and the fact that they are gaining their learning from external sources such as the media. Even the clients, who may have requirements for information sharing in their decision making, were not seen as notable sources of information. This may also tell us about the lack of co-creation or the not understanding client needs, as in other retailing sector online this is emerging rapidly, even in furniture retailing, like in IKEA. The lowest value was given to learning from competitors, from whom firms could gain valuable information.

The minor roles given to staff training and recruitment were also alarming. Increasing competence by training, which is mentioned as crucial for organization development (Puusa & Reijonen 2011) may be one missing key issue in diffusion among the wood products industry.

5.3 New opportunities for business

5.3.1 Impact of digitalization on firms’ businesses

In this study, the impact of digitalization was perceived mainly as positive among the wood products companies. A weak significance was found between Early adopters and Laggards in their opinions on the impact of digitalization in the Mann-Whitney test. Most of the Laggards and the Majority felt that digitalization has opened up new markets, while Early adopters also believed that it has supported them in defending their current market positions. Only a few were of the opinion that digitalization has hindered their companies in preserving their current market positions. Size was an important
factor in opinion-forming on the firm level for market impact (p=0.016), verified by the Kruskall-Wallis-test.

The results may suggest that those who adopt the digital tools later, may see them as opening new possibilities but they do not yet notify the competition in their business environment fully of this. Or if the surveyed industry is adopting digitalization at a slightly later stage as compared to other industries, there is still an open market, like a kind of “Blue sea” phenomenon for them as referred to by Kim and Mauborgne (2007). Thus adoption of digital tools may be very essential for the Majority and the Laggards to increase their businesses, and the development activities should be directed to those groups, beginners in learning of digital tools, where the leap in sales may be the most beneficial in the wood products industry.

Companies, who are already further advanced in adoption of digitalization, like the Early adopters, may see the market already more in a state of competition, like in the “Red sea” position. But exploiting the position of being an Early adopter and learning from the applications of digitalization from other industries, they may already have a more multi-channeled approach to find information about the newest innovations.

If there had been more respondents in this survey, its reliability would have improved. It must be admitted that for this question, more than one tenth responded that they did not know about the impact on their firm’s business opportunities. Thus the findings can only be considered weak signals on the direction and should be studied more in order to confirm the findings more precisely.

5.3.2 Advantages of digitalization

The perceived benefits have been mentioned as one important factor for motivating adoption (Rogers 2003, Zheng et al. 2004). The most important benefit of digitalization was bringing in new customers, parallel to the previous findings of Adelaar et al. (2004), Michaelidou et al. (2011), Pires & Aisbett (2003) and Zheng et al. (2004). The answers did not differ much between the adopter categories, but there were differences between them in market focus. The domestic enterprises agreed more than the exporters that digitalization “Brings in new customers”. This may suggest that domestic enterprises considered that digital marketing could attract customers on the domestic market, while exporters preferred to increase their businesses in other ways. It may also indicate that competition in the international market through digital platforms is high, and that for example the personal participation in fairs can increase their business better.
Providing improved customer services was the second most important benefit and no variation was found between the adoption categories or the other variables. In improving customer satisfaction, size had a weak statistical significance in the Kruskall-Wallis test, where opinions of companies with different amounts of staff varied significantly (p=.029). Improving customer satisfaction was placed as the third most important benefits in digitalization, thus the findings confirmed the previous research on e-customer satisfaction (Amin 2016, Carlson & O’Cass 2011, Michaelidou et al. 2011, Wallace et al. 2004).

In “responding to customer demand for digital services”, different adopter categories differed significantly (p=.028) as the Early adopters agreed more that their customers demanded digital services, while half of the Majority did not agree with this option. Half of the Laggards answered that they do not know. That suggests that Early adopters better recognize their customers’ demands. It would be compelling to further study which product groups or for which client groups digitalization would be most beneficial to increasing sales, and where it is less relevant. This finding confirms the results of the previous literature, which stressed the significance of strong customer orientation in the digital era according to Lipiäinen and Karjaluoto (2015b), Karjaluoto et al. (2015) and Baird & Parasnis (2011).

Cost savings have previously been found to be one important driver, according to Zheng et al. (2004). That was however not confirmed in our study, as “providing cost savings” received a high amount of do not know answers. Furthermore, it varied between product groups with a weak significance (p=.074) in Kruskall-Wallis-test. Thus the monetary models for estimating of the cost savings would need to be investigated in the future.

In “increases sales to current customers”, opinions of the different adopter categories varied significantly (p=.051). Especially Early adopters agreed with this opinion, while the Majority’s opinions were distributed on a wider scale. In the Mann-Whitney test, market areas varied significantly for the perceived benefit to “Increases sales to current customers” (p=.088). The same trend also received variation between occupation groups. The T-test gave parallel statistically significant results for “Responds to customer demands for digital services” (p=.000) and “increases sales to current customers” (p=.010). Although the findings were distributed between the various adopter categories, they are in same direction as the previous research (Karjaluoto et al. 2015; Michaelidou et al. 2011).
For “staff recruitment”, almost half of the responders did not know the answer. In the Mann-Whitney test, Early adopters and the Majority differed significantly in their opinions on the benefits of digitalization on supporting staff recruitment (p=0.039). Between the Majority and the Laggards, there was a significance in the benefit on supporting staff recruitments (0.041). The findings did not confirm the perceived importance of recruiting through social media, as suggested by Jussila, Kärkkäinen & Aramo-Immonen (2014).

The least important benefits was found to be the assumption of “Customers crossing over to digital channels”. A bit more than half of the respondents found their customers to be shifting to the digital channels, while one fifth did not know or disagreed. The low value in importance in the crossing-over effect finding was contradictory to the previous research (Blázquez 2014; Cao 2014; Karjaluoto & Lippiäinen 2015a; Bilgicer, Jedidi, Lehmann & Neslin 2015). Thus Blázquez (2014) suggest that retailers need to consider about the sales channels as a whole, by creating interactive content and benefitting of the touch points with the client, covering mobile shopping channels and social media. The contradictory results in this study suggest that the wood products industry could find several new business opportunities by tracking the usage of digital channels in a new way.

Behavioral tracking thorough marketing automation has been suggested to lead to more qualified sales leads (Järvinen & Taiminen 2016), thus it was interesting to find that tracking customer behavior was one of the least important factors among the respondents in this study. Especially in “tracking customer behavior”, the statistical significance was found between product groups (p=.003) in the Kruskall-Wallis-test. Like the findings of Michaelidou et al. (2011) found that in Britain the most of firms did not apply any metrics to investigate social media effectiveness, this study also confirmed the finding that visitor tracking was less employed among our responding companies. This may suggest that in order to overcome the barrier of being considered a of wasting resources into digital marketing, the knowledge of the practical analysis tools should be distributed among the micro firms and SME’s to help measure the effects and learn from the customer behavior. The findings were contradictory to the previous research (Saarijärvi et al. 2013; Michaelidou et al. 2011; Järvinen & Karjaluoto 2015).

To summarize the findings, the main benefits were suggested to be bringing in new clients, increased customer satisfaction and improved customer service and supporting the retention of current
customers. The perceived benefits were dependent on the adopter categories for “responds to customer demands for digital services” and for “increases sales to current customers”.

5.3.3 Market trends for the wood products industry in the digital era

The respondents estimated the emerging future trends that digitalization may bring to the businesses of the wood products industry. The trends were evaluated and ranked according to their importance to business and probability of realization.

In the B2C business, distribution of product information directly to clients via digital channels was perceived to be the most probable trend. The importance of the trend was perceived to be a bit lower, as opinions differed in the adopter categories. The Early adopters valued the importance lower than the Majority and the Laggards (p=.083), while in the B2B market the Early adopters valued the meaning higher than others (p=.023). In the Kruskall-Wallis test, a similar significance was found in the B2C market (p=.016). The findings confirm the findings of earlier research on digital product information (Pires & Aisbett 2003; Bullard & West 2002; Järvinen & Taiminen 2016; Zolkiewski & Littler 2004; Pauwels, Leeflang, Teerling & Huizingh 2011).

In practice, sharing information digitally requires digital platforms that are easy to access as well as digital marketing skills. It is interesting that that this trend was found to be the most probable one, while in the pre-interview it was mentioned that the industry lacks suitable digital platforms for their marketing. The respondents see the probability and importance of sharing product information on digital channels important, although there was a low rate of adoption of ecommerce and even of social media and internet pages. It is questionable how the companies generate sharing the information into sales. Do they have conversion or landing pages on their internet pages that redirect clients into a sales funnel? Also digital marketing skills are needed, for which counseling is a crucial development tool for the industrial associations and networks. As the media was found to be the most important information channel, the media could raise interest and perhaps offer such knowledge and tools for micro firms to begin digital marketing.

The second most probable trend was found to be increasing co-creation with clients in the consumer markets. Its probability was high but the importance was considered lower, even though the Early adopters valued the meaning higher than the Laggards in the T-test (p=0.040). In the B2B market, its probability and importance was a bit less than in the consumer market. The results also reflect that
the size of firm may have some dependence in co-creation with clients (p=.025) in the Kruskall-Wallis test. The findings confirm the previous research in the importance of co-creation (Vargo & Lusch 2004, Galvagno & Dalli 2014). It supports the need to understand the hidden needs of customers in product development (Osterwalder & Pigneur 2002). As the probability of co-creation was perceived high, but its importance lower, the importance of finding models to benchmark practical solutions in the industry is stressed. The meaning of co-creation with clients also varied in the B2B business environment between the adopter categories with statistical significance (p=0.027).

Digitalization was seen to impact the new operators entering the market, both by enabling small operators to sell internationally but also by increasing international competition on domestic markets. The findings confirm the previous research for international competition and global markets (Zheng et al. 2004, Pimentel et al. 2016). The Laggards observed the value of “probability of increasing international competition in B2B markets” higher than the Majority and the Early adopters, who estimated it at more moderate or lower values (p=.089). A difference was found too between domestic sellers and exporters opinions in the B2C market for “Global markets will open to small operators” (p=.055). There the competence of digital skills may form the basis of the competitive advantage of firms. In the customer market, entering the international market requires offering products to well-known international selling platforms. This can increase the sales of the products. A similar trend can also be seen in the US, where online sales of furniture has increased (Bullard 2002). In the comparison of the market areas, domestic companies and exporters differed statistically significantly on the importance of the “Role of online retailing increases significantly” (p=.048) in the Mann-Whitney test.

Contradictory to the above mentioned point, respondents evaluated the probability of increasing online retailing moderate, but its importance to business was seen the highest among the trends. When comparing the perceived importance of the trend and the low rate of own ecommerce or joint-platforms, the contrast sounds alarming. Even separate digital selling channels may have difficulty to differentiate in the market, thus the joint-platforms would be crucial for development of online sales. More suppliers create more variety and are attractive to customers. Industrial associations and enterprises should work together in order to get a strong enough commercial actor as the engine to lead the online sales platforms. For micro firms operating on domestic markets, local newspapers and their web platforms may also offer suitable digital marketing channels. Actually the low probability tells more about the present situation and that the potential of digital channels is not fully utilized.
The increasing role of online retailing was noted to the fifth place in selling to the consumer market (B2C), but not to the B2B market. Thus the finding is contradictory to the earlier research of Doherty & Ellis-Chadwick (2009), Zheng et al. (2004), Blázquez (2014), Donnell et al. (2012), Jussila et al. (2014) and Michaelidou et al. (2011).

For digital channels, the distinctiveness of brands plays an essential role (Lipiäinen & Karjaluoto 2015b). Contrary to previous literature (Lipiäinen & Karjaluoto 2015, Michaelidou et al. 2011, Muniz & O’Guinn 2001, Munnukka, Karjaluoto & Tikkanen 2015), the importance of brands was perceived among the lowest in valuation in this study. However, in B2B markets the importance and probability of the brand was higher. This finding may suggest that most of the respondents’ companies are selling raw materials instead of more highly productized brands. Domestic companies and exporters differed statistically significantly in importance of trend in the B2C market in “Importance of Brands will be emphasized” (p=.029) and in Probability (p=.010). The same significance was observed in the B2B market in both meaning (p=.045) and probability in brands (p=.068).

The lowest probability was considered for the assumptions of “increasing direct selling from producers to end-users” and in “multichannel-retailing”, contrary to the findings of Doherty & Ellis-Chadwick (2009), Bullard & West (2002), Cortiñas et al. (2010), Ansari et al. (2008) and Van Bruggen et al. (2010). The respondents perceived emerging multiple retailing channels and new cooperation platforms unlikely between traditional brick-and-mortar and online shops in B2C commerce of wood products, like furniture, kitchen, outdoor and building supplies. Direct selling to professional buyers (B2B) was more than ten degrees more probable and important than with consumer-customers (B2C). Opinions on the direct selling from producers differed between the adopter groups (p=.027) in the Kruskall-Wallis-test for B2C and B2B markets (p=.050). Opinions between the Early adopters and the Majority also varied significantly (p=.010) in the Mann-Whitney test, which found a significant difference also in the B2B market (p=.069). Also market areas differed significantly for the trend of “Multi-channel retailing will increase” in the B2C market (in Meaning p=.051) and in the B2C market probability (p=.068) and in the B2B market (p=.049).

Direct and multi-channel selling were recognized as an example of the behavior of a disruptor in the pre-interview. The producers were cautious to use this pattern of selling if they had a contract with the retailer, as the retailer could close the contract. However, IKEA was mentioned as a disruptor in the field of furniture and kitchens, and other consumer products. Although the probability and importance of the direct and multi-channel selling was seen low, they may offer micro firms and SME’s a way to modify their business-model and look to new opportunities for growth.
To summarize, the most important and probable trends in the B2C market were distribution of product information directly to clients via digital channels, increasing co-creation with clients and enabling international sales for small operators in general. All of them like the other trends had statistical differences between the adopter categories, so trends were perceived differently in the importance to the firm and probability.

5.4 Limitations of the survey

In spite of conducting the pre-study to customize the design of the questionnaire, the reliability of the study suffered from the small sample. As there were only few respondents, the distribution of the sample did not follow the S-curve of adopter categories of Rogers’ (2003) Adoption Theory. That may be due to fact that the share of respondents was skewed and that those who were interested in filling the questionnaire already had some knowledge about the phenomenon, which emphasized the share of Early adopters. Laggards were minor representatives in the sample, but as it is a question of the traditional product-driven industry, it is possible that those keen on digitalization did answer the questionnaire, while those less keen on digitalization rejected the survey, because there was quite a high failure in the percentage in respondents (more than 1000 contacts resulted in 31 respondents for the online survey and 13 personal interviews). Furthermore, the status of the adopter categories was named by respondents by themselves, which valuation may suffer from subjectivity.

Most of the respondents were from micro firms with less than 2 million in turnover and sold on the domestic market. Due to the larger amount of answers to the specific question, the variables of product group, occupation and size were more reliable than the variables of age, gender and market areas. Especially in age and gender, the sample was too skewed and therefore no further statistical tests were conducted for those factors.

Although the sample of the study was minor, which limits its reliability, it emphasizes some significant insights for further development. To summarize the evaluation of the reliability and validity, despite the low rate of responders the results can be considered to providing weak signals and development directions of where wood products companies are proceeding. It gave some insights on the process of diffusion of digitalization and its impacts and benefits in micro firms and SMEs. The results concerning the impacts, estimated budgets and benefits can be considered as quite reliable,
likewise the factors of size, product group and occupation, but the results for the rate of applying
digital tools and trends suffered in reliability from the missing answers. The reliability of the specific
factors was discussed within each result more specifically in the previous chapter.

Furthermore the study identified the Early adopters and Laggards, and through that identification it
also suggested which factors are the characteristics of Early adopters, in order to follow them in
business, or which kinds of companies need more support in the progress into digital world. The most
interesting new finding was that Early adopters had a strong customer orientation compared to the
Majority and the Laggards, this can be considered quite reliable as it was confirmed from multiple
directions with parallel results from the benefits and trends.

5.5 Managerial implications

This study explored the impact of digitalization on the business of Finnish wood products companies.
Emerging digitalization challenges the traditional product-driven industry, not only in its ways of
marketing, but also in its business models and entire value chain.

In diffusion of innovation, the perceived benefits are important. The respondents of this study
perceived that the most beneficial advantages of digitalization were bringing in new clients, especially
for domestic enterprises, improved customer services and increased customer satisfaction. The main
finding of this study was the high customer-orientation of the Early adopters. In evaluating the main
benefits and trends perceived by the Early adopters, they considered responding to customer demand,
sharing product information digitally and co-creation with clients much more important than the
Majority or the Laggards.

This chapter discusses the characteristics of adopter types, and what we can learn from them. It also
presents possible future development and research needs.

5.5.1 Learnings from adopter types

The findings showed weak differences in adoption behavior amongst the companies of different sizes.
The survey found size of the company to have a major effect on adoption behavior. Micro firms were
more often Laggards than Early adopters. Furthermore, position in the firm had an impact on the
adoption attitude, the study found some evidence that owners may be more conservative in introducing innovations in their companies than staff, who found their companies more often to be Early adopters. However, most of the owners who responded were from the micro companies, which may have an effect on the result. Differences were also identified between companies focused on local markets and companies operating on trans-local and export markets.

The findings of the study are summarized in the Table 11. The results show the factors which were dependent on the adopter categories in the cross tabulation, Kruskall-Wallis and Mann-Whitney tests. Although some factors suffered in reliability, the table gives some insights about the characteristics of Early adopters and Laggards.

Table 11. The summary of the results presents the characteristics of the various adopter types.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Early adopter</th>
<th>Majority</th>
<th>Laggard</th>
<th>Other remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production group</td>
<td>Service-oriented and in B2B commerce</td>
<td></td>
<td>B2C commerce</td>
<td>Not statistical significant</td>
</tr>
<tr>
<td>Market</td>
<td>Exporters</td>
<td></td>
<td></td>
<td>Not stat. signif.</td>
</tr>
<tr>
<td>Size</td>
<td>Larger SME’s</td>
<td></td>
<td>Micro firms</td>
<td>Statistical signif.</td>
</tr>
<tr>
<td>Age</td>
<td>-</td>
<td></td>
<td></td>
<td>No difference</td>
</tr>
<tr>
<td>Gender</td>
<td>-</td>
<td></td>
<td>-</td>
<td>No difference</td>
</tr>
<tr>
<td>Occupation</td>
<td>Staff</td>
<td>Owners, entrepreneurs</td>
<td></td>
<td>Not significance</td>
</tr>
<tr>
<td>Rate of adoption of digital tools</td>
<td>Use more digital tools (4-7)</td>
<td>Use less tools (1-3)</td>
<td></td>
<td>Not significance</td>
</tr>
<tr>
<td>Share of digital marketing budget</td>
<td>Estimates budget to increase in future</td>
<td>Digital marketing budget will not increase</td>
<td></td>
<td>Significant</td>
</tr>
<tr>
<td>Impact on business</td>
<td>Opened new market, supported current market position</td>
<td></td>
<td>Opened new markets</td>
<td>Significant in pairwise Early adopters - Laggards</td>
</tr>
<tr>
<td>Benefits</td>
<td>Responding customers demand, Increases sales to current customers, Supports in recruitment</td>
<td>Disagree, Answers distributed</td>
<td>Don’t know</td>
<td>Stat. significant</td>
</tr>
</tbody>
</table>
One of the most important managerial implications of this study was that the Early adopters had strong customer orientation. They valued “responding to customers demand on digital services”, “distribution of product information directly to clients via digital channels” and “increasing co-creation with customers” more than the Majority and the Laggards. Thus as a result, Early adopters also agreed more with “increases sales to current customers” than the Majority.

While firms are attempting to create suitable business models to scope in the digital era, tracking of Early adopters’ behavior may provide a solution, although in the study the competitors were named as the least important information channel from which firms gain their learning. In this study, the Early adopters were more service-oriented and working in B2B business. They had international orientation, but did not see international competition to be as important as the Laggards. They were more often larger SME’s rather than micro firms. Their rate of adoption of digital tools, like internet pages, social media etc. was higher than among the Majority. They considered that digitalization has supported them in defending current market position.

The findings of this study were two-fold. In addition to the characteristics of Early adopters, it is also crucial to recognize the later adopters, who need more support in their development in to digitalization. Laggards observed the value of “probability of increasing international competition in B2B markets” higher than the Majority and the Early adopters. The probability of increasing online retailing and importance of brands were valued the lowest. The professional associations could help them in training. The Laggards were more often micro firms and operating on the B2C market. They considered that digitalization has opened new market opportunities, but they were less keen on customer insights and suffered from international competition in their market.

The study found some evidence that the potentiality of digital channels are not fully utilized. The respondents considered the disruptive business models of increasing direct selling from producers to end-users and the rise of common multiple retailing channels as the most unlikely. Although of that, those emerging business models may offer micro firms and SME’s new opportunities for growth. The adoption of digital tools is important for the Majority and the Laggards in order to increase their competitiveness. The development activities should be directed to the beginners in learning about digital tools, there the leap in sales may be the most beneficial. In narrowing the gaps between Early adopters and Laggards, like Rogers (2003) emphasized, the next chapter discusses about the future directions in development and research needs raised in this study.
5.5.2 Future development and research needs

Retailing in both traditional brick-and-mortar and online shops was challenging according to the respondents. In the interviews it emerged that one barrier for online shop business was the question of how to allocate revenues and costs between producers and intermediators. Searching for new business logic may affect the entire value chain and leave many questions to be solved. This may be a reason for why the respondents considered the rise of joint multiple retailing channels unlikely. Best-practices and models from other industries are needed to support the wood industry to benefit for digitalization more profoundly.

The level of adoption of digital solutions was low among the respondent enterprises. They did not have many resources to develop systems on their own. The key thing is how they could benefit from digitalization.

The study raised important questions for future research. Although the micro firms and SMEs may be competitors amongst themselves, there is a question of which kinds of common platforms or arenas they would be willing to invest in that could provide them the most benefit from the cooperation? Could open innovation offer them competitive advantage? How would it increase their possibilities of reacting to international competition? How would larger companies benefit from cooperation with smaller ones? Furthermore, developing more cost-effective solutions and promoting simple measuring analytics may provide firms with a more stable basis to adopt digital solutions in their businesses.

Although micro firms and SMEs have less resources for joining digital development, the study shows that learning seems to be crucial for development of new business from digitalization. Motivation for the training could rise through creating and joining common online retailing channels. Therefore, developing practical models for open innovation can increase the competitiveness and innovativeness of the small-scale industry providing new solutions in retailing, logistics, distribution of intellectual property, customer insight and cost-efficiency.

The adoption of digitalization in the new business models was evaluated from the viewpoint of companies, of which digital tools they apply in their businesses, which benefits they perceive to gain from digitalization and what the emerging trends in the B2C and B2B markets were.

In the light of the share of Early adopters in this study (40.9%), the wood product companies seem to have a low rate in applying digital tools. Thus adoption of digital tools may be essential for Majority
and Laggards in order to increase their business, and the development activities should be directed to those groups, beginners in learning of digital tools, where the leap in sales may be the most beneficial in the wood products industry.

The results suggest that the companies need good practices and models for benchmarking and information on tools. As the survey found the size of the company to be a critical factor in adoption of digital tools, it is important that development actions and special counseling are directed to micro enterprises to support them.

The results gave an insight that the respondents did not perceive digitalization as creating a new opportunity for a profoundly new approach to value creation, but more in piecemeal, gradual movements. Firms could engage in new forms of digital marketing collaboration, participating in joined web platforms as peer-to-peer collaborative marketing platforms. New practical models for benchmarking and sharing knowledge in media and peer-wise learning through industrial associations may be crucial in diffusion and for competitiveness of the industry.

As business in the wood products industry is mainly based on functionality of the entire value chain and networks, open innovation approach may also provide a new modification tool for its business models. If mature wood product companies need to speed up their process to adopt digitalization, cooperation with start-ups or more-advanced companies may support them in adoption of suitable digital strategies and tools.

When searching for new business models from digitalization, a firm can do minor modifications in their business, likewise taking into account to the findings raised in this study. The results found many caps, which the firms did not apply in their business, like tracking customer behavior or recognizing the degree to which the customers are buying through online channels. By recognizing the most disruptive models, like chasms in this survey, a firm may gain a huge advantage in the market. The study showed that the most disruptive business models of increasing direct selling and the increase of joint multiple retailing channels was considered as the most unlikely. Although the probability and importance of the direct and multi-channel selling was seen as low, they may offer micro firms and SMEs a way to modify their business-model and gain new opportunities for growth.
6. REFERENCES


Aguila-Obra A. & Padilla-Meléndez A. 2006. Organizational factors affecting Internet technology adoption. Internet Research, Vol. 16 Iss 1 pp. 94 – 110


Holopainen, M & Pulkkinen, P. 2002. Tilastolliset menetelmät. WSOY.


Puuinfo: http://www.puuinfo.fi/ (referred 2.4.2015)

PuuKymi: http://www.puukymi.fi/ (referred 2.4.2015)


Puutuotetori: http://www.puutuotetori.fi/ (referred 2.4.2015)


APPENDICES 1. Questionnaire

1. Mitkä ovat yrityksesi tuotannon tärkeimmät tuoteryhmät?

   Saha-, höylä- tai hirsitavara
   Puu- tai hirsitalot
   Rakennuselementit
   Piharakenteet
   Ikkunat, ovet tai niiden osat
   Rakennuspuusepäntuotteet (listat, paneelit)
   Huonekalut, julkiskalusteet, kalusteosat
   Keittiökalusteet
   Muu, mikä?

1. Yrityksen henkilöstömäärä

   ___ alle 10
   ___ 11-50
   ___ 51-250
   ___ 250 +

3. Yrityksen vuosiiliikevaihto

   ___ alle 2 miljoonaa euroa
   ___ 2-10 miljoonaa euroa
   ___ 10-50 miljoonaa euroa
   ___ yli 50 miljoonaa

4. Kuinka paljon myynnistä menee eri alueille?

   Oma maakunta _____ %
   Suomi _____ %
   Pohjoismaat _____ %
   Eurooppa _____ %
   Muu maailma _____ %

5. Miten digitaalisen kaupankäynnin välineet tai niihin liittyvät muutokset ovat vaikuttaneet yrityksesi toimintaan? Digitaalisen kaupankäynnin yleistyminen on:

   ___ Avannut yritykselle uusia markkinoita
   ___ Auttanut yritystä puolustamaan jo olevia markkinoita
   ___ Vaikeuttanut yrityksen asemaa markkinoilla
   ___ En osaa sanoa

6. Mitä digitaalisen kaupankäynnin välineitä yritykselläsi on käytössä?

<table>
<thead>
<tr>
<th>käytössä</th>
<th>ei käytössä</th>
<th>tulossa</th>
<th>mobiili</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verkkosivut, omalla osoitteella</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verkkosivut osana yhteistä portaalia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sosiaalinen media tai blogit (Facebook, LinkedIn, YouTube)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hakukoneoptimointi</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mainostilan ostaminen verkkopalveluista (mm. bannerit)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suoramainonta (sms-mainosviestit, uutiskirjeet)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. Miten seuraavat väitteet kuvaavat digitaalisen kaupankäynnin väälineiden hyödytämistä yrityksessäsi?

<table>
<thead>
<tr>
<th>Asia</th>
<th>Samaa mieltä</th>
<th>Jokseenkin samaa mieltä</th>
<th>En osaa sanoa</th>
<th>Jokseenkin eri mieltä</th>
<th>Täysin eri mieltä</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asiakkaat edellyttävät digitaalisia palveluita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lisää myyntiä nykyisille asiakkaille</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parantaa asiakastyytyväisyyttä</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuo uusia asiakkaita</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asiakaskunta on siirtynyt digitaalisin kanaviin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auttaa seuraamaan kuluttajakäyttäytymistä</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mahdollistaa paremman asiakaspalvelun</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sähköinen kaupankäynti tuo säästöjä</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auttaa työntekijöiden rekrytoinnissa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Paljonko yrityksesi käyttää vuodessa rahaa digitaaliseen markkinointiin?

- alle 2 000 €
- 2 000-4 999 €
- 5 000-9 999 €
- 10 000-19 999 €
- 20 000 € tai yli
- en osaa sanoa

9. Miten digitaalisen markkinoinnin osuus tulee kehitymään yrityksesi liikevaihdosta seuraavan kahden vuoden aikana?

- Kasvaa yli kaksinkertaiseksi
- Pienenee
- Kasvaa
- Pysyy ennallaan
- En osaa sanoa
10. Mitä kautta olet saanut tietoa digitaalisen kaupankäynnin mahdollisuuksista?
___ Asiakkaiden kautta
___ Saman toimialan yhteistyökumppaneilta
___ Kilpailijoilta
___ Ulkopuolisilta asiantuntijoilta tai konsulttiyrityksiltä
___ Toimialajärjestöltä tai omista ammattilehdistä
___ Mediasta, myös muilta toimialoilta
___ Työntekijöiden koulutuksen ja rekrytointien kautta

11. Miten vähittäiskauppa (B2C) muuttuu digimaailmassa?

Merkitä seuraavien väittämien numero kuvioon sen mukaan, miten merkittävä se on yrityksen liiketoiminnalle ja miten todennäköinen sen toteutumista pidät.

Skaala: 0 = Ei tapahdu/ei tärkeä; 100 = Tapahtuu varmasti/erittäin tärkeä

1. Verkkokaupan rooli kasvaa merkittäväksi.
2. Tuotetietoa jaetaan sähköisesti suoraan asiakkaille.
4. Myynnin monikanavaisuus, eli verkko- ja kivijalkakaupan yhteistyö lisääntyy
5. Suoramyynti valmistajilta loppukäyttäjille lisääntyy
7. Digitaalisuus mahdollistaa myös pienille toimijoille kansainväliset markkinat.
8. Tuotekehitys painottuu yhteistyöhön asiakkaiden kanssa.
12. Miten yritysten välinen (B2B) liiketoiminta muuttuu digimaailmassa?

Merkitse seuraavien väittämien numero kuvioon sen mukaan, miten merkittävä se on yrityksen liiketoiminnalle ja miten todennäköisenä sitä pidät.

Skaala: 0 = Ei tapahdu/ei tärkeä; 100 = Tapahtuu varmasti/erittäin tärkeä

1. Verkkokaupan rooli kasvaa merkittävästi.
2. Tuotetietoa jaetaan sähköisesti suoraan asiakkaille.
4. Myynnin monikanavaisuus, eli verkko- ja kivijalkakaupan yhteistyö lisääntyy
5. Suoramyynti valmistajilta loppukäyttäjille lisääntyy.
7. Digitaalisuus mahdollistaa myös pienille toimijoille kansainvälisten markkinat.
8. Tuotekehitys painottuu yhteistyöhön asiakkaiden kanssa.

13. Miten kuvailisit yritystäsi uusien asioiden kokeilijana?

Olemme ensimmäisinä kokeilemassa ennakkoluulottomasti uutta, vaikka onnistumisesta olisi hyvin vähän takeita.
___ Emme ole aivan ensimmäisten joukossa, mutta kokeilemme mielellään uutta, jos koemme sen järkevaksi.
___ Kokeilemme uusia asioita yleensä silloin, kun ne alkavat yleistyä ja alalla alkaa olla niistä kokemusta.
___ Kokeilemme usein uutta vasta pitkään harkittuamme sitä ja usein niin, että sitä on ostanut jo muutamat kerrat.
___ Ovatamme jotain uutta käyttöön vasta, kun siihen on aivan pakko ryhtyä.

14. Mitä digitaalisen kaupankäynnin estettä yrityksessä on?

Korkeintaan kolme tärkeintä estettä.
___ En tiedä, mitkä sähköisen kaupan ratkaisut sopivat yritykselleni.
___ Tuntemani ratkaisut eivät kata kulua. Tuotto investointiin nähden ei ole riittävä.
___ Käyttöönottoon liittyvät riskejä.
__ Tarvitsemme lisää tietoa tai koulutusta.
__ Lisäärvon luominen asiakkaille digitaalisella palvelulla on vaikeaa.
__ Meillä ei ole liiketoimintakumppaneita, jotka voivat hyödyntää digitaalisia ratkaisuja.
__ Yrityksen johto ei koe digitaalista kaupankäyntiä tärkeäksi.
__ Tulosten mitaaminen on hankalaa.

15. Jos ette markkinoi tai myy tuotteita verkossa itse, mistä syistä se johtuu?
__ Korkeintaan kolme tilannetta parhaiten kuvaava vaihtoehtoa.
__ Tukku- tai vähittäiskauppa hoitaa verkkomarkkinoinnin tai -myyinnin.
__ Nykyiset jakelijat eivät hyväksy itsenäisiä verkkokauppoja.
__ Epäselvää hyötyä sijoitetuille ressurseille.
__ Hitasta näkyvät tulokset, ei välitöntä tarvetta verkkokaupalle.
__ Tekijänoikeus- ja sääntöviidakko.
__ Ajan tai resurssien puute toiminnan suunnittelussa.
__ Yrityksen oman osaamisen puute.
__ Ulkoistamistarve, liian korkea hinta.

16. Mitä digitaalisen liiketoiminnan kehittämisen tarpeita teillä on?
__ Sähköisen kaupan välineiden valinta __ Asiakkuuksien hallinnan välineet
__ WWW palvelun luonti ja ylläpito __ Verkkoanalytiikka
__ Verkkokaupan perustaminen __ Palvelujen kustannustehokkuuden arviointi
__ Tuotteiden saaminen verkkokauppaan __ Tuotannon ohjaus
__ Verkkomainonta __ Muu, mikä? ________________________


19. Tehtävä yrityksessä
__ Omistaja __ Yrittäjä __ Ylin johto __ Markkinointi/ myynti
__ Tuotekehitys __ Tuotanto __ Muu: ____________________________

20. Palautteesi tai yhteystietosi, jos haluat kertoa lisää:

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________