

# THE CORRELATION BETWEEN COMPANY SIZE AND THE DEGREE OF DIGITALIZATION: A QUANTITATIVE STUDY IN DANISH MANUFACTURING COMPANIES

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## ABSTRACT

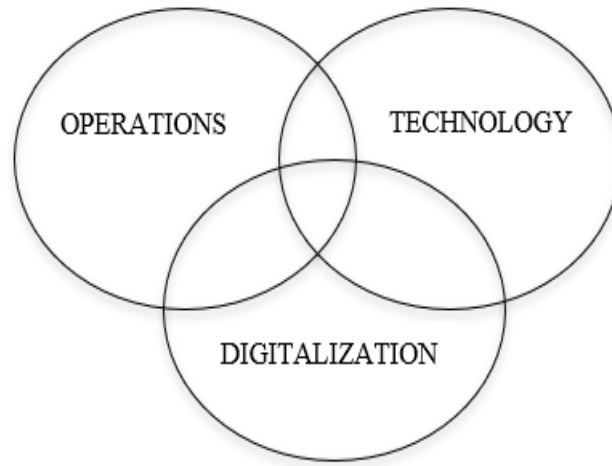
*Although digitalization in the manufacturing sector is considered an important factor of competitive advantage, its branches of application and the real benefits obtained by companies are still being studied.*

*The purpose of this paper is to investigate the relationship between the use of digital technologies and the company size in a sample of Danish manufacturing companies. When it comes to operations management, the degree of digitalization can have a great impact on the performance of the company. In this paper a literature review of digital technologies in operations management is conducted in order to create a conceptual model. A quantitative study was designed, and empirical data was collected through a survey. The findings from the survey suggests a minor correlation between company size and the degree of digitalization within Danish manufacturing companies, but it also implicates that size is not an accurate measure of degree of digitalization.*

**Keywords:** Digitalization, Survey, Technology, Operations Management

## 1. INTRODUCTION

Rapidly changing market demands and the uncertain state of the global economy have pushed companies to increasingly turn to digital transformation, ushering in a new era of manufacturing. Every stage of the manufacturing cycle, from the early design and development stages to organizational activities and distribution, is digitally permeated. The interconnection between digitalization, operations, and technology gives rise to multiple fields of application. The three main constructs on which this paper is based are shown in Figure 1.



**Figure 1 Venn Diagram about operations, technology, and digitalization**

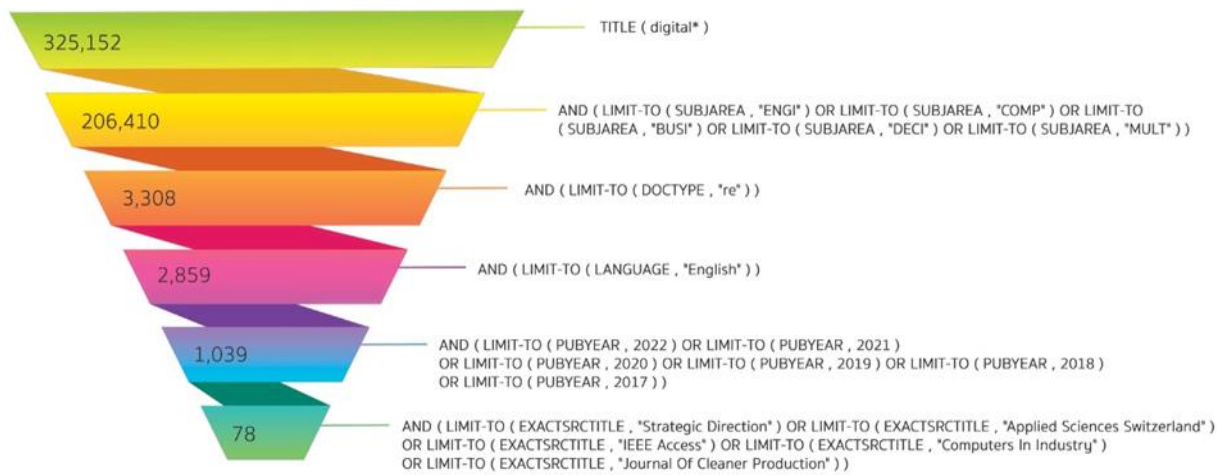
This paper will attempt to define what is meant by digital technologies in operations through a systematic literature review. The aim of this paper is to analyze digital technologies in the operations of Danish manufacturing companies and to measure their correlation with the company profile.

## **2. LITERATURE REVIEW**

The following structured literature review is going to investigate which variables to use as measures for the degree of digitalization and its connection to operations management. The first section explains the overall methodology approach. The second section deals with the theoretical explanation of operations management and digital technologies. The third section explains drivers and barriers to adopting digital technologies within operations management.

### **2.1 METHODOLOGY APPROACH**

The review methodology approach is sketched out in a two-step framework. The literature search was conducted on Scopus and gradually narrowed down to 78 articles, as shown in Figure 2.



**Figure 2 Funnel search chart**

Then, keywords shown in Figure 3 were sorted by frequency of occurrence, and categories were identified.



**Figure 3 Wordcloud Key-Words search**

## 2.2 OPERATIONS MANAGEMENT AND DIGITAL TECHNOLOGIES

Operations management (OM) is the activity of managing the resources that create and deliver services and products. The operation function is the part of the organization that is responsible for this activity. Every organization has an operation function because every organization creates some type of product and/or services (Slack 2016). Digitalization refers to the adoption or increase in use of digital technology by an organization, industry, country, etc. (Brenneen and Kreiss (2016)).

Digital technologies (DT) are fundamentally transforming business strategies, business processes, firm capabilities, products and services, and key inter-firm relationships in extended business networks (Priyono, Darmawan et al. 2021). These include Internet of Things, Big data analytics, Cloud, Cybersecurity, Horizontal/Vertical system integration, Simulation, Augmented Reality, Autonomous robot, Additive manufacturing (Cagno, Neri et al. 2021).

### **2.3 DRIVERS IN APPLICATION OF DIGITAL TECHNOLOGIES**

The adoption of digital technologies creates competitive advantages in many areas. Main drivers of using digital technologies in manufacturing are (Teixeira, Tjahjono et al. 2022):

- *Process improvement*
- *Workplace improvement*
- *Vertical integration*
- *Cost reduction*
- *Innovation push*
- *Market pressure*

When firms succeed in implementing digital technologies into their organizations, better innovation and use of resources can be achieved (Priyono, Darmawan et al. 2021). The possibilities created by digital technologies enable the formation of competitive advantages and, if used in the right way, redefine operations environments (Coelho Rodrigues 2022). Digital technologies benefit both small and large enterprises. It enables small enterprises to support the process of internalisation and expand their business. At the same time, these technologies enables incumbent companies to review their position in the market (Priyono, Darmawan et al. 2021).

### **2.4 BARRIERS IN APPLICATION OF DIGITAL TECHNOLOGIES**

Not all companies are able to effectively benefit from digital technologies. The use of big data, for example, is continuously expanding. The volume of this data often does not fit into traditional database structures (Miklosik and Evans 2020). The transition enabling digital transformation requires a thorough analysis in terms of initial investment, responsibility, adaptability, flexibility, customisation and levels of automation (Teixeira, Tjahjono et al. 2022). The use of digital technologies must also be accepted by the workforce and ensure a balance in terms of environmental sustainability. Moreover, organisations often hold onto established ways of doing things (Li 2020). In many companies, funds for initiatives are scarce and most of the budget is used for infrastructure maintenance (Li 2020). The transition to digital regeneration requires an understanding of jurisdictional and legal aspects, such as data protection, intellectual property, working hours and customer privacy (Teixeira, Tjahjono et al. 2022). To fully exploit the potential of digital technologies, a complete transformation of processes, staff and technologies is required (Miklosik and Evans 2020).

### **2.5 RESEARCH QUESTION**

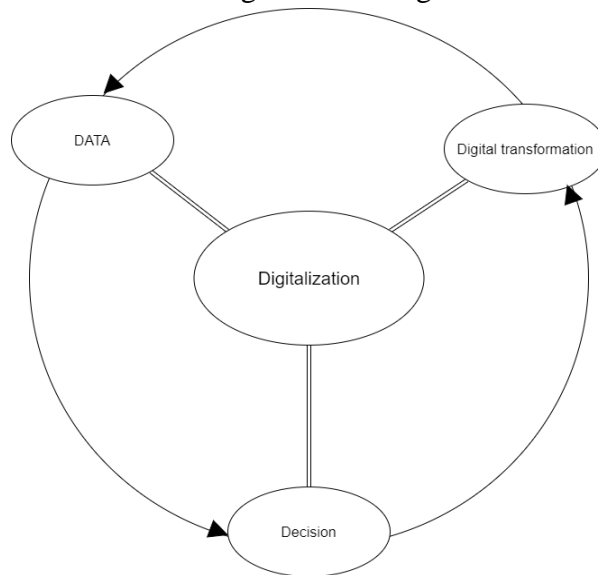
The 78 articles found showed different uses of digital technologies. The use of these technologies varied significantly depending on the contexts and objectives. For example, (Lee and Falahat 2019) studied how SMEs can gain competitive advantages in international markets, considering digitalization, resources and capabilities, in relation to company size and age. Other papers showed how competitive advantages can be gained through the use of machine learning and especially big data (Miklosik and Evans 2020).

The study conducted by the authors of this paper was based on a sample of 104 Danish companies. To investigate whether company size directly correlates to the use of digital technologies, this paper aims to answer the following research question:

*How does company size and degree of digitalization correlate within Danish manufacturing companies?*

## 2.6 CONCEPTUAL MODEL

The conceptual model was developed from the findings of the literature review. The digitalization of operations is a complex process involving multiple aspects. In particular, the adoption of data analytics and big data are considered primary digital technologies (Ivančić, Vukšić et al. 2019). From this, the first construct of digitalization has been identified as data. Data, in smart manufacturing, are acquired by manufacturing cells via sensors, and administered and exchanged via devices and servers (Rathore, Shah et al. 2021). Moreover, data analysis is often used with the aim of providing decision support. The second construct of digitalization has been identified in decisions. Decisions and data are also one of the inputs and outputs of digital transformation. Decisions, in fact, might relate to possible investments that manufacturing companies make in order to digitize a production process. Consequently, as stated by (Rathore, Shah et al. 2021), smart manufacturing mainly involves data. The conceptual model was developed based on the assumptions described above. This model, shown in Figure 4, explains how digitalization depends on data and the application of digital technologies, and how using data efficiently aids decision making processes. These decision making processes are then reflected in the investment choice of digital technologies.



**Figure 4 Conceptual model**

## 3. RESEARCH DESIGN

Based on the research question, the null hypothesis being tested is stated:

*‘There is a correlation between the size of Danish manufacturing companies and their degree of digitalization.’*

### 3.1 RESEARCH APPROACH

To accept or reject the hypothesis, the research must provide an overview of the degree of digitalization within manufacturing companies of different sizes. A survey is chosen as it is a cost effective and time saving method to reach a large sample size (Wright 2017). Reliability of the findings should be high using a survey, as other researchers should be able to replicate the findings. Since many manufacturing companies are global and use the same digital technologies, the external validity should be high. It should be noted that this study only investigates the degree of digitalization and the relation to company size found in Denmark. There is no evidence to support that the correlation will be the same in other regions or industries.

### 3.2 SURVEY STRUCTURE

The survey is conducted as an online survey consisting of three main sections shown in Table 1. The full set of survey questions can be seen in APPENDIX 1.

Section	Category	Objective
1	Company profile	Identify industry, age, location, size etc.
2	Process digitalization	Identify the use of digitalized processes.
3	Technology digitalization	Identify the use of digitalized technologies.

**Table 1** Three main sections in the survey

Sections two and three are answered by a five-point Likert scale. The survey was developed with lecturers at University of Southern Denmark and six other groups of student researchers stationed at University of Southern Denmark, all working on topics focused digitalization within manufacturing companies. Because of this, not all questions and answers are relevant to this paper. This paper will focus on company size from section one and use the means of answers in sections two and three to determine the degree of digitalization within two categories:

- *Degree of process digitalization*
- *Degree of technology digitalization*

### 3.3 POPULATION & PROTOCOL

The research target group consisted of 1814 Danish manufacturing companies extracted from the Danish Central Business Registry (CVR). Companies were approached by members of all seven research groups using the same standard protocol of calling by phone and asking to be put in contact with an employee positioned as COO, CTO, production manager or similar. If the employee agreed to participate in the survey, they would receive a link via email.

## 4. ANALYSIS AND RESULTS

Through the collection of answers for the survey 104 answers were obtained from different manufacturing companies across Denmark. The team of student researchers was

in contact with 48 companies were as 34 agreed to receive and answer the survey. From these 34 companies it was seen that 18 companies fulfilled their promise. This results in a response rate of 37.5% for the overall contacted companies and a rate of 53% within the companies which agreed to participate.

#### 4.1 DATA CLEANING PROCESS

The survey data was cleaned by targeting missing answers and checking for repetitive answers. Through the first cleaning step, each response is given a unique ID. Next, locating the frequency of missing answers, running from 0 to 39 missing answers to eliminate corrupt data points. The raw data contains a total of 4160 possible answers, whereas 331 are left empty, resulting in an empty answer rate of 8%.

Based on the setup of questions and in particular, q9a<sup>1</sup> and q9b<sup>2</sup> within the survey, it is accepted that 2 or less answers are missing from each row. Hence, 11<sup>3</sup> rows are eliminated from the questionnaire. The first clean show a reduction of missing data from 8% to 1%. Next, the variance within ‘Degree of process digitalization’<sup>4</sup> and ‘Degree of technology digitalization’<sup>5</sup> is checked to identify the repetitive responses. Both, variances are controlled in reference to the different business areas and the age of the company, the level of repetitive answers are accepted to proceed to the data analysis. The overview of the data cleaning process can be seen in Table 2.

Survey stats			
	Raw data	1st clean	2nd clean
Rows	104	93	93
Cells in total	4160	3720	3720
Filled cells	3829	3680	3680
Filled %	92%	99%	99%
Empty cells	331	40	40
Empty %	8%	1%	1%
Removed rows since previous	0	11	0

**Table 2 Data cleaning process**

#### 4.2 DATA ANALYSIS

To further analyze the data each response is categorized into one of four company sizes based on the number of employees; micro (1-9), small (10-49), medium (50-249) and large (above 250). This is done to accept or reject H0. See Figure 5 for distribution. Since the number of responses from micro companies is below 5 it is not included in the further analyses as it may contaminate or misrepresent the degree of digitalization.

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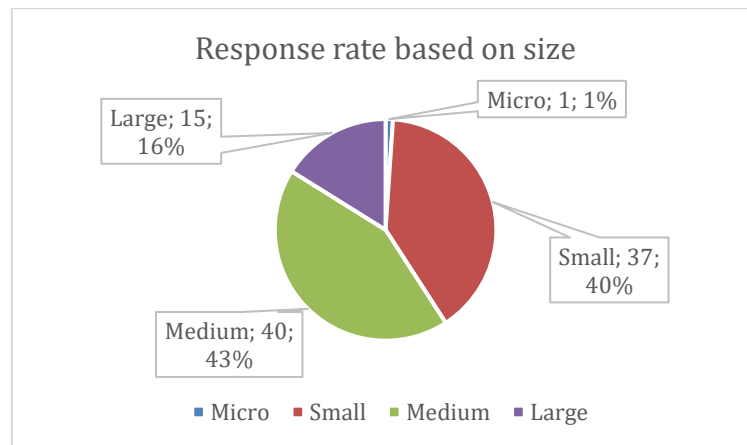
1 APPENDIX 2 – Section 1

2 APPENDIX 2 – Section 1

3 Response ID:27,95,96,97,98,99,100,101,102,103,104

4 q10a-q10j (See Appendix 3 Section 2 – Q10)

5 q11a-q11r (See Appendix 4 – Section 3 – Q11)



**Figure 5 Response rate based on size (amount; percentage)**

The degree of digitalization is based on the responses within q10: ‘*Degree of process digitalization*’ and q11: ‘*Degree of technology digitalization*’, as it shows the adaptation of digital technologies within processes and technology.

### 4.3 FINDINGS

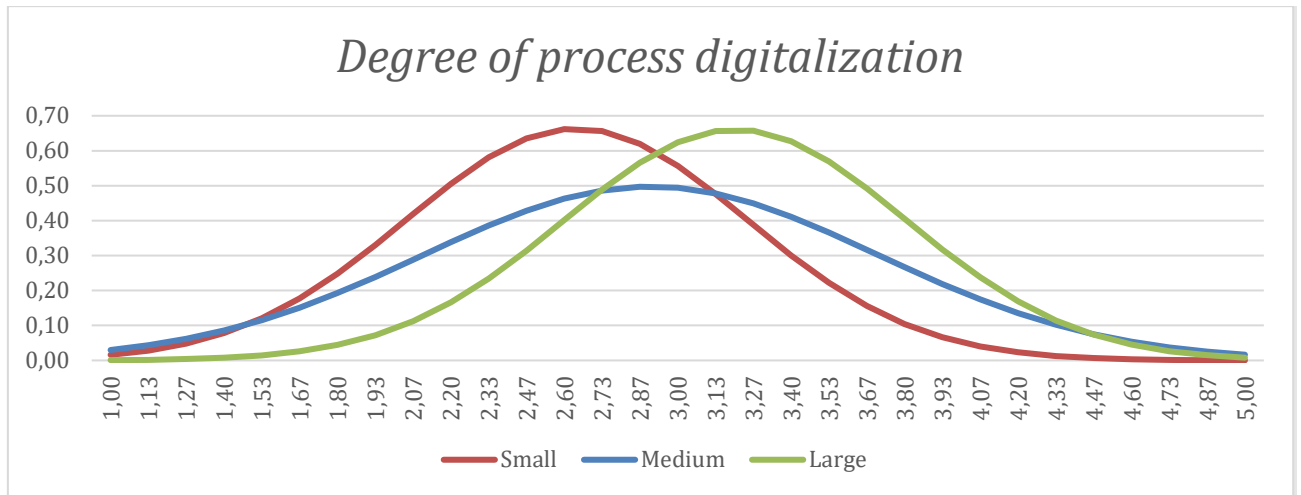
Firstly, the degree of digitalization is measured as the mean of responses within the ‘*Degree of process digitalization*’ and ‘*Degree of technology digitalization*’ on a Likert scale from 1 to 5. 1 represents no use at all and 5 represents full potential use. Table 3 shows that the means in both cases are increasing in relation to the company size. Hence, a higher degree of digitalization is identified in relation to the company increasing in number of employees.

		Degree of process digitalization			Degree of technology digitalization		
Company Size	N	Mean	Std. Deviation	Std. Error Mean	Mean	Std. Deviation	Std. Error Mean
Small	37	2,6	0,6	0,1	1,3	0,2	0,0
Medium	40	2,9	0,8	0,1	1,6	0,5	0,1
Large	15	3,2	0,6	0,2	1,8	0,4	0,1

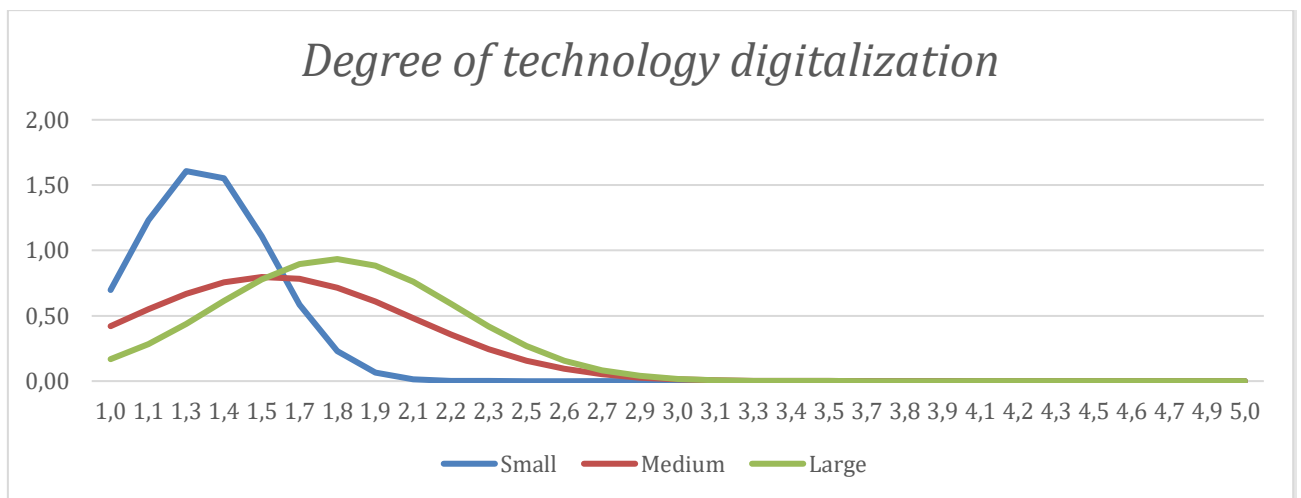
**Table 3 Illustration of the means and comparisons of means regarding company size and Degree of process digitalization/Degree of technology digitalization**

The normal distribution for both measures are visualized in Figure 6 and Figure 7. The figures show the mean and the deviation of degree of digitalization for each size category.





**Figure 6: Normal distribution of: Degree of process digitalization**



**Figure 7 Normal distribution of: Degree of technology digitalization**

Additionally, an ANOVA test is carried out, see Table 4, showing the low significance within degree of digitalization, however the significant p-value is above 0.05 within the mean of ‘*Degree of process digitalization*’, indicating the null hypothesis cannot be rejected as the statistical possibility of a higher ‘*Degree of process digitalization*’ is 6.2%, and therefore it is demonstrating the higher agreement may be occurring by chance. On the other hand, the significance of the p-value within the ‘degree of technology digitalization’ is less than 0.05 resulting in a rejection of the null hypothesis and is thereby indicative of a high chance the result can be replicated.

### ANOVA

		Sum Squares	df	Mean Square	F	Sig.
Mean Degree of process digitalization	Between Groups	3,690	3	1,230	2,534	0,062
	Within Groups	43,192	89	0,485		
	Total	46,882	92			

Mean Degree of technology digitalization	Between Groups	3,126	3	1,042	6,435	0,001
	Within Groups	14,411	89	0,162		
	Total	17,537	92			

**Table 4 ANOVA test of 'Degree of process digitalization' and 'Degree of technology digitalization' in relation to company size**

#### **4.4 RELIABILITY AND VALIDITY OF THE DATA**

To test the reliability of the data, a Cronbach's Alpha calculation is conducted within 'Degree of process digitalization' to establish the measure of internal consistency. It shows a Cronbach's Alpha of 78.5% and 'Degree of technology digitalization', which results in a reliability level of 87.7%. Hence, the reliability of the degree of digitalization is acceptable.

Furthermore, a correlation test is carried out to investigate if the questions within the q10 and q11 are valid within each of the two groups. Here it can be seen the average significance level of the correlation is 0% throughout the questions within 'Degree of technology digitalization', meaning the validity of the measures of digitalization is accepted. On the other hand, an average of 7.7% correlation is seen within 'Degree of process digitalization', meaning the validity is slightly above the 5% threshold.

However, based on the sample size of 93 respondents, the findings cannot be argued for with full confidence, but will be an indicator for the state of digitalization of Danish manufacturing companies.

## **5. DISCUSSION**

Throughout the interpretation of the collected data from the survey, quantifying the degree of digitalization as a mean of 'Degree of process digitalization', 'Degree of technology digitalization', and/or both, may on first sight result in a low score, regardless of the companies' sizes. Nonetheless, taking the mean of respectively 10 and 17 factors within the section 2 and 3 in the survey, will most certain result in a low score of digitalization. As most companies do not focus on all aspects of the industry 4.0 transformation at once. Hence, the difference in a score from 2 to 3 will undeniably be a significant increase within the degree of digitalization.

However, the data quality and sample size does not sufficiently create a basis for an assertive conclusion on whether the size of a company is indicative of a higher degree of digitalization. As the confidence interval is spread apart due to the large standard deviation. What can be seen from the data is a tendency for larger companies to have a higher degree of digitalization. In respect to the conceptual model, it is argued that an average large company has had a larger amount of time and resources to fulfill the iterative digitalization process. By having data, being able to achieve better decision-making, and therefore focusing on further advancing the digital transformation, resulting in more data. Smaller companies may have a slight disadvantage compared to larger

companies, but they are able to achieve a high degree of digitalization, especially as a micro or small company do not face the same level of rigidity.

## **6. IMPLICATIONS & LIMITATIONS**

The findings of this paper implicate some correlation between company size and the degree of digitalization within Danish manufacturing companies. However, it is not possible to determine the degree of digitalization based on the company size alone. The spread seen for each size group implicates that size is not the determining factor for how digitalized a company is or can be.

Since the findings from this paper are based on a small sample of Danish companies, they can't be trusted as an indicator for the correlation between size and degree of digitalization in other regions or industries. Furthermore, the sample size of 93 companies, could result in inaccurate data. Finally, the survey was designed as a general-purpose survey to answer multiple different research questions. Because of this, the survey questions were not formulated specifically to answer this paper's research question, and the authors of this paper had only little influence over the phrasing of the questions.

## **7. CONTRIBUTION AND FURTHER RESEARCH**

This paper contributes with a concept for measuring the degree of digitalization and it provides an overview of the current state of digitalization within Danish manufacturing companies. The paper also provides evidence suggesting some correlation between size and degree of digitalization in Danish manufacturing companies, but it also suggests that size is not an accurate measure to determine the degree of digitalization.

Further research could investigate:

- *Why companies of the same size have vastly different degrees of digitalization.*
- *The correlation between other variables and the degree of digitalization to determine potential drivers*
- *Whether size and degree of digitalization have similar correlation in other regions and industries*

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## APPENDIX 1

### Kære Respondent, medarbejder med ansvar for produktionen

Det følgende spørgeskema har til formål at undersøge graden og udbredelsen af digitalisering, ofte benævnt i relation til "Industry 4.0", i danske produktionsvirksomheder. Generelt beskriver Industry 4.0 den tendens, der videreudvikler virksomheder med afsæt i automatisering imod højere grad af digitalisering, systemintegration og dataudveksling inden for teknologi og processer i fremstillingsindustrien.

Undersøgelsen er rettet imod danske produktionsvirksomheder med mere end 20 ansatte.

Vi ser gerne, at du besvarer spørgeskemaet på vegne af din virksomhed generelt, og efter behov (f.eks. virksomhedens placering), med henvisning til det sted, hvor du er ansat.

Alle svar er vigtige og forbedrer de data, vi vil have til rådighed for analyse, og derved den indsigt vi får fra denne. Det er derfor vigtigt, at hvis du støder på spørgsmål i undersøgelsen, som ikke umiddelbart har relevans eller som du ikke kan svare præcist på, at du giver dit bedste skøn eller det svar du vurderer, er tættest på den sande værdi for virksomheden.

Alle deltagende virksomheder er garanteret fuld anonymitet, ikke kun direkte men vi garanterer også, at virksomheder ikke vil være identificerbare gennem arten af den præsenterede analyse. Efter afslutningen af analysen af de indsamlede data vil de registrerede mailadresser blive slettet.

Undersøgelsen gennemføres af civilingeniørstuderende i Operations Management ved Syddansk Universitet (SDU) og deres undervisere ledet af lektor Henrik Blichfeldt og lektor Mads Bruun Larsen. Ved uddybende spørgsmål eller kommentarer venligst kontakt Henrik Blichfeldt.

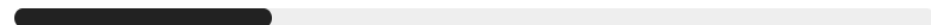
Hvis du er interesseret i at se resultaterne af undersøgelsen, er du velkommen til at registrere en personlig e-mail i slutningen af spørgeskemaet for at modtage et kort resumé af resultaterne. Ved at afgive din e-mail accepterer du kun at modtage resultater fra den undersøgelse du har deltaget i. Hvis du og din virksomhed har en generel interesse og/eller problemstillinger indenfor digital produktion og digitalisering af produktionen, er du altid velkommen til at tage kontakt for dialog og samarbejde.

Med venlig hilsen og på forhånd tak for hjælpen.

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PREVIOUS

NEXT

 28%

## APPENDIX 2 – SECTION 1

Indledningsvist vil vi bede dig udfylde lidt baggrundsinformation om din virksomhed ...

Hvad er din virksomheds primære branche?

Hvornår blev din virksomhed etableret?

Hvor er virksomheden placeret

- ☐ Region Hovedstaden
- ☐ Region Sjælland
- ☐ Region Syddanmark
- ☒ Region Midtjylland
- ☐ Region Nordjylland

Hvor mange ansatte er der i virksomheden?

Hvordan fordeler jeres ansatte sig i forhold til uddannelse?

Andel af medarbejdere med...

Videregående uddannelse / eller uddannelse der kvalificerer  
medarbejderen til en stilling i ledelsen

Faglærte medarbejdere

Ufaglærte inkl. elever og lærlinge

PREVIOUS

NEXT



42%



**I de følgende spørgsmål vil vi gerne spørge ind til din virksomheds produkter**

Hvordan vil du karakterisere - Virksomhedens Batch / partistørrelse

- ☐ Enkeltstyks produktion
- ☐ Små eller middelstore batch eller partier
- ☐ Store Batch eller partier

Hvordan vil du karakterisere - Virksomhedens produktionsmetode

- ☐ Ordreproduktion (f.eks. ved ordremodtagelse) (M-to-O)
- ☐ Endelig montering af produkt sker efter modtagelse af kundens ordre (A-to-O)
- ☐ Lagerproduktion (M-to-S)
- ☐ Produktion efter konfiguration eller udvikling direkte til kundeordre (C-to-O eller E-to-O)
- ☐ Findes ikke

Hvordan vil du karakterisere - Produktkompleksiteten af jeres produkt?

- ☐ Simpelt produkt
- ☐ Produkt med medium kompleksitet
- ☐ Komplekse produkter

## Q9A & Q9B

Har virksomheden introduceret nye produkter til markedet indenfor de seneste 3 år?

- ☐ Ja
- ☐ Nej

Var nogen af de produkter i introducerede nye ikke bare for virksomheden men også for markedet? (besvares kun hvis du har svaret "Ja" ovenfor)

- ☐ Ja
- ☐ Nej

PREVIOUS

NEXT



## APPENDIX 3 SECTION 2 – Q10

I hvor høj grad...

	Det gør vi ikke	I mindre grad	I nogen grad	I høj grad	I meget høj grad
...er jeres forretningsprocesser/ordre flow forbundet via IT-systemer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...er der manuelle datahåndteringer i jeres ordre flow, fx via indtastninger i systemer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...er der automatiske kontroller af dataregistreringer ift. ordre flowet?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...er status på en produktionsordre tilgængelig i real-time fx via skærme eller i systemer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...er udskrevne papirer nødvendige for gennemførelsen af produktionen, fx i forbindelse med ordrestyring og kvalitet?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...opdateres data i ERP systemet automatisk?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...kan jeres maskiner og udstyr kobles til jeres lokale netværk? F.eks. Ethernet eller WIFI?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...opsamles der automatisk produktions- og procesdata fra jeres udstyr og maskiner fx via sensorer og data interfaces?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...anvendes dedikeret software til at analysere produktions- og procesdata fra jeres maskiner og udstyr, fx power BI, Minitab, SAS JMP, blackbird, trendlog?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...anvendes automatiske algoritmer til at analysere produktions- og procesdata, fx simuleringstools, machine learning og process mining?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## APPENDIX 4 – SECTION 3 – Q11

Hvilke af nedenstående teknologier anvender virksomheden, og for de teknologier der anvendes, i hvor høj grad udnyttes potentialet i teknologien?

	Vi anvender ikke teknologien	Vi anvender teknologien - men udnytter ikke teknologiens potentiale i særlig grad	Vi anvender teknologien - og udnytter store dele af teknologiens potentiale	Vi anvender teknologien - og udnytter dens potentiale fuldt ud
Robotter til produktion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Robotter til håndtering	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Selvkørende truck/robot (AGV, automatiseret guidet køretøj via magnetbånd)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autonome selvkørende truck/robot (AIV, Autonomous Intelligent Vehicle)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3D printing for rapid prototyping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3D printing for direct tooling eller direct manufacturing af enten værktøjer eller komponenter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3D scannere eller vision kameraer til identifikation eller kvalitetskontrol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Data visualiseringsværktøjer, fx interaktive business intelligence løsninger	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cloud computing, datahåndtering og administration via ekstern webservices	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ERP, Enterprise Ressource Management, planlægning og ressource styring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Machine Learning (kunstig intelligens til behandling af store/komplekse datamængder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet of Things (IoT), integration af processer i datanetværk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Big Data, via store komplekse datasæt af både organiserede og uorganiserede data, fx billeder, temperatur og produktionsdata	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Simulering, af produktionsprocesser/linjer eller produkt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital Twin, af enten produkter eller processer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Augmented Reality, visualisering via både fysisk og virtuel data anvendt til fx service og træning	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Virtual Reality, 3D univers for fx produktions optimering og træning af medarbejdere	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PREVIOUS

NEXT



85%

Spørgeskemaet er slut - Tak for din deltagelse!

Hvis du ønsker det, kan du gratis og uden yderligere forpligtelse få tilsendt en opsummering af undersøgelsens primære konklusioner. Det gør du ved at skrive din e-mailadresse i feltet nedenfor. Vi understreger, at den opgivne adresse udelukkende anvendes til at fremsende resultater af undersøgelsen.

Ja - tak! Send undersøgelsens resultater til:

PREVIOUS

FINISH

