International Conference at the Brno University of Technology,
Faculty of Business and Management, April 30, 2019 Brno, Czech Republic
Perspectives of Business and Entrepreneurship Development in Digital Transformation of Corporate Business

The digital Transformation in Supply Chain

Stavros Valsamidis[a,*], Dimitrios Maditimos[a], Ioannis Petasakis[a], Efstathios Dimitriadis[a]

[a] *TEI of East Macedonia and Thrace, Agios Loukas, 65404 Kavala Greece*

Abstract

Purpose of the article The purpose of the study is to explore executives' attitudes towards the use of trends and technologies in supply chain.

Methodology/methods A primary survey conducted in May 2018-September 2018 to 204 to supply chain management executives in North-Eastern Greece. A Principal Component Analysis (PCA) with varimax rotation conducted to identify the main factors that affect executives' attitudes towards the use of digital trends and the technologies in supply chain. The Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) value was checked to be suitable for factor analysis. Chi-square value for Bartlett's test of sphericity was also checked. Regression analysis indicated which the main characteristics are. For all the analysis the statistical package SPSS 22 was used.

Scientific aim The aim is to investigate whether companies are overlooking emerging opportunities, such as those in supply chains. This may influence companies for resource reallocation and strategically shift resources to create more value and deliver higher returns to shareholders.

Findings Executives' attitudes towards the use of trends and technologies such as elastic, cost-to-serve, autonomous road transportation, mobility, IoT, Robotics, in supply chain are affected by the type of company, year of establishment, number of employees, technological infrastructure. The main factors revealed in regression analysis are mobility, human factor and pricing.

Conclusions The supply chain world has transformed fairly quickly over the last few decades. The low rate of supply-chain digitisation to date has much to do with the capabilities of the technologies that companies have available. This preliminary research could not be considered as an indicative for generalization of results. The sample of respondents is only from one part of Greece. Enlargement and reopening of the investigation in future years will record more accurately the views of executives in order to provide safer conclusions.

Keywords: supply chain, digital transformation, chi-square, Principal components analysis, Regression analysis

JEL Classification: M15, M21

* Corresponding author.
E-mail address: svalsam@teiemt.gr.

1 Introduction

Industry 4.0 is not limited to the technical dimension of digitalizing modern businesses, as it is rather the complete new organization and network coordination of value and supply chains (Glas and Kleemann, 2016). Industry 4.0 is expected to form in its ultimate shape new digitalized supply chains, which shall realize collaborative productivity rents and ensure no less than the competitiveness of entire industries (Willems, Agrell, and Lejeune, 2018). Whilst many more companies are already investigating how to react to the current trend of implementing Industry 4.0 technologies and concepts, recent research with respect to this term is highly diverse and limited to the operational implementation of technologies and concepts on the production process-level (Herman, Pentek and Otto, 2015).

For a number of industry sectors (retail, auto, electronic, aviation, chemical), digitalization of supply networks has been an important issue for more than two decades, but this concern is not shared across other industries (Hartmann, King and Narayanan, 2015). Digital transformation can have a major impact on all parties across the supply chain. It can negatively impact the supply of materials from manufacturing plants through to the customers, as well as alter the flow of money (Alicke, Rachor and Seyfert, 2016). Unfortunately, the cause of the disruption often goes unexposed until the repercussions actually occur. By then it may be too late to account for the changes that should have happened to prevent the disruption. This can lead to major financial problems, such as a devastating loss of revenue (Baxter, 2016).

The management needs to evaluate how their supply chain will be impacted by the relevant technologies, i.e. which challenges and potentials are to be expected with respect to the primary supply chain activities (Lambert, 2008). With the global supply chain poised to make dramatic shifts in the coming years to accommodate trends and gain deeper visibility into business processes in order to stay ahead of the competitive curve, every company throughout the value chain stands to benefit by adopting new technologies early and rethinking traditional, outdated processes to combat industry disruptors (Pontius, 2017).

According to McKinsey research, digitization has only begun to transform many industries (McKinsey Special Collection Digital strategy, 2017). Digital is penetrating all sectors, but to varying degrees (Bughin, LaBerge and Mellbye, 2017). The perception of respondents for the digital penetration by industry is 44% for travel, transport and logistics. Only 2 percent, in fact, report that supply chains are the focus of their forward-looking digital strategies, though headlining examples such as Airbnb and Uber demonstrate the power of tapping previously inaccessible sources of supply and bringing them to market.

The benefits of Digital supply chain (DSC) include cost-effectiveness of services and value-creating activities that are advantageous to many actors in the ecosystem, including firms and their suppliers, employees and customers (Maier, Passiante and Zhang, 2011). According to Mentzer et al. (2001), a supply chain can be defined as a set of three or more entities (i.e., organizations or individuals) directly involved in the upstream and down-stream flows of products, services, finance, and/or information from a source to a customer.

Supply chain management (SCM) encompasses the efforts involved in delivering and producing products and services in the value chain (Sherer, 2005). SCM links the processes across supplier–user companies and functions that enable the value chain to make products and provide services to the customer (Cox, Blackstone, & Spencer, 1995).

A study by The Boston Consulting Group shows that the leaders in digital supply chain management are enjoying increases in product availability of up to 10 percentage points, more than 25% faster response times to changes in market demand, and 30% better realization of working-capital reductions, on average, than the laggards (Korn Ferry Institute, 2018). They have 40% to 110% higher operating margins and 17% to 64% fewer cash conversion days. With the help of three key strategies, these agile companies are quickly leaving behind their less nimble competitors. The general consensus is that companies cannot afford to wait and the leaders in digital supply chain management are building a financial advantage that will be more difficult to overcome with each passing year. Companies will need to map opportunities for each of the newly available technologies. With digital transformation changing markets everywhere, top executives around the world are changing their priorities. Korn Ferry International surveyed 100 senior supply chain executives, along with interviewing academics and consultants, to explore issues that leaders face and their approach to building and organising the required talent to support this transformation. More than half of the respondents (53 percent) had a formal position to lead digital SCM, with most (92 percent) reporting to a Chief Operating Officer (COO), Chief Supply Chain Officer (CSCO), or to a supply chain leadership member. Digitisation is highly relevant for SCM, with three-quarters (74 percent) of executives rating this as 4 or 5 out of 5. Three out of four respondents said their organisations lack a clearly defined success profile for digital transformation of supply chain leaders, with many leaders suggesting that "we don't know how to improve our level of digitisation in supply chain".

McKinsey observes that most of the disparity between potential and actual gains from supply chain digitisation can be explained by technology gaps and poor management choices (McKinsey Special Collection Digital strategy, 2017). However, now that better digital solutions have become available, companies can make greater and faster improvements in supply-chain performance (Gezgin, Huang, Samal and Silva, 2017). According to Supply Chain Digital, 70 percent of executives have already begun digital supply chain transformation, yet progress is slow.

Capgemini Consulting and GT Nexus studied 337 executives from major global manufacturing and retail organizations across 20 countries throughout Europe and North America (Capgemini and GT Nexus, 2017). Exploring the relationship between organizations and their partners throughout the supply chain in their study, they remark that the first to examine both the current and future states of digital transformation across the sup-ply chain. The survey found that half of the executives responding view digital transformation as very important (75 percent agree that digital transformation is at least 'important'), but more than 30 percent are dissatisfied with their progress to date. Just 15 percent of respondents to the survey indicate that data from the extended supply chain is readily available to their organizations, yet 54 percent expect improvements in availability within the next five years (Pontius, 2017).

So, it is useful reading for most procurement people, particularly anyone in those sectors where supply chain is key, and it paints a picture of unmet need really in terms of the skills and talent available in this field. Three quarters of the 100 supply chain executives who participated in the study (through a survey and interviews) acknowledged that digitisation is highly relevant to their situation (KPMG, 2018). As the report says, "The function is expected to develop greater flexibility, lower cost and risk, and even develop new ways of analysing its potential revenue impact". But about four in 10 of those surveyed (41 percent) said a key barrier to digitising the supply chain was the availability of digital talent. Despite this, the "financial commitment to developing the required skills is low", with two thirds of executives saying that less than 10% of training budgets is relevant to digital, and that this amount is clearly not enough. Three-quarters of the sample positioned themselves in the middle of the pack, saying that a start has been made on digitisation, but there was still some way to go, with the "lack of a clear strategy" the biggest barrier to digital transformation. Lack of digital talent was a close second - that fits with our own thinking on general procurement transformation, where clarity of strategy has to come first, and then the "people aspects" really are the most critical success factor (Smith, 2018).

Traditional players in the logistics industry risk becoming irrelevant unless they embrace change in order to deliver more customer-centric services (Brightmore, 2018). DSC examines the findings of a new report by Accenture, which offers businesses advice on how to upgrade digital logistics strategies, calling on companies to raise their game and prepare to disrupt (Morley, 2017). However, according to the report by Accenture on digital disruption in freight and logistics, if traditional players embrace digital adoption and harness the power of new technologies to build new digital business models, they could not only enhance their competitiveness, but also boost earnings by approximately 13% per annum (Accenture, 2017).

The aim of this study is to find out whether there is a relationship between the business digitalization and the supply chain, technology systems or other company features.

2 Methodology

In order to ascertain the views of experts on the digital transformation in supply chain, the views of 204 supply chain management executives in the area of Northern Greece were recorded and processed. However, the respondents are executives who are responsible for SCM functions (i.e. Chief Supply Chain Officers) or executives whose responsibilities explicitly include SCM or indirectly, who had acquired SCM experience in their previous positions. 57.8% of the companies belong to production sector, 4.4% to packing sector, 20.1% to retail sale sector and 17.6% to distribution sector. 13.7% of the companies have less than 10 employees, 28.4% up to 30 employees, 33.8% up to 50 employees, 14.2% up to 200 employees and 8.8% have more than 200 employees.

In order to achieve this goal, we composed a questionnaire for the purpose of collecting empirical data from companies in the region selected for the research. The questionnaire consists of four (4) sections of questions, each of which were matched with company features and views on the digital transformation of the company. The questionnaire is structured since it has a strict order of questions.

Questionnaire consists of 43 items. In section A there are 6 items about company information. In section B there are 14 items about incidence of certain supply chain management issues, in section C (ICT items) there are 11 items about technology systems that have been adopted by each company and in section D there are 12 items about digitalization. All items in sections B, C and D are in 5 point Likert scale where 1 corresponds to "not adopted at all" and 5 to "fully adopted". Since the aim of the study is to find out whether there is a relationship between the digital business and the supply chain, technology systems or other company features, the 12 items in D sector measure the digitalization.

In order to identify patterns in the relationships between the items in section B, a principal component analysis (PCA) was conducted on the 14 items with orthogonal rotation (Varimax). During the analysis, in sequential steps we drop out items 4 and 7 because in the first of them the maximum component value in the corresponding table was 0.373, while in the second the maximum value of the component in the corresponding table was 0.343. The Kaiser-Meyer-Olkin measure verified the sample adequacy for the analysis, (KMO=0.802, Bartlett's test of sphericity $X^2(66)=1249.757$, $p<0.001$), indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Two components had eigenvalues over Kaiser's criterion of 1 and in combination explained 68,178% of the variance. The scree plot showed inflexion that justify retaining of 2 two components in the final analysis.

Finally, the items that cluster on the same components suggested that the first factor represent A-Incoming components and second factor represents B-outcoming components. Incoming denotes activities related to the input of the company while outcoming denotes activities related to the output of the company.

Subsequently, we create a new factor for each one of the above components, as the average value of the items that consists them. These factors are called A-Incoming and B-Outcoming. In order to check about validity and reliability of each one of these two new factors, we use Cronbach's A index. The value of Cronbach's A for factor A is 0.873 and for factor B 0.768, which means that each factor is high reliable, in the sense of internal consistency.

In section C (ICT items), respondents should state whether 11 technology systems have been adopted by their company. These technology systems are presented in table 1. For each one of the technology systems they have to choose between 1 (not adopted at all) to 5 (fully adopted). We generate a new variable that expresses the degree to which each company has adopted technology systems. For this purpose, we added the 11 independent items and we create a new variable, named technology systems adoption, with possible values between 11 and 55. The mean value of this new variable is 35.06 (standard deviation 9.9) and median 34.5.

Table 1 Technology systems that may have been adopted by each company

	Technology system
1	Supply Chain Management (SCM)
2	Customer Relationship Management (CRM)
3	Partner Relationship Management (PRM)
4	Enterprise Resource Planning (ERP)
5	Warehouse Management Systems (WMS)
6	Manufacturing Execution Systems (MES)
7	Transportation Management Systems (TMS)
8	Radio Frequency (RF) systems
9	Geo-coded Tracking
10	Bar coding technology
11	Electronic Commerce Technology

Source: Own research

The digitalization of the company is expressed by 12 items about supply chain in section D. In order to identify patterns in the relationships between these items a principal component analysis (PCA) was conducted on the 14 items with orthogonal rotation (Varimax). During the analysis, in sequential steps we drop out items 7, 10 and 11 because in the first of them the maximum component value in the corresponding table was 0.373, while in the second the maximum value of the component in the corresponding table was 0.343. The Kaiser-Meyer-Olkin measure verified the sample adequacy for the analysis (KMO=0.802, Bartlett's test of sphericity $X^2(66)=1249.757$, $p<0.001$) indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Two components had eigenvalues over Kaiser's criterion of 1 and in combination explained 68,178% of the variance. The scree plot showed inflexion that justify retaining of 2 two components in the final analysis.

In repetive steps we drop out items because in the first item, the Measure of Sampling Adequacy value in the Anti-image Matrix was very low (0.436) and the maximum value of the component value in the corresponding table was 0.386, while in the second item the maximum value of the component in the corresponding table was 0.381.

In order to identify patterns in the relationships between these items, a principal component analysis (PCA) was conducted on the 12 items with orthogonal rotation (Varimax). During the analysis, in sequential steps we drop out items 6, 7 and 11 because in the first one the value of Measure of Sampling Adequacy in the Anti-image Matrix was very low (0.422) and the maximum component value in the corresponding table was 0.386, while in the other two the maximum value of the component in the corresponding table was 0.381 and 0.401. The Kaiser-Meyer-Olkin measure verified the sample adequacy for the analysis, KMO=0.762, Bartlett's test of Sphericity $X^2(36)=348.919$, $p<0.001$, indicated that correlations between items were sufficiently large for PCA. An initial analysis was run to obtain eigenvalues for each component in the data. Three components had eigenvalues over Kaiser's criterion of 1 and in combination explained 58.958% of the variance. The scree plot showed inflexion that justify retaining of 2 two components in the final analysis.

Finally, the items that cluster on the same components suggested that the first component represents mobility, the second one represents human factor and the third component represents pricing. Items that consist each one of the three components are presented in table 2.

Table 2 Items that consist mobility, human factor and pricing components

	Item
1	Warehouse Robotics in the Supply Chain
2	Increased Focus on Cost-to-serve
3	More Things Will Connect to the IoT
4	Autonomous Road Transportation
5	The Appeal of Supply Chain Social Responsibility
6	The Rise of the Virtual Logistics Team
7	Elastic is the New Lean
8	The Blurred Line Between Logistics and Technology Services
9	Enterprise Mobility Penetration into the Supply Chain

Source: Own research

Subsequently, we create a new variable for each one of the above components, as the average value of the items that consists them. These variables are called mobility, human factor and pricing.

Then, we test whether each of the three factors that constitutes digital business, that is mobility, human factor and pricing, is affected by the sector in which companies operate, the number of employees, the way the supply chain is managed, the degree of adoption of technology systems, incoming and outcoming. This is checked with three multiple regression models. To control the sector in which companies operate, the number of employees and how supply chain is managed, dummy variables have been created. More specifically in our sample, the companies come from four sectors, production, packing, retail and delivery and the way they man-aged the supply chain has four categories, no management at all, empirically, department of the company and is outsourced. The variable "number of employees" has five values, that is less than 10 employees, between 11 and 30 employees, between 31 and 50 employees, between 51 and 200 employees and more than 200 employees.

3 Results

In this section we present the results of the regression analysis for the three dependent variables.

Dependent variable mobility

In the first regression model, we use mobility as dependent variable. From the final model we excluded the A variable because it was found to be not significant at 5% level (t-statistic = -0.599, p-value = 0.55). The model that will be adjusted is:

$$Mobility = b_0 + b_1 \times technology\ systems\ adoption + b_2 \times B + b_3 \times retail + b_4 \times packing + b_5 \times distribution + b_6 \times no\ management + b_7 \times empirical\ management + b_8 \times department\ of\ the\ company$$

Checking for collinearity was done through the VIF test. All VIF values are lower than 5, so we can safely conclude that collinearity is not a problem for our model. The value of Durbin-Watson test is 1.601, very close to value 2 so is satisfied the condition of independent errors. Regression is significant at 5% ($F(8.199) = 15.915$, p-value < 0.001). Test for normal error distribution (Normal Probability Plot) showed that errors follow the normal distribution (diagram 1). Test for stable variance of the residuals showed that there is steady variation (diagram 2).

The final model is:

$$Mobility = 4.074 + 0.028 \times technology\ systems\ adoption - 0.521 \times B - 0.439 \times retail + 0.262 \times packing - 0.374 \times distribution + 1.346 \times no\ management - 0.450 \times empirical\ management - 0.043 \times department\ of\ the\ company$$

The coefficients of this model are presented in table 3.

We notice that:

i. For each unit growth of technology_systems_adoption, mobility increases by 0.028 units.

ii. Retail and distribution companies have a lower average of mobility than those involved in the production.

iii. Increasing the score on factor B (Outcoming) leads to a decrease in the average mobility.

iv. Companies that do not manage the supply chain are more mobile than those outsourced, while those who managed supply chain empirically, have lower mobility than outsourced.

Table 3 The coefficients of the model with mobility as dependent variable

	Unstandardized Coefficients				Collinearity Statistics	
	B	Std. Error	t	Sig.	Tolerance	VIF
(Constant)	4.074	.335	12.162	.000		
Technology_systems_adoption	.028	.006	4.675	.000	.721	1.387
B-Outcoming	-.521	.075	-6.928	.000	.933	1.072
Retail sales	-.439	.137	-3.213	.002	.820	1.220
Packing	.262	.251	1.046	.297	.921	1.086
Distribution	-.374	.144	-2.593	.010	.892	1.121
Minimum management of supply chain	1.346	.425	3.169	.002	.705	1.418
Empirical management	-.450	.198	-2.278	.024	.265	3.778
Management Department of the company	-.043	.189	-.228	.820	.278	3.596

Source: Own research

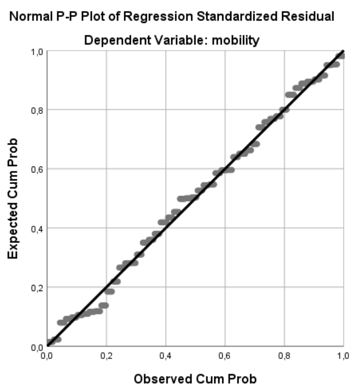

Diagram 1 Normal Probability Plot for mobility

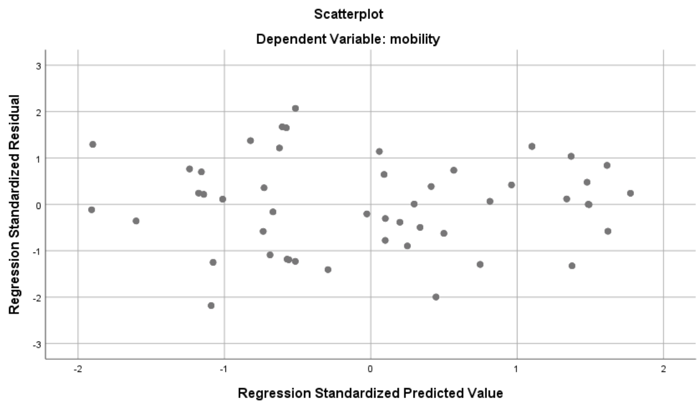

Diagram 2 Test for stable variance of the residuals for mobility

Dependent variable human factor

In the second regression model we use human factor as dependent variable. From the final model we excluded the A variable because it was found to be not significant at 5% level (t-statistic = 1.259, p-value = 0.21). The model that will be adjusted is:

$$Human\ factor = b_0 + b_1 \times technology\ systems\ adoption + b_2 \times B + b_3 \times retail + b_4 \times packing + b_5 \times distribution + b_6 \times (employees < 10) + b_7 \times (employees\ 11 - 30) + b_8 \times (employees\ 31 - 50) + b_9 \times (employees\ 51 - 200) + b_{10} \times empirically\ management$$

Checking for collinearity was done through the VIF test. All VIF values are lower than 5, so we can safely conclude that collinearity is not a problem for our model. The value of Durbin-Watson test is 1.762, very close to value 2 so is satisfied the condition of independent errors. Regression is significant at 5% (F(10.199) = 29.674, p-value < 0.001). Test for normal error distribution (Normal Probability Plot) showed that errors follow the normal distribution (diagram 3). Test for stable variance of the residuals showed that there is steady variation (diagram 4).

The final model is:

$$Human\ factor = 4.252 + 0.018 \times technology\ systems\ adoption - 0.409 \times B - 0.796 \times retail + 0.007 \times packing - 0.239 \times distribution - 0.839(employees < 10) - 0.547 \times (employees\ 11 - 30) - 0.323 \times (employees\ 31 - 50) + 0.100 \times (employees\ 51 - 200) + 0.212 \times empirically\ management$$

The coefficients of this model are presented in table 4.

We notice that:

i. For each unit growth of technology_systems_adoption, human factor increases by 0.018 units.

ii. Retail and distribution companies have a lower average of human factor than those involved in the production.

iii. Increasing the score on factor B leads to a decrease in the average human factor.

iv. Companies that manage empirically the supply chain have higher score in human factor than all other companies.

v. Companies that have less than 50 employees have lower score in human factor than these companies with more than 200 employees.

Table 4 The coefficients of the model with human factor as dependent variable

	Unstandardized Coefficients				Collinearity Statistics	
	B	Std. Error	t	Sig.	Tolerance	VIF
(Constant)	4.252	.291	14.637	.000		
Technology_systems_adoption	.018	.004	4.520	.000	.563	1.776
B-Outcoming	-.409	.052	-7.875	.000	.654	1.529
Retail sales	.007	.158	.045	.964	.772	1.296
Packing	-.796	.083	-9.631	.000	.747	1.338
Distribution	-.239	.090	-2.652	.009	.763	1.311
Employees <10	-.839	.173	-4.839	.000	.230	4.349
Employees 11-30	-.546	.143	-3.827	.000	.315	3.173
Employees 31-50	-.323	.125	-2.593	.010	.237	4.216
Employees 51-200	.100	.153	.652	.515	.326	3.071
Empirical management	.212	.067	3.172	.002	.775	1.290

Source: Own research

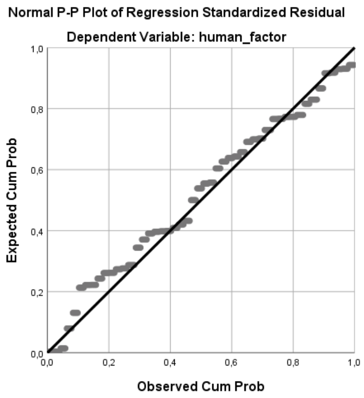

Diagram 3 Normal Probability Plot for human factor

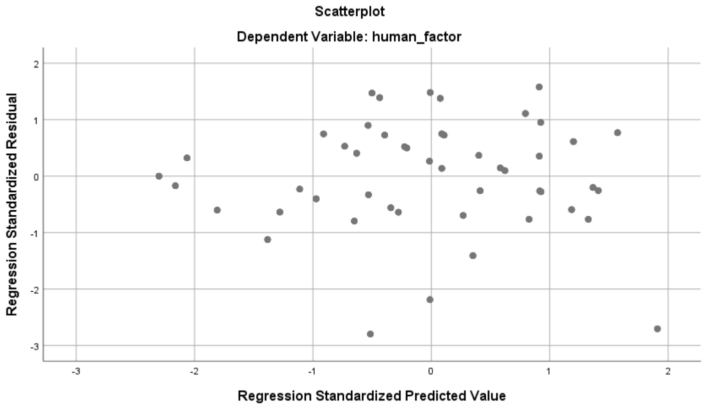

Diagram 4 Test for stable variance of the residuals for human factor

Dependent variable pricing

In the third regression model we use pricing as dependent variable. From the final model we excluded the A variable and the dummy variables related to the number of employees because they were found to be not significant at 5% level. The model that will be adjusted is:

$$Pricing = b_0 + b_1 \times no\ management\ of\ supply\ chain + b_2 \times empirically\ management + b_3 \times department\ of\ the\ company + b_4 \times packing + b_5 \times retail\ sales + b_6 \times distribution + b_7 \times B + b_8 \times technology\ systems\ adoption$$

Checking for collinearity was done through the VIF test. All VIF values are lower than 5, so we can safely conclude that collinearity is not a problem for our model. The value of Durbin-Watson test is 1.804, very close to value 2 so is satisfied the condition of independent errors. Regression is significant at 5% ($F(8,199) = 9.718$, p-value < 0.001). Test for normal error distribution (Normal Probability Plot) showed that errors follow the normal distribution (diagram 5). Test for stable variance of the residuals showed that there is steady variation (diagram 6).

The final model is:

$$Pricing = 2.014 + 1.356 \times no\ management\ of\ supply\ chain - 0.049 \times empirically\ management - 0.023 \times department\ of\ the\ company + 0.728 \times packing - 0.478 \times retail\ sales + 0.571 \times distribution - 0.213 \times B + 0.033 \times technology\ systems\ adoption$$

The coefficients of this model are presented in table 5.

We notice that:

i. For each unit growth of technology_systems_adoption, pricing increases by 0.033 units.

ii. Packing and distribution companies have a higher average of pricing than those involved in the production.

iii. Increasing the score on factor B (outcoming) leads to a decrease in the average pricing.

iv. Companies that do not manage the supply chain have higher score in pricing than companies that use outsource.

Table 5 The coefficients of the model with pricing as dependent variable

	Unstandardized Coefficients				Collinearity Statistics	
	B	Std. Error	t	Sig.	Tolerance	VIF
(Constant)	2.014	.338	5.960	.000		
Minimum management of supply chain	1.356	.413	3.284	.001	.705	1.418
Empirically management	-.049	.192	-.256	.798	.265	3.778
Management Department of the company	-.023	.184	-.124	.901	.278	3.596
Packing	.728	.133	5.483	.000	.552	1.811
Retail sales	-.478	.260	-1.842	.067	.813	1.229
Distribution	.571	.172	3.313	.001	.591	1.693
B-Outcoming	-.213	.073	-2.918	.004	.933	1.072
Technology_systems_adoption	.033	.006	5.778	.000	.721	1.387

Source: Own research

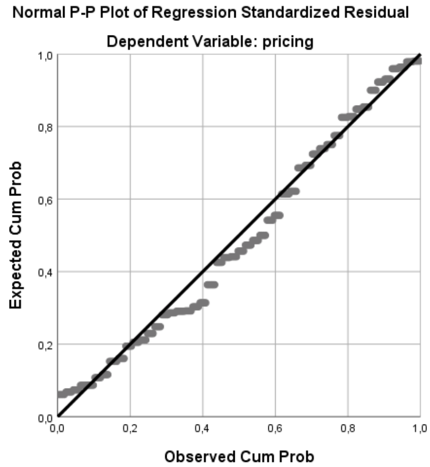

Diagram 5 Normal Probability Plot for pricing

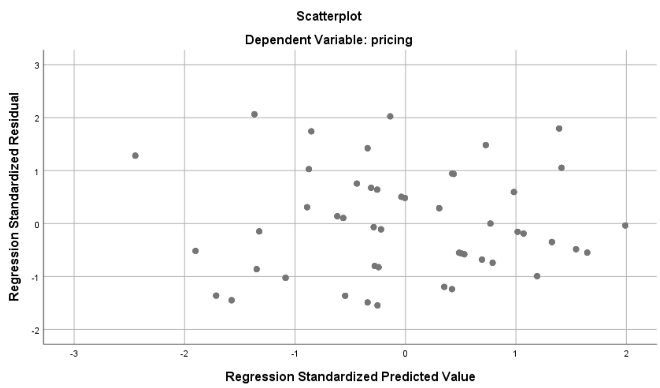

Diagram 6 Test for stable variance of the residuals for pricing

4 Discussion and conclusions

This study explored the supply chain management executives' attitudes towards the use of trends and technologies in supply chain. Executives' attitudes towards the use of trends and technologies such as elastic, cost-to-serve, autonomous road transportation, mobility, IoT, Robotics, in supply chain are affected by the type of company, year of establishment, number of employees, technological infrastructure. The main factors revealed in regression analysis are mobility, human factor and pricing. The findings may influence companies for re-source reallocation and strategically shift resources to create more value and deliver higher returns to shareholders.

The supply chain world, in relative terms, has transformed fairly quickly over the last few decades. Globalization, industry 4.0, the Internet and technological advancement have been the driving forces in manufacturing. The transportation industry has been a little slower to evolve. The low rate of supply-chain digitisation to date has much to do with the capabilities of the technologies that companies have had available until recently. While the transition to digital supply chains is complex, failure to act now will put your company at a severe disadvantage in the future.

Digital capabilities are critical to meeting the challenge of digital transformation successfully. Incumbents need to consider and drive this rotation to the new as a conscious and deliberate act of renewing and transforming their core business, while growing into new businesses and services.

This preliminary research could not be considered as an indicative for generalization of results. The sample of respondents is only from one part of Greece. Enlargement and reopening of the investigation in future years will record more accurately the views of executives in order to provide safer conclusions.

References

ACCENTURE. (2017). *Digital disruption in freight and logistics. Ready to roll?* Retrieved from https://www.accenture.com/t00010101T000000Z__w__/gb-en/_acnmedia/PDF-53/Accenture-Digital-Disruption-Freight-Logistics.pdf.

ALICKE, K., RACHOR, J., SEYFERT, A. (2016). *Supply Chain 4.0—the next-generation digital supply chain*. Retrieved from https://www. mckinsey. com/business-functions/operations/our-insights/supply-chain-40--the-nextgeneration-digital-supply-chain.

BAXTER, D. (2016). *By Supply Chain Disruption: The Bad, The Ugly, & The Future, Real-Time Visibility*. Retrieved from https://www.supplychain247.com/article/supply_chain_disruption_the_bad_the_ugly_the_future

BRIGHTMORE, D. (2018). *How companies can embrace digital disruption*. Retrieved from https://www.supplychaindigital.com/technology/how-companies-can-embrace-digital-disruption.

BUGHIN, J., LABERGE, L., MELLBYE, A. (2017). The case for digital reinvention. *McKinsey Quarterly*, 2, 1-15.

CAPGEMINI AND GT NEXUS. (2017). *The Current and Future State of Digital Supply Chain Transformation*. Retrieved from https://www.supplychain247.com/paper/the_current_and_future_state_of_digital_supply_chain_transformation

COX, J. F., BLACKSTONE, J. H., SPENCER, M. S. (1995). *APICS dictionary*. Falls Church, VA: American Production and Inventory Control Society.

DELOITTE'S DIGITAL SUPPLY NETWORKS. (2016). *The rise of the digital supply network*. Retrieved from https://www2.deloitte.com/insights/us/en/focus/industry-4-0/digital-transformation-in-supply-chain.html.

GEZGIN, E., HUANG, X., SAMAL, P., SILVA, I. (2017). Digital transformation: Raising supply-chain performance to new levels. *McKinsey & Company*, 1-10.

GLAS, A. H., KLEEMANN, F. C. (2016). The impact of industry 4.0 on procurement and supply management: A conceptual and qualitative analysis. *International Journal of Business and Management Invention*, 5(6), 55-66.

HARTMANN, B., KING, W. P., NARAYANAN, S. (2015). Digital manufacturing: The revolution will be virtualized. *McKinsey Quarterly*, Aug.

HERMAN, M., PENTEK T., OTTO, B. (2015). *Design Principles for Industrie 4.0 Scenarios: A Literature Review*. Technische Universität Dortmund. Audi Stiftungslehrstuhl Supply Net Order Management. Retrieved from http://www.snom.mb.tu-dort- mund.de/cms/de/forschung/Arbeitsberichte/Design-Principles-for-Industrie-4_0-Scenarios.pdf

KORN FERRY INSTITUTE. (2017). *The Supply Chain Digital Disruption. - Korn Ferry*. Retrieved from https://www.kornferry.com/institute/download/download/id/18363/aid/1811

KORN FERRY INSTITUTE. (2018). *Struggles with the Digital Supply Chain*. Retrieved from https://www.kornferry.com/institute/digital-supply-chain.

KPMG. (2018). *Transforming for a digitally connected future*. Retrieved from https://home.kpmg/content/dam/kpmg/gr/pdf/2018/06/GM-TL-01066_2018%20GMO.pdf

LAMBERT, D. M. (2008). *Supply chain management: processes, partnerships, performance*. Supply Chain Management Inst.

MAIER, R., PASSIANTE, G., ZHANG, S. (2011). Creating value in networks. *International Journal of Innovation and Technology Management*, 8(03), 357-371.

McKINSEY SPECIAL COLLECTION DIGITAL STRATEGY, (2017), Retrieved from https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/Strategy%20and%20Corporate%20Finance/Our%20Insights/Strategy%20and%20corporate%20finance%20special%20collection/Final%20PDFs/McKinsey-Special-Collections_DigitalStrategy.ashx

MENTZER, J. (2001). *Supply Chain management*. Sage Publications, Inc. 2001.

MORLEY M. (2017). *How Supply Chains are Embracing Digital Disruption*. Retrieved from https://blogs.opentext.com/supply-chains-embracing-digital-disruption/.

PONTIUS, N. (2017). *Transformation via Technology: The Key Drivers of Digital Supply Chain Disruption, Business.com / Technology*. Retrieved from https://www.business.com/articles/the-key-drivers-of-digital-supply-chain-disruption/.

SHERER, S. A. (2005). From supply-chain management to value network advocacy: Implications for e-supply chains. *Supply Chain Management*, 10(2), 77–83.

SMITH, P. (2018). *Supply Chain Digital Disruption – What Does It Mean For "Talent"?* Retrieved from http://spendmatters.com/uk/supply-chain-digital-disruption-mean-talent/.

WILLEMS, L., AGRELL, P. J., LEJEUNE, C. (2018). *On the Supply Chain in the Fourth Industrial Revolution*.