

Modeling the adoption of E-Procurement and Technology, Marketing and Social media bi-Products from Greek businesses and their effect on electronic sales

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Abstract: Today's Greek businesses strive to overcome economic obstacles and increase their sales by constantly searching new ways of improvement and economic sustainability. The technology factor has infiltrated every aspect of our lives, making the electronic element a vital part of living. Business bubble adopts more and more technological ways of improvement with E-Procurement and Technology adoption being the most dominant. The purpose of this paper is to analyze this adoption of Technology and E-Procurement from Greek businesses and the effect of those factors in businesses' electronic sales through simulation modeling using a sample of 400 Greek businesses. The reason the paper was created, is to provide this optimal solution to all businesses seeking how to increase their e-sales through Technology Monitoring and E-Procurement adoption. Thorough research through the paper revealed that Technology Monitoring and E-Procurement can be used from Greek companies to successfully increase their e-sales effectively.

Keywords: E-Procurement, Technology, Greek businesses, Simulation modeling, Economy.

1. Introduction

Our world is advancing constantly and in extreme ways. Businesses strive to improve and stand out of the all increasing competitive marketplace [1]. Greek businesses are another economic chapter, because of the Greece's unsustainable market and economic environment. That resulted in many business key economic variables being affected, with sales and electronic sales belonging in the factors being affected the most. With company sales continuously decreasing in extreme level, those businesses constantly search new ways to improve their sales. Technology has surfaced fast and quickly gained its position in everyday life affecting many factors [2]. One extensively been affected are businesses which constantly seek new ways to improve and develop economically [3]. Nowadays Greek

businesses rely in Technology by Monitoring new technological ways. This Technology Monitoring comes together with E-Procurement, another way of electronic sale improvement, composed of purchasing and supply sales through the Internet. Combining these powerful leading factors, Technology Monitoring with E-Procurement adoption, Greek businesses' electronic sales could have remarkably increasing results [4].

Simulations are used with mathematical precision to modelize and conduct a real experiment without the need of real resources and give real related results. A well-known tool used for empirical simulation modeling is E-Views 8, which has the capacity to absorb information data from a questionnaire and eventually find the appropriate correlations among the data. Another well-known tool used for simulation modeling is Anylogic 7.2.0 University, which provides all the necessary tools to simulate a real model [5].

There although is a big problem in the likes of business sphere and the e-sales factor. Every business who seeks to find the admirable key factors, the one that would increase its electronic sales, needs to search thoroughly and test the searched factors and eventually initiate a continuous comparison to spot the right key variable factors [6]. That procedure doesn't usually give the desirable effect and requires an appropriate time percentage and loss of resources. It is even more difficult for newborn businesses that recently emerged to the competitive and economically damaged Greek market [7]. What if there was a way, what if the leading variables as regarding the electronic sales, the ones that would lend a helping hand in Greek businesses who nowadays strive to sale online, were somehow known. That question this paper comes to answer.

There have been many previous studies as regarding Greek businesses. More precisely, 1102 as a whole. That number indicates that Greek businesses are a pole of study and appeal in the scientific world. The case of Greece is a well-known term in the economic world. As regarding the E-Procurement factor, there has been referred in 3063739 researches, a significant number. As for the Technology Monitoring factor, it has been referred in 66977 researches by now. E-Sales factor were referred in 3126143 researches, another significant number of researches. Researches that have Technology Monitoring, E-Procurement and E-Sales as factors are 8727 in number. Researches having used E-Views 8 for empirical analysis simulation and Anylogic 7.2.0 simulation modeling combined and the three factors, Technology Monitoring, E-Procurement and E-Sales for a 400 Greek business sample are none [8]. The part of this study that makes the difference of all the others is the fact that no other study has been conducted to modelize the E-Procurement and Technology adoption from Greek businesses and their effect on electronic sales and that is what makes this paper unique.

The objectives of this study are of vital importance. It uses technology, now part of everyday life and e-procurement, to modelize their adoption from Greek businesses and their effect on electronic sales and eventually find the optimal key factor comparatively.

2. E-Procurement and Technology monitoring as Marketing and Social Media bi-Products

Through the begging of time man human kind were constantly seeking new ways to improve their ways of living and that is the reason of Technology invention which evolved in many ways and sectors [9].

Nowadays Technology has many derivatives. Marketing and Social media factors are among them with the equation leaning between the Marketing and Social media factors. The last possess a significant role in today's way of living. Two bi-Products of those Marketing and Social Media key factors are E-Procurement and Technology Monitoring. In order to fulfill this E-Procurement role, someone has to search

thoroughly and acquire knowledge through the web using Marketing and Social Media, thus using Technology. In order to fulfill this E-Procurement role, someone has to search thoroughly through the web using Marketing and Social Media, thus using Technology too [9].

3. Two main factors affect E-Sales improvement from Greek businesses.

3.1. E-Sales

Electronic Sales, is the trading of products or services using computer networks, such as the Internet. Electronic sales have penetrated businesses in many ways. It enables them to take well framed decisions about policies and investments in e-sales. Internet marketing capacity play a role in enhancing other capability of information availability related to e-sales market. Internet marketing capabilities are important for grasping international marketing and e-sales opportunities. However, they may not necessarily lead to competitive vantage for a firm. Leveraging Internet marketing capabilities occur only when firm embed them in other organizational capabilities that relate to specific praxis and cognitive process in ways that generate a competitive advantage and impact a firm's electronic sales performance. The effect of Internet technology on electronic sales factors, such as online advertisement and market research has a significant direct effect on businesses' market growth. This is consistent with previous studies which shown a positive impact of Internet marketing activities on electronic sales [9].

To implement E-Sales, Greek businesses may develop electronic sales creativity, techniques to make a business stand out from the others as regarding e-sales. New and improved online shopping web sites for retail sales, where consumers could participate in online marketplaces, which process third-party business-to-consumer or consumer-to-consumer sales is one form of that electronic sales creativity. Another important factor is innovation implementation as regarding the electronic sales force. The electronic sales creativity could lead to this sales force innovation implementation. The last would eventually lead by its turn to an exponential e-sales force performance [10].

3.2. E-Procurement

Taking into consideration that Internet is used extensively for various routines, we could say that e-procurement is used intensively. Research has shown that Internet use is limited as regarding buying products and services online. That may be due to the fact that either Greek firms use a small portion of Internet tools during the whole leverage cognitive operation or the firm uses a wider figure of Internet tools but concentrated in a small level. As regarding the first ingredient of e-procurement intensity, in the industrial purchase process, the use of different Internet tools is possible, through to the supplier's vane land site to the creation of a business network on the Internet. The intensity of e-procurement is determined by the number of different Internet tools used and the stage of the buying process. This is a new area of research as it conveys into the effects of intensity of use and not only of acceptance of e-procurement tools in the organization, and particularly, in the industrial purchasing process. Several pieces of research examine the use of

Internet throughout different phases of the industrial purchasing process. E-procurement intensity refers to the extent of which e-business tools are used in one concrete purchase [11].

To implement E-Procurement, Greek businesses should first process the information taken from the Internet, taking into consideration the cost needed for the e-procurement procedure [12]. This would initiate an electronic participation in the electronic marketplace and its derivatives, such as Video-Conferences, Intranet and Extranet services. That E-procurement would eventually lead to an increased firm and e-sales performance [13].

3.3. *Technology Monitoring*

Firm organizational characteristics have an important impact on e-sales activity. Organizational peculiarity was specifically defined as firm size, average order size, willingness of the firm to adapt, type and quality of intersection manufactured. Technological characteristics have an important effect on e-sales too. They were defined as management mode, export performance, decision-making process, adequacy of company's resources, type of merchandising and selling logistics requirements and market penetration. Younger Greek firms monitor technology less than older ones because of the lack of cost-competitive advantages and adequate resources to compete in the well-established domestic market. Although with bigger firms comes greater contest, thus the firm needs to cope with this competitiveness by retaining and regaining new experience. That comes with monitoring new technologies constantly.

To implement Technology-Monitoring, Greek businesses should firstly emphasize to develop and enhance in their organizational characteristics. That would lead to a technology and research and development adoption and eventually affecting positively Greek businesses e-sales [14].

4. **Empirical strategy**

1. *Dependent and Independent variables*

To proceed in empirical analysis the dependent and independent variables of the model needs to be specified.

a. *Dependent variable*

E-Sales will be the dependent variable in the regression model. From the questionnaire we use the E-Sales to implement electronic sales.

b. *Independent variables*

Technology-Monitoring belongs to one of the independent variables used in the regression analysis model. From the questionnaire we use the Technology_Monitoring variable to implement this factor in our model. E-Procurement will be the second independent variable in our model. E-Procurement is the questionnaire variable that equals this E-procurement.

5. Forecasting Estimation Equation and regression analysis specification

In Equation 1, we can see the Forecasting Estimation Equation with the Dependent and Independent variables analyzed before. The regression analysis will lean on the Least Squares method used normal regression analysis [15]. C(1), C(2), C(3), will be estimated by the regression analysis Least Squares method which will be used, with C(1) being the constant variable of our model.

Estimation Equation:

$$E\text{-Sales} = C(1) + C(2) * \text{Technology_Monitoring} + C(3) * E\text{-Procurement} \quad (1)$$

6. Regression Results

E-Sales	
Technology_Monitoring	0.067970 (0.012050)
E-Procurement	0.568253 (0.013730)
Log likelihood	-4870.349
LR test (χ^2)	1178.93 ***
Number of obs	400

Notes: The figure reports marginal effects of ordered probit regressions. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level. Standard errors are reported in parentheses.

Figure 1. Regression Results

In Figure 1, we indicate the regression results of the model analysis using Least Squares method.

Firstly, the R-squared factor is 0.560899 in number, above 0.5, meaning that the regression analysis approaches reality.

Let's check Coefficient numbers. C(1) is the constant value as implied. Values C(2), and C(3) are signed positively, which means a positive relation exist between Technology-Monitoring, E-Procurement and E-Sales.

Checking the Probabilities in Prob. section and the Confidents together, we can see that C(1), C(2), C(3) of the Coefficient results have Probability less than $\alpha=5\%$. This reflects econometric theory where numbers with probabilities less than $\alpha=5\%$, which means results with a 95% level of confidence, have statistical significance and impact in the dependent variable. In other words Technology-Monitoring and E-Procurement affect E-Sales in a statistically significant way [15]. We see that C(3) Coefficient is higher than C(2) Coefficient for the same level of Prob. and same level of confidence. That means that E-Procurement variable affects in much higher level E-Sales factor.

	Technology Monitoring	E-Sales	E-Procurement
Technology Monitoring	1		
E-Sales	0.064423	1	
E-Procurement	0.080099	0.148630	1

Figure 2. Substituted Coefficients

In Figure 2 we can see the substituted coefficients of our model implicated in our initial equation. Here we can easily observe that positive influence, plus signs in front of each variable of the independent variables to the dependent one.

7. Implementation of the dynamic simulation model and previous research

To create the models, the modeling software tool Anylogic 7.2.0 University, was used to create stock and flow diagrams to model and simulate processes. It presents you the results of inputs defined by the user and connects the interrelationships between procedures and functions. Outputs can be displayed in the form of graphs and tables. Dynamic simulation model techniques were used to create this model [16].

8. Dynamic simulation model system analysis and z-statistic

This section describes the individual parameters of the dynamic simulation model. Firstly, the purpose of each element used, will be analyzed. Stocks, flows, converters and connectors consist the model. A stock represents the concentration of a quantity, either physical or nonphysical. A flow fills or depletes a stock. The arrow points the direction of positive flow into or out a stock. There are two types of Connectors. The first is the solid wire, an action link and the second a dashed wire, an information link. A converter keeps values stable or serves as an external input to the model or converts inflows into outflows through user-defined algebraic or graphical functions [16].

In order to modelize the two variables as regarding their adoption of firms and their E-Sales intensity, 400 answered statistics were extracted for each variable from the questionnaire and next the t-statistic value as computed for each variable as seen in Figure 3 were taken into consideration.

A t-statistic, measures the degree of agreement between a sample of data and the null hypothesis. When data present strong evidence against the null hypothesis assumption, the magnitude of t-statistic becomes large or small depending on the alternative hypothesis. t-statistic, finds evidence of a significant difference between two or more sample means. Those t-statistics will be used in the model for the firm to know exactly the percentage of resources that will be assigned for the implication of each variable.

T-Statistics	
Technology_Monitoring	5.640464
E-Procurement	41.38734
Log likelihood	-4870.349
LR test (χ^2)	1178.93 ***
Number of obs	400

Notes: The figure reports marginal effects of ordered probit regressions. *Significant at 10% level. **Significant at 5% level. ***Significant at 1% level. Standard errors are reported in parentheses.

Figure 3. T-Statistics

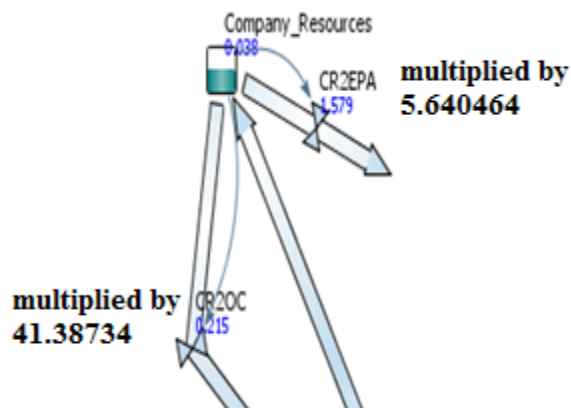
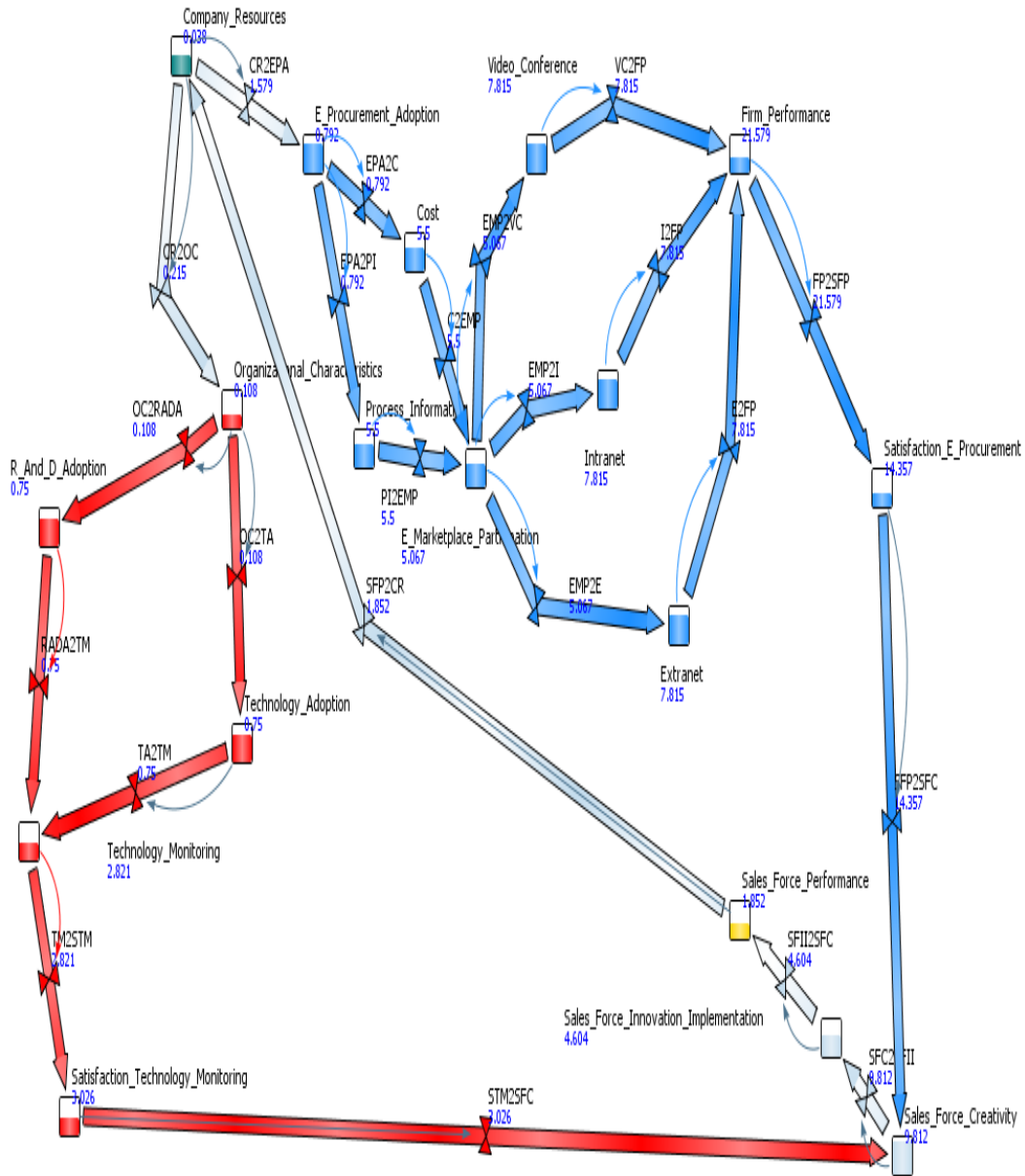


Figure 4. Exact numbers of resource percentage given from the firm for each variable implication.

In Figure 4 we can observe the exact numbers of resource percentage given from the firm for each variable implication that flow from the center "Company_Resources" Stock to each variable Stock.

9. Implementation of the dynamic simulation model

This section describes the individual parameters of the dynamic simulation model.



The tank “Company Resources” supplies with resources the two subsystem counterparts consisting of E-Procurement and the Technology-Monitoring subsystem. These resources are available in order to execute the related activities and to satisfy leverage. The trail of thought followed, in order to create the model is called storytelling. Storytelling is the main characteristic of Anylogic 7.2.0 University simulation model. Every stock of the simulation model successses its previous one like unfolding a story with every stock being its next succeeding chapter. The direction of action in that storytelling is indicated by the direction of the flows [16].

E-Procurement subsystem

The stock “Company_Resources” a percentage of resources as indicated in Figure.7, in that subsystem. In order to achieve that purpose, firstly that resources are

provided to the “E_Procurement_Adoption”. And that’s where the storytelling begins. From that stock two other flows are emerging to connect to the “Cost” one and the “Process_Information”. Those two converge in the “E_Marketplace_Participation” which breaks in three Stocks. Those three are the “Video_Conference” Stock, the “Intranet” Stock, the “Extranet” Stock. Those three next, lead to the “Firm_Performance” Eventually the last lead to the “Satisfaction_E-Procurement”, an indication of the satisfaction percentage this activity offers.

Technology-Monitoring subsystem

The stock “Company_Resources” a percentage of resources as indicated in Figure.7, in that subsystem. In order to achieve that purpose, firstly that resources are provided to the “Organizational_Characteristics”. And that’s where the storytelling continuous. From that stock two other flows are emerging to connect to the “R_And_D_Adoption” one and the “Technology_Adoption”. Those two converge in the “Technology_Monitoring” which eventually the lead to the “Satisfaction_Technology_Monitoring”, an indication of the satisfaction percentage this activity offers.

E-Sales subsystem

The two previous subsystems converge in “Sales_Force_Creativity”, Stock. The last the provides with resources, the “Sales_Force_Innovation_Implementation” Stock. Next, “Sales_Force_Innovation_Implementation” provides with resources the “Sales_Force_Performance” Stock which eventually gives its resources to the “Company_Resources” Stock, closing the dynamic circle.

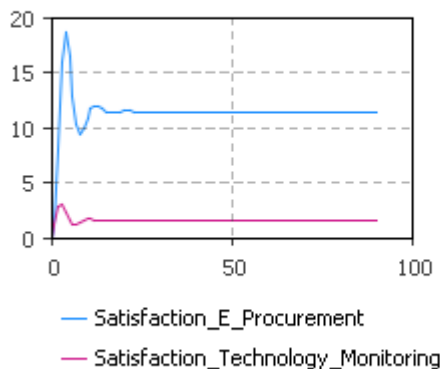


Figure 5. Satisfaction_E_Procurement and Satisfaction_Technology_Monitoring:

What we observe from the graph in Figure 5, is that the satisfaction percentage as regarding the two factors, is rising significantly during the first months and then those satisfactions gain stability. We can easily observe that the company resources in the beginning, given in the two leading factors, lead eventually to company resources replenishment in a steady rate and in the same time the four factors are

getting a high rise at the beginning but eventually tending to stabilize their resources.

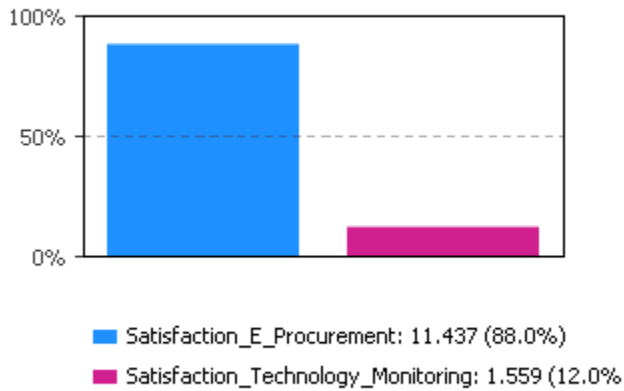


Figure 6. Bar-Chart: Satisfaction_E_Procurement and Satisfaction_Technology_Monitoring

From Figure 6 and the bar-chart, we can observe that the Satisfaction_E_Procurement is higher than Satisfaction_Technology_Monitoring Bar. That means, that E-Procurement affects E-Sales factor by 88% whereas Technology-Monitoring affects E-Sales by only 12%.

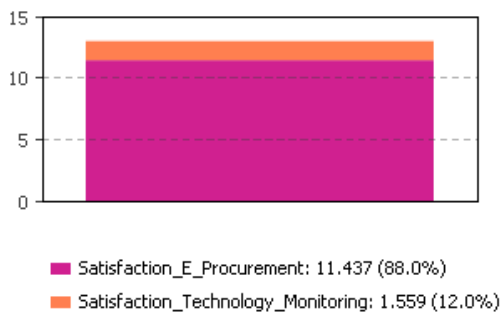


Figure 7. Stack-Chart: Satisfaction_E_Procurement and Satisfaction_Technology_Monitoring.

From Figure 7 and the Stach-Chart, we can observe that the Satisfaction_E_Procurement is higher than Satisfaction_Technology_Monitoring Bar. That means, that E-Procurement affects E-Sales factor by 88% whereas Technology-

Monitoring affects E-Sales by only 12%, the same results we observed in the previous Bar-Chart.

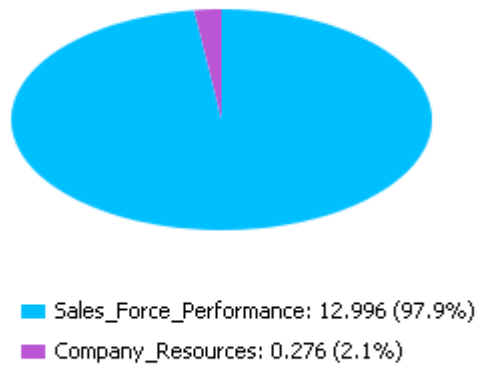


Figure 8. Pie-Chart: Company_Resources in conjunction with Sales_Force_Performance.

In Figure 8, we can observe a pie-chart as regarding the Company Resources E-Sales gained. As we can see, the amount of E-Sales gained back, given in percentage is almost 100% more that the Company Resources initially lost.

10. Conclusion

The purpose of this research is to Modeling the E-Procurement and Technology adoption from Greek businesses and their effect on electronic sales. The development of dynamic simulation models aims to provide an optimal solution for that E-Procurement and Technology adoption, in order to bring about the best results of it. In this research, in-depth exploration of key factors is being conducted for this adoption from Greek businesses and their effect on electronic sales. Through the theoretical analysis, regression modeling and then eventually comparison of various operations of the model we were able to test with great success, the leading factors [16]. Both models resulted in the conclusion that E-Procurement affects in much higher level E-Sales than Technology-Monitoring does. The ultimate aim is the successful E-Procurement and Technology adoption from Greek businesses as regarding the electronic sales of Greek business sphere.

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