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RESEARCH ARTICLE **Open Access**

Interrelations Among Business Model Components and their Role in a Business Model System

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Abstract

Businesses are the heart of every economic and social system. However, some of them are faces with failure due to the lack of a proper business model or having an inappropriate one. For designing a business model or innovating it, different elements should be taken into account. Not only considering these elements is crucial, but also their role in the system and detecting the interrelations between them are of outmost importance. With this regard, the aim of this article is investigating the possible effects and impacts of each element on others in a Business Model and categorizing them based on their importance and their net contribution in the selected model. For this purpose, Decision Making Trial and Evaluation Laboratory (DEMATEL) method is hired. The business model investigated in this article is the one introduced by krumeich and consisted of 20elements. Although all the elements are interdependent, based on the findings of this research, Resource Model is the most effectual component as well as being the most important element in the system. Furthermore, Cost Model is the highest impact receiver due to the highest amount of impacts receives from other elements. The results of this research are depicted in the form of tables and graphs.
Keywords: Business Model, Business Model Elements, Krumeich Business Model, DEMATEL, Interrelation

Introduction

By the emergence of new trades and businesses, the need of having a business model has increased at a break neck pace world over. The question of whether having a proper business model could bring about a great success for a company has generated a great deal of debate among managers and business researchers. Based on numerous surveys, almost between 50% - 80% or sometimes 90% of startups will be faced with failure due to various reasons. Among all those reasons, not having a proper business model plays a devastating role in a company's failure. (Hermes & Hein, 2019, p.1)

According to Bellman et al., the term of business model was appeared for the first time in an article in 1957.(Osterwalder et al., 2005, p.4) Recently, the business model has attracted both academics and practitioners' attraction. Since 1995, almost 1,177 articles with having references to business model have been published in peer-reviewed academic journals. Regardless of this explosion, researchers have yet to develop a shared language by its help they would be able to examine the business model construction. (Zott et al., 2011, p.1020) Moreover, in the late 1990s, this term was widely used in accordance to a mean in order to explain how an organization works during the

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rise of internet and electronic businesses. (Günzel & Holm, 2013, p.6)

Based on the several surveys done by various scholars, the business model has been allude to as a "statement", a "description", a "representation", an "architecture", a "conceptual tool or model", a "method", a "frame- work", and a "set". Interestingly, however, the business model is usually studied without a unique definition of the concept. (Zott et al., 2011, p.1022) Based on Teece, a business model is considered as the "design or architecture of the value creation, delivery, and capture mechanisms" of a firm. (Teece, 2010, p.191)

George and Bock in an article entitled " The Business Model in Practice and its Implications for Entrepreneurship Research " discussed the implications of business model including organizational design, resource-based view, narrative and sense making, and nature of innovation.(George & Bock, 2011, p.85) In another research which has been conducted in 2016 by Wirtz et al. called " Business Models: Origin, Development and Future Research Perspectives"' four points such as innovation, change and evolution, performance and controlling, and design were being lighted. (Wirtz et al., 2016, p.12)

However, considering the dynamic nature of businesses environment, having a stable BM for a long time is not practical for the development of that business. A suitable BM is the one which could be compatible with changes of the market and customers' demands and these kinds of compatibilities need changing in BMs. In fact, most of researches which have done in the field of business model focus on creating static BMs and dynamic nature of BMs has neglected.(Schaffer et al., 2019, p.2)

Based on Schaffer's definition a dynamic business model (DBM) is a complicated system of interconnected elements of the value creation, delivery, and capture mechanisms, which is cooperating with heterogeneous internal and external impacts results in the evolution of its components and the system. (Schaffer et al., 2019, p.8) As it is mentioned in this definition, the subcomponents of a BM are interrelated hence if a subcomponent is changed, a kind of change may occur in other subcomponents. With this regard, the aim of this article is the investigation of the impacts of one component on the others while there is a change. Since the emergence of BM concept, various BM frameworks have been introduced among which the researcher chose Krumeich et al. (2012) being consist of 20 components that create the possibility of describing a BM in more detail in comparison with other models such as Canvas being introduced by Osterwalder. This structure focuses on value creation, delivery, and capture and, meanwhile, gives significant details, describing intelligibly the constituting elements and expanding the three value dimensions by a cooperation model and a financial model which is shown in Figure 1.(Krumeich & Loos, 2013, p.3)

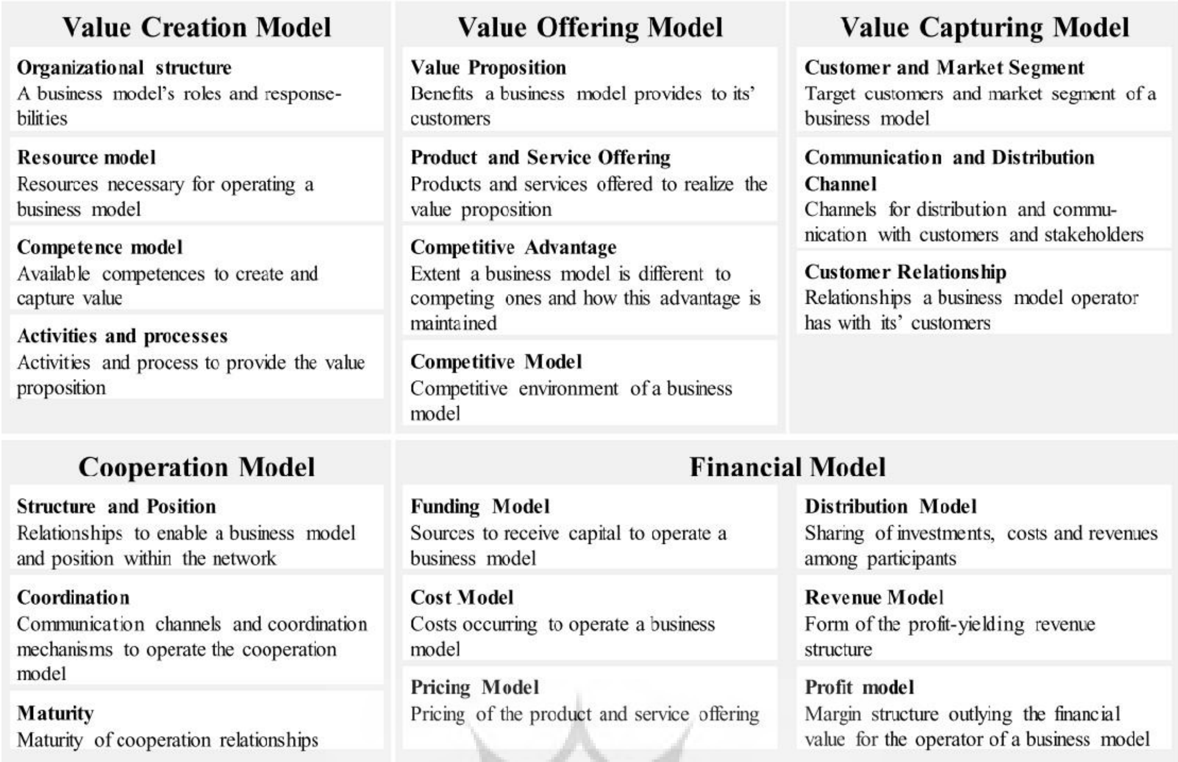


Figure 1: *Business Model Component Framework by Krumeich et al. (2012)*

Literature Review

A research has done on the course of studying the relationship between components of a BM, it was conducted in 2013 by Julian Krumeich et al. named "Interdependencies between Business Model Component-A Literature Analysis" which provides an understandable analysis of business model literature with the aim of finding structural relations among business model elements and visualizing them on a unifying business model elements framework that was done sooner than this research. Since the current research has conducted based on previous researches and available literature, the result is abstract in researcher's opinion hence, further research based on experts' interviews was recommended in the mentioned article. (Krumeich & Loos, 2013, p.7)

Another research was done in 2020 by Norman Schaffer at al. which leads to an analysis of the interrelations between BM components. In this article, the existence of qualitative interrelations has been demonstrated through the revision of previous studies. The researcher attempted to make a dual comparison between elements of a BM and reveal whether those elements have any impacts on each other. However, the result does not show the intensity of the existed impacts as well as indirect influences in a BM. Schaffer et.al mentioned that a quantitative research would hand out more extended information about interrelations and relative intensity.(Schaffer et al., 2020, p.11)

Line Hvilsom, in her master thesis (2012) entitled " Business Model Components and Their Interrelations - A study of understandings and interpretations of business models and a single case study of Liz Claiborne " attempted to figure out the numerous definitions of business models and interrelations between their components and the way that they were explained and expanded in other proposed researches. As a qualitative research and being library based, she studied and compared various studies which have done in the same field and tried to demonstrate some researchers' claim about the existence of interrelations among components.(Varnes, 2012, p.71-72) However, she did not focus on a specific BM as well as showing the intensity of interrelations and their effects on other components.

In an article which was conducted in 2014 and named " Analyzing Business Model Components Using the Sensitivity Model", Ujwary-Gil et al. studied just direct interrelations between key elements of a 6-component BM in 3 companies and their effects on BM based on sensitivity model. The researcher limited the study to just 3 companies and conducted a case study.

In the mentioned articles, the interrelations between elements were discussed and all of them are based on the revision of previous studies. The researcher was not able to find almost no quantitative researches in which both direct and indirect relations are shown as well as the intensity of those impacts. Furthermore, the role of each individual component in a system in terms of receiving effect from all other elements of a system and exerting impacts on all other components in the same system and the intensity of these impacts and the importance of elements have not been studied in previous researches. In the current article, the researcher intends to conduct quantitative research in order to fill the existed gaps and hand out a more comprehensible framework as well as presenting a practical visual map for managers and scholars for designing new BMs and innovating them.

Methodology

Decision Making Trial and Evaluation Laboratory which is mostly referred to DEMATEL was expanded by the science and human affairs program of the Battelle Memorial Institute of Geneva in the seventies of the twentieth century, between 1972 and 1976. Recently, the DEMATEL method has turned to a very generic method in Japan due to the fact that it is specifically pragmatic to map the structure of complex causal relationships. It is a sophisticated method based on paired comparison which uses experts' judgments for determining a structural model including causal relationships among complicated factors which creates the possibility of solving complex problems and analyzing the nature of the relationship among variables.(Gabus & Fontela, 1972, p.1-8) In this method, the using of graph theory bring forth hierarchical structure from existed elements in system with interactive relationships. It could confirm the interrelations between the variables/attributes and investigate the intensity of causal and effectual relations among components which are shown in numerical scores. The final product of the DEMATEL process is a visual depiction-an individual mind map-by which the respondent organizes his or her own action in the world. (Falatoonitoosi et al., 2013, p.3476-3477) The procedures of the DEMATEL method are discussed below.

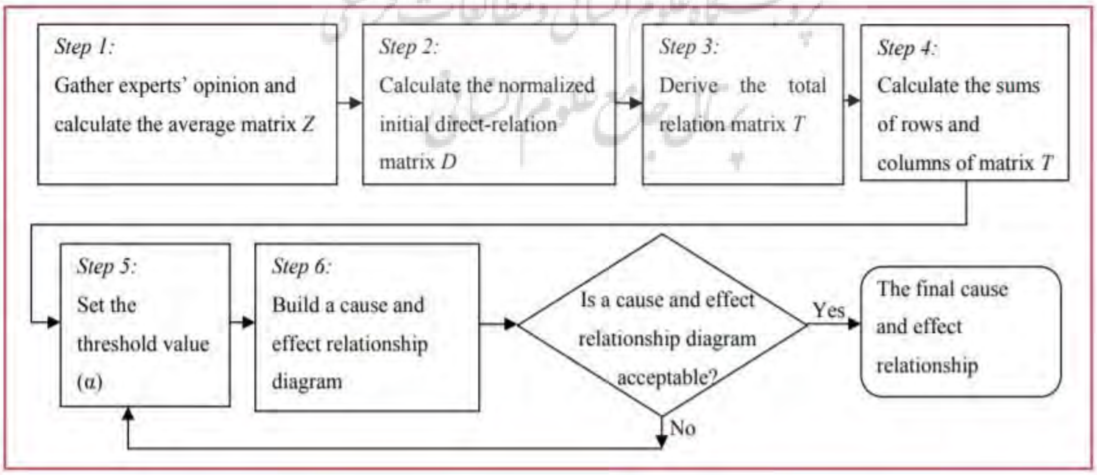


Figure 2. *The process of DEMATEL method*

Step 1: Gather experts' opinion and calculate the average matrix Z.

The researchers employ a group of m experts and n factors in this step. Each expert is expected to answer a list of questions and estimate the degree of direct impact among two factors, i -cell per raw- and j -cell per column, according to pair-wise comparison based on his or her belief. The degree to which the expert perceived factor i has an impact on factor j is denoted as x_{ij} and it is assigned integer score ranging from 0, 1, 2, 3, 4.

0 = no influence
1= low influence
2= medium influence
3= high influence
4= very high influence

An n × n non-negative matrix is built as $X^k = [x_{ij}^k]_{n\times n}$ for each expert, in this matrixes k is the expert number of partaking in estimating process with $1 \leq k \leq m$. Therefore, X^1, X^2, X^3 ..., X^m are the matrices from m experts. To sum all evaluations from m experts, the average matrix $Z= [z_{ij}]$ is depicted in what follow. (Sumrit & Anuntavoranich, 2013, p.85-86)

$Z_{ij}= \frac{1}{m}\sum_{i=1}^{m}[x_{ij}^k]_{n\times n}$

The average matrix Z_{ij} is named the initial direct-influenced matrix as well. It demonstrates the initial direct impacts each criterion casts on and receive from others. In this step, gaining the causal effect among each and every pair of criteria in a system would be probable by the help of an illustration which is called an influence map. (Falatoonitoosi et al., 2013, p.3478)

Step 2: In this step, the normalized initial direct-relation matrix which is called matrix D is being calculated through the following formula:(Sumrit & Anuntavoranich, 2013, p.86)

$D = \lambda * Z$

$\lambda=\text{Min}\left[\frac{1}{\max_{1\leq i\leq n}\sum_{j=1}^{n}|z_{ij}|}, \frac{1}{\max_{1\leq i\leq n}\sum_{i=1}^{n}|z_{ij}|}\right]$

The sum of each row i of matrix Z is considered as total direct impacts that criterion gives to others; besides, the summation of each column j depicts the most direct effects on other criteria by total direct effects of the criterion. Matrix D is the outcome of multiple of λ in each of elements of matrix Z. Each component d_{ij} of matrix D is between zero and less than 1. D^m is the powers of matrix D, as an illustration, $D^2, D^3, \dots, D^\infty$ guarantees the convergent solutions to the matrix inversion.

$\lim_{m\to\infty} D^m = [0]_{n\times n}$

To explain, $[0]_{n\times n}$ is a null matrix. (Falatoonitoosi et al., 2013, p.3478)

Step 3: Considering the fact that by completing step 2, just direct relation matrix would be calculated, hence, to compute matrix T which is the illustration of both direct and indirect relations, indirect relations should be taken into account. Therefore, the total relation matrix T should be derived through following steps:

T= $\lim_{m\to\infty}(D + D^2 + \cdots + D^m)$

$=\sum_{m=1}^{\infty} D^i$

$(\sum_{m=1}^{\infty} D^i = D^1 + D^2 + \cdots + D^m)$

$= D\,(I + D^1 + D^2 + \cdots + D^{m-1})$

$=D(I-D)^{-1}\,(I-D)(I + D^1 + D^2 + \cdots + D^{m-1})$

$=D(I-D)^{-1}(I-D^m)$

$T = D(I-D)^{-1}$

In this formula, an $n \times n$ identity matrix is depicted by I. Each component of t_{ij} shows the effects that factor i cast on factor j, in this regard, matrix T depicts the total relationship among each pair of factors in the system.

Step 4: In this step, it is needed to sum the elements of rows and columns of matrix T. In the total-influence matrix T, the sum of rows is shown by r and the sum of columns are shown by c.

$r = [r_i]_{n\times 1} = (\sum_{j=1}^{n} t_{ij})_{n\times 1}$

$c = [c_j]_{1\times n} = (\sum_{i=1}^{n} t_{ij})_{1\times n}$

In this formula, r_i is the sum of i^{th} row in matrix T. The total given impacts, direct and indirect ones, that criterion i has on the other factors is the outcome of the value of r_i. Furthermore, c_j is considered as the sum of the j^{th} column in matrix T. The total received effects, both directly and indirectly, that all other criteria cast on criterion j is depicted by the value of c_j. When j = i, the sum of r_i and c_i ($r_i + c_i$), being called "prominence", shows the level of importance role of factor i in the system as well as the total received and given impacts by criterion i. On the flipside, the amount of (r_i-c_i) which is called "relation" represents the net contribution by criterion i on the system. In addition, if (r_i -c_i) is positive, criterion i will be a net cause and if (r_i -c_i) is negative, criterion i will be a net receiver. (Yang et al., 2008, p.162) (Sumrit & Anuntavoranich, 2013, p.87)

Step 5: (α) is a threshold value which is calculated by the average of all elements in matrix T. It could be numerated through the following formula. As a result, some minor impacts elements in matrix T would be neglected due to the fact that their values are less than threshold. (Yang et al., 2008, p.163) The total number of elements in matrix T is shown by N.

$$\alpha = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n} t_{ij}}{N}$$

Step 6: In this step, a cause-and-effect relationship diagram would be constructed. This diagram is built by visualizing all coordinate sets of (r_i +c_i, r_i -c_i) in order to map the complicated relationships, both direct and indirect, as well as information to decide which of them are of the most importance and play a critical role in the system. Moreover, in what ways influence affected factors is investigated in this step. (Shieh et al., 2010, p.277-282) The factors with t_{ij} greater than threshold, are elected and illustrated in cause-and-effect diagram (Yang et al., 2008, p.162).

In the current article, DEMATEL method is hired in order to investigate the direct and indirect relationships among all factors in a business model and calculate the intensity of interdependencies. In addition, by mapping a diagram the importance of each factor is depicted for showing which factors in the system could be more effective or receive more influence of others. By fulfilling this research, while business model designers are designing a new BM or innovate a BM, they would be able to estimate which part of a BM should be more highlighted so that the amount of profit will be increased and the possibility of system failure will be decreased.

Research Findings

In the current research, among numerous BMs, Krumeich's BM was selected and based on it, 20 BM components were considered in order to investigate whether they cast any effect on each other as well as their role in the whole system. A questionnaire was designed in the form of a table consisting of 400 cells in which the dual relations between these 20 BM components were investigated. After that,10 experts who have at least 5 years work experiences and work in management positions in different companies which are active in various field of business, were asked to complete this questionnaire and decide about the causal relations of these BM components and write a number between 0- 4 in each cell. This range shows the intensity of causal relations, in other words, 0 represents the lack of relations between the elements, however, 4 illustrates very high intensity of relations. After collecting these questionnaires, the researcher analyzed the received information and data based on DEMATEL analytical technique which was discussed previously. The results of analysis are shown in what follows. At first, the average matrix was calculated based on questionnaires. This matrix was used as the raw material in this numerical process. This matrix is shown in Table 1.

Table 1. *Average Matrix*

Average Matrix Z	Organisational Structure	Resource Model	Competence Model	Activities & Process	Value proposition	Product & Service Offering	Competitive Model	Advantage Model	Customer & Market Segment	Communication & Distribution Channel	Customer Relationship	Stucture & Position	Coordination	Maturity	Funding Model	Distribution Model	Cost Model	Pricing Model	Revenue Model	Profit Model	sum
Organisational Structure	0	0	3/1	3/2	0	0/1	0/1	0/1	0	0/1	0/1	2/6	0/1	2/9	3/2	0	0	0/1	0	0/1	15/8
Resource Model	2/9	0	2/7	3	2/7	3/3	0	0	2/6	0/1	3/1	2/9	3	2/6	2/7	0	3	0/1	2/5	0/1	37/3
Competence Model	0/2	0/3	0/1	2/3	3/2	0/4	2/1	2/2	0/4	0/1	0/4	2/3	0	2/5	2/4	0/1	0/2	0	2/8	0/1	22/1
Activities & Process	3	2/8	0/3	0/4	2/1	2/9	0	0/5	2/8	0/7	2/8	0/2	0/3	0/6	0/3	0/5	2/7	0	2/8	0	25/7
Value proposition	2/4	2/8	0/5	3/3	0/2	2/6	2/6	2/5	3/1	3/1	3	0/5	0/1	2/5	0/2	2/1	2/7	0/4	0/4	0	35
Product & Service Offering	0	2/9	2/2	3/2	2/5	0	1/6	1/8	3/5	3	2/9	2/8	0/3	2/3	0/6	0/2	2/5	0/2	3/2	0/1	36/1
Competitive Model	0/4	1/1	0/3	0/5	0/6	0	0/1	0/2	0/9	0/6	0/4	0/6	0/2	0	0/1	0/2	0/2	0/1	0/2	0/2	6/9
Advantage Model	0/1	1/8	0/2	0/2	2/1	0/1	0	0/1	1/6	0/5	0/1	0/1	0	0/1	0	0	0	0	0	0/1	7/1
Customer & Market Segment	3/1	0/1	0/4	0/2	3	3/3	0	0	0	3/4	0	0/1	0/1	0/2	3/1	3/2	3/1	3/2	3/7	0/1	30/3
Communication & Distribution Channel	0/1	0/3	0	0/2	0/1	2/7	0/2	0/2	0/1	0	0	0	0/2	0/1	0	0	2/9	0/1	2/9	0	10/1
Customer Relationship	0	0/1	0	2/4	0/1	2/4	0	0/1	0/1	0	0	2/6	0/1	0	2/1	2/2	2/3	1/6	2/7	0	18/8
Stucture & Position	0/2	2/3	2/3	1/9	2/5	2/2	3/1	2/7	0/1	0/4	2/3	0	0/1	0	2/6	0/2	3/2	0/1	2	0	28/8
Coordination	0/2	0/1	2/2	2/5	0/2	0/4	0/1	0/1	0/1	0/5	0/2	0/2	0	2/2	2/8	0/1	2/4	0	0/1	0/2	14/6
Maturity	0/4	2/2	2/6	0/2	0/2	2/5	2/5	2/7	3/3	2/7	2/7	0/1	0	0	2/8	0/1	2/5	2/7	2/5	0/1	32/8
Funding Model	0	2/4	3/2	2/9	0	3/1	0	0	0/1	0/3	0	0/1	0	2/4	0	0/1	0	0	0	0	14/6
Distribution Model	0	2/8	0	0	0/1	0	0	0/1	0/1	0/1	0	0	0	0	0	0	0	0	0	0	3/2
Cost Model	0/1	2/7	0/1	2/9	0/1	2/6	0	0/1	0/1	0/1	0	2/7	0	0	0/1	0	0	0	0	0	11/6
Pricing Model	0/2	0/3	0/2	0/1	3/2	0	0	0	3/4	0/1	0/1	0/1	0/3	0/1	0	0	0	0	3/4	0	11/5
Revenue Model	0/1	3/1	0/3	0/4	3/4	0/2	0	0	3/8	0	0/1	0/2	0/2	0/2	0/1	3/3	3	0	0	3/1	21/5
Profit Model	0	0	0	0	0/2	0/2	0	0/1	0	0	0/2	0	0/1	0	0/1	0	0	0	0	0	0/9

Based on what is obtained in above, matrix D which represents normalized initial relations between components was calculated through the formula which has been discussed in step 2 of DEMATEL method previously. Table 2 illustrates matrix D.

Table 2. *Matrix D*

Matrix D	Organisational Structure	Resource Model	Competence Model	Activities & Process	Value proposition	Product & Service Offering	Competitive Model	Advantage Model	Customer & Market Segment	Communication & Distribution Channel	Customer Relationship	Stucture & Position	Coordination	Maturity	Funding Model	Distribution Model	Cost Model	Pricing Model	Revenue Model	Profit Model
Organisational Structure	0/0602	0	0/0602	0/0602	0	0	0	0	0	0/012	0/0422	0/012	0/0542	0/0422	0/006	0	0/0422	0/012	0/0422	0/0422
Resource Model	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0	0/0602	0	0/0602	0/0602	0/0542	0/0602	0/0542	0/0181	0/0482	0/0602	0/0422	0/0602	0/0602
Competence Model	0	0	0/0602	0/0602	0/0602	0	0/0602	0	0	0/006	0/0422	0/0181	0/0542	0/0542	0	0/012	0/012	0/006	0/0361	0/0361
Activities & Process	0/0602	0/0602	0	0/0602	0/0602	0/0602	0	0/0602	0	0/0602	0/0181	0	0/0181	0/012	0/0181	0/0482	0/0482	0/0422	0/0301	0/0542
Value proposition	0/0602	0/0602	0	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0/0181	0/006	0/0602	0/0181	0/0602	0/0602	0/0482	0/0602	0/0301	0/0542
Product & Service Offering	0	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0/0482	0/0602	0/0181	0/0602	0/0181	0/012	0/0602	0/0241	0/0482	0/0482	0/0542
Competitive Model	0	0/0602	0	0	0/0602	0	0/0602	0/0602	0	0/006	0/012	0/006	0/006	0/012	0	0/0181	0/012	0/0301	0/012	0/012
Advantage Model	0/0602	0	0	0	0/0602	0/0602	0	0/0602	0/0602	0/0181	0/006	0	0/006	0/0602	0/0602	0/0422	0/0542	0/0241	0/0241	0/012
Customer & Market Segment	0	0	0	0	0	0/0602	0	0	0/0602	0	0/006	0	0	0/006	0/012	0/0422	0/006	0/012	0/006	0/006
Communication & Distribution Channel	0	0	0	0/0602	0	0/0602	0	0	0	0/0422	0/0482	0	0/012	0/0422	0/0542	0/0422	0/012	0/012	0/006	0/0361
Customer Relationship	0	0/0602	0/0602	0/0602	0/0602	0/0602	0/0602	0	0	0/0482	0/0602	0/0181	0/012	0/0542	0/012	0/0602	0/0181	0/0361	0/0482	0/0542
Stucture & Position	0	0	0/0602	0/0602	0	0	0	0	0	0	0	0/0542	0/0542	0/0422	0	0/0422	0/0181	0/006	0/0361	0/0361
Coordination	0	0/0602	0/0602	0	0	0/0602	0/0602	0/0602	0/0602	0/0422	0/0181	0/0181	0/0482	0/0482	0/012	0/0602	0/0301	0/0422	0/0422	0/0241
Maturity	0	0/0602	0/0602	0/0602	0	0/0602	0	0	0	0	0/0181	0/012	0/0542	0/0422	0/012	0/006	0/012	0/0361	0/0361	0/0542
Funding Model	0	0/0602	0	0	0	0	0	0	0	0	0/012	0	0	0	0/0422	0/006	0	0/0361	0/006	0/012
Distribution Model	0	0/0602	0	0/0602	0	0/0602	0	0	0	0	0/0602	0	0/012	0	0/012	0/0482	0/006	0/0361	0/012	0/0482
Cost Model	0	0	0	0	0/0602	0	0	0/0602	0	0/006	0	0	0/006	0/012	0	0	0/012	0	0/006	0
Pricing Model	0	0/0602	0	0	0/0602	0	0	0/0602	0	0/006	0/012	0	0/006	0/012	0/0422	0/0482	0/0181	0/0361	0/0181	0/012
Revenue Model	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Profit Model	0	0	0/0602	0/0602	0/0602	0/0602	0/0602	0	0/0602	0/006	0/006	0/0181	0/012	0/0602	0/012	0/012	0/012	0/0181	0/0361	0/0422

Total relations matrix which is matrix T depicts the sum of direct and indirect relations between all components. In the following table R stands for the total given impacts, direct and indirect, and C represents the received direct and indirect influences from other components.

Table 3.
Matrix T

Matrix T	Organisational Structure	Resource Model	Competence Model	Activities & Process	Value proposition	Product & Service Offering	Competitive Model	Competitive Advantage	Customer & Market Segment	Communication & Distribution Channel	Customer Relationship	Stucture & Position	Coordination	Maturity	Funding Model	Distribution Model	Cost Model	Pricing Model	Revenue Model	Profit Model	R
Organisational Structure	0/0247	0/0523	0/1208	0/1341	0/0456	0/0584	0/0309	0/0332	0/044	0/0295	0/0413	0/0969	0/0099	0/1095	0/1238	0/0172	0/0509	0/0176	0/0521	0/0084	1/101
Resource Model	0/134	0/1116	0/1523	0/204	0/1704	0/2076	0/053	0/0574	0/1689	0/071	0/1618	0/1544	0/0971	0/1443	0/1612	0/0557	0/2048	0/0389	0/1772	0/0208	2/5465
Competence Model	0/0411	0/081	0/046	0/1234	0/1429	0/0799	0/0878	0/0928	0/0772	0/0434	0/0602	0/0953	0/0109	0/1044	0/1057	0/0363	0/0772	0/0197	0/1314	0/0155	1/4721
Activities & Process	0/1239	0/1484	0/062	0/0991	0/1272	0/1621	0/0303	0/0466	0/1479	0/067	0/1293	0/0673	0/0256	0/0686	0/0701	0/0577	0/1622	0/0266	0/1528	0/015	1/7898
Value proposition	0/1168	0/1647	0/0745	0/1816	0/0891	0/1731	0/1038	0/1059	0/168	0/1386	0/1455	0/0811	0/0229	0/1209	0/0768	0/0994	0/1773	0/0437	0/1121	0/0125	2/2085
Product & Service Offering	0/0622	0/1901	0/1217	0/1885	0/1662	0/1207	0/0876	0/0968	0/1903	0/1407	0/1515	0/1425	0/0304	0/1202	0/0943	0/0626	0/1912	0/041	0/1947	0/0219	2/4152
Competitive Model	0/0239	0/0473	0/0217	0/0348	0/0351	0/0237	0/011	0/0143	0/0415	0/0277	0/0254	0/0298	0/0105	0/0134	0/0194	0/0158	0/0295	0/0092	0/0267	0/0082	0/4689
Competitive Advantage	0/0225	0/0707	0/0218	0/0328	0/0793	0/0338	0/0115	0/0149	0/0671	0/0323	0/0234	0/0195	0/0073	0/0211	0/0203	0/015	0/0315	0/0097	0/0269	0/0057	0/5671
Customer & Market Segment	0/1165	0/0852	0/0622	0/0879	0/1471	0/1642	0/0303	0/033	0/0768	0/1339	0/0484	0/054	0/0158	0/0574	0/1271	0/1218	0/1618	0/1022	0/1699	0/0187	1/8141
Communication & Distribution Channel	0/0159	0/0457	0/0182	0/0388	0/0335	0/1007	0/0167	0/018	0/0362	0/018	0/0211	0/0247	0/0114	0/0201	0/0169	0/0169	0/1119	0/0094	0/1043	0/0095	0/6881
Customer Relationship	0/0251	0/0672	0/0345	0/1169	0/0549	0/1171	0/0215	0/0262	0/0548	0/027	0/0376	0/1018	0/0121	0/0292	0/0863	0/083	0/1179	0/0532	0/1216	0/0112	1/1992
Stucture & Position	0/047	0/1445	0/11	0/1375	0/1375	0/1411	0/114	0/107	0/0771	0/0534	0/1168	0/0582	0/0195	0/0516	0/1189	0/042	0/1655	0/0214	0/1249	0/0129	1/8011
Coordination	0/0265	0/0486	0/0888	0/1111	0/0405	0/0601	0/022	0/0246	0/0402	0/0364	0/0356	0/0336	0/0065	0/0863	0/1038	0/0173	0/1049	0/0124	0/0448	0/0102	0/9452
Maturity	0/0535	0/1405	0/1211	0/0915	0/0917	0/1562	0/0966	0/1052	0/167	0/1198	0/1217	0/0621	0/0175	0/0515	0/1328	0/0471	0/1566	0/0988	0/1579	0/0185	2/0075
Funding Model	0/031	0/1167	0/1229	0/1317	0/0539	0/1377	0/0273	0/0306	0/059	0/0416	0/0467	0/0424	0/013	0/1017	0/0421	0/0227	0/0602	0/0164	0/0626	0/007	1/1673
Distribution Model	0/0108	0/0848	0/0119	0/0162	0/0164	0/0169	0/0044	0/0075	0/0163	0/0089	0/0128	0/0121	0/0074	0/0114	0/0127	0/0049	0/0167	0/0034	0/0144	0/0017	0/2914
Cost Model	0/0307	0/1179	0/0362	0/1253	0/048	0/118	0/0214	0/0258	0/0467	0/0279	0/0418	0/104	0/0128	0/0293	0/0364	0/0168	0/0545	0/0099	0/0491	0/0053	0/9579
Pricing Model	0/0323	0/0466	0/025	0/038	0/1235	0/0411	0/0157	0/0164	0/1298	0/0323	0/0269	0/022	0/0144	0/0257	0/0268	0/032	0/048	0/0161	0/1257	0/0115	0/8498
Revenue Model	0/0428	0/14	0/0421	0/0709	0/1396	0/0726	0/0221	0/0241	0/1496	0/0386	0/0439	0/0444	0/0199	0/0416	0/0451	0/1186	0/1425	0/0204	0/0538	0/0892	1/362
Profit Model	0/0013	0/0029	0/0019	0/0034	0/0075	0/0082	0/0013	0/0041	0/0027	0/0019	0/0074	0/002	0/0031	0/002	0/0045	0/0015	0/0031	0/0008	0/0027	0/0003	0/0626
C	0/9825	1/9067	1/2957	1/9676	1/7499	1/9931	0/8094	0/8846	1/7612	1/0898	1/2991	1/2481	0/3681	1/2105	1/4249	0/8842	2/0683	0/5707	1/9055	0/3042	

For distinguishing the influential relations from minor ones in the system, the threshold should be calculated through the formula which has been discussed in DEMATEL method. In this research, threshold is equal to 0.0553; so, all those digits which are less than this number are neglected and depicted by 0. In other words, in this step, just those digits which are higher than 0.0553 are considered and shown by 1. The interrelation matrix which is provided in what follows, depicts the interrelations between elements.

Table 4. *Interrelation Matrix*

Interrelation Matrix	Organisational Structure	Resource Model	Competence Model	Activities & Process	Value proposition	Product & Service Offering	Competitive Model	Competitive Advantage	Customer & Market Segment	Communication & Distribution Channel	Customer Relationship	Stucture & Position	Coordination	Maturity	Funding Model	Distribution Model	Cost Model	Pricing Model	Revenue Model	Profit Model
Organisational Structure	1	0	1	1	0	0	0	0	0	0	1	0	1	1	0	0	1	0	1	1
Resource Model	1	1	1	1	1	1	0	1	0	1	1	1	1	1	1	1	1	1	1	1
Competence Model	0	0	1	1	1	0	1	0	0	0	1	0	1	1	0	0	0	0	1	1
Activities & Process	1	1	0	1	1	1	0	1	0	1	1	0	1	1	0	1	1	1	1	1
Value proposition	1	1	0	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1
Product & Service Offering	0	1	1	1	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1
Competitive Model	0	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
Competitive Advantage	1	0	0	0	1	1	0	1	1	0	0	0	0	1	1	1	1	1	1	0
Customer & Market Segment	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0
Communication & Distribution Channel	0	0	0	1	0	1	0	0	0	1	1	0	0	1	1	1	0	0	0	1
Customer Relationship	0	1	1	1	1	1	1	0	0	1	1	0	1	1	0	1	1	1	1	1
Stucture & Position	0	0	1	1	0	0	0	0	0	0	0	1	1	1	0	1	0	0	1	1
Coordination	0	1	1	0	1	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1
Maturity	0	1	1	1	0	1	0	0	0	0	0	0	1	1	0	0	0	1	1	1
Funding Model	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Distribution Model	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	1	0	1
Cost Model	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Pricing Model	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0
Revenue Model	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Profit Model	0	0	1	1	1	1	1	0	1	0	0	0	0	1	0	0	0	0	1	1

Based on what discussed above, the dual relations are found between the components of a system, however, each individual element could play its own role in the whole system and they should be taken into account. As it was mentioned previously, almost all researches in this field focus on the dual relations and they did not work on the total role of each element. In the following parts, the role of each component is being discussed in the whole system as an autonomous entity and some tables and diagrams are provided.

In the following table, R represents the total impacts that r_i gives to others and C depicts the total received impacts that c_i gets from other components. R + C is called the "Prominence" and it shows the total received and given effects of an element in a BM. Moreover, R-C which is called "Relation" is net contribution of an element in the system. In other words, these are those components which could affect on other elements in higher degree after omitting the effects that they receive from the system.

Table 5.
Result Table

Result	R	C	R+C	R-C
Organisational Structure	1/101	0/9825	2/0835	0/1185
Resource Model	2/5465	1/9067	4/4532	0/6398
Competence Model	1/4721	1/2957	2/7678	0/1764
Activities & Process	1/7898	1/9676	3/7574	-0/178
Value proposition	2/2085	1/7499	3/9584	0/4586
Product & Service Offering	2/4152	1/9931	4/4083	0/4221
Competitive Model	0/4689	0/8094	1/2783	-0/341
Competitive Advantage	0/5671	0/8846	1/4517	-0/318
Customer & Market Segment	1/8141	1/7612	3/5753	0/0529
Communication & Distribution Channel	0/6881	1/0898	1/7779	-0/402
Customer Relationship	1/1992	1/2991	2/4983	-0/1
Stucture & Position	1/8011	1/2481	3/0492	0/553
Coordination	0/9452	0/3681	1/3133	0/5771
Maturity	2/0075	1/2105	3/218	0/797
Funding Model	1/1673	1/4249	2/5922	-0/258
Distribution Model	0/2914	0/8842	1/1756	-0/593
Cost Model	0/9579	2/0683	3/0262	-1/11
Pricing Model	0/8498	0/5707	1/4205	0/2791
Revenue Model	1/362	1/9055	3/2675	-0/544
Profit Model	0/0626	0/3042	0/3668	-0/242

For having a clear depiction of what is discussed above, some visual figures are drawn in what follows. In these figures, the position of each element based on its Prominence and Relation is being shown and a model would be handed out for BM designers.

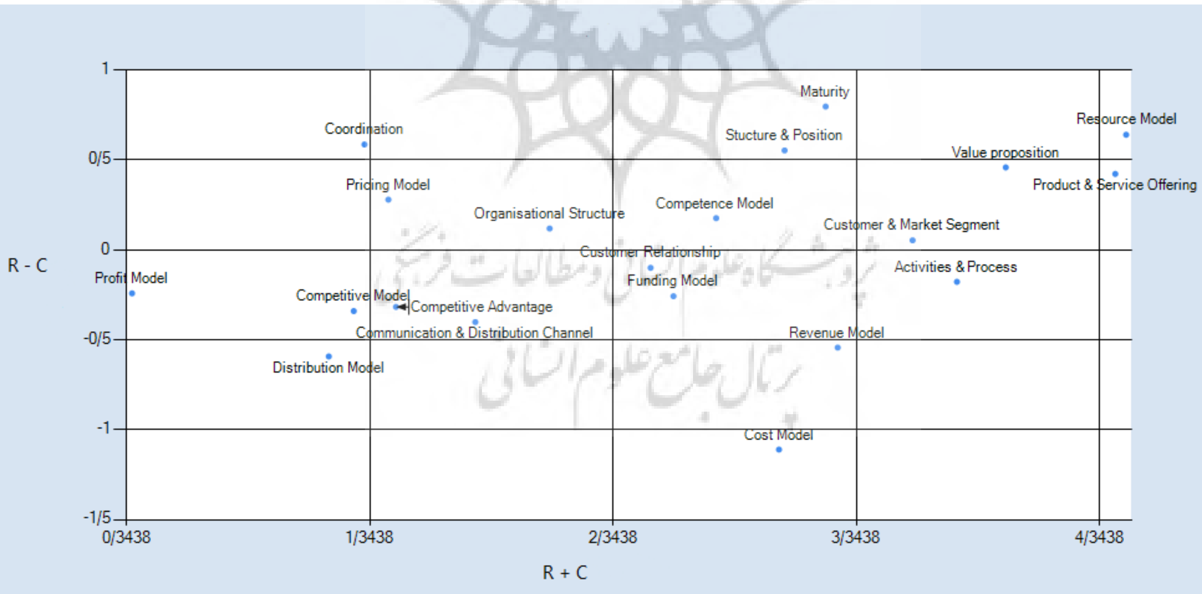
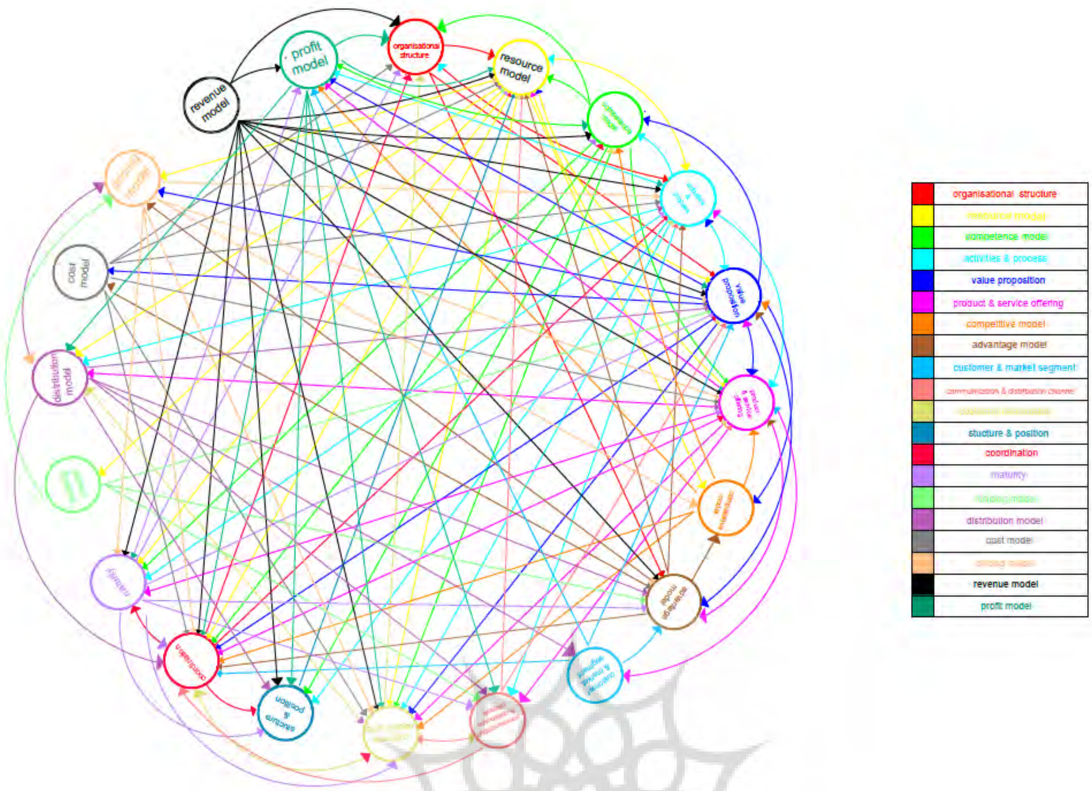


Figure 3. *Prominence and Relation between the elements of a BM*

The following graph illustrates the dual relationships between each pair of a BM's components. In the following graph, impacts of every component on another one has been shown with an arrow. Both direct and indirect impacts are considered in drawing this graph in order to provide a comprehensive understanding of a BM's elements' relations for better decision making.



Graph 1: *Interrelation diagram*

Conclusion

This research has provided a comprehensive analysis of BM by using DEMATEL method with objective of discovering the importance of each element in a BM as well as the dual interrelations between its components. The research has revealed that almost all components are intermingled by having complex relations. Based on this research, Resource Model and Product and service Offering have the most effectiveness in the system due to the fact that their amounts of R are higher than others. Similarly, Cost Model and Product and Service Offering receive more impacts from other components based on the amount of their C. Moreover, the elements with higher R+C and R-C could play an important role in the system. Hence, in this system, Resource Model by having the highest R+C is of notable importance in the system. Similarly, Maturity has the highest net contribution due to the highest R- C. The result of the research has been summarized in some tables and graphs for helping managers and decision makers to design or innovate a BM with more efficiency.

Further research could be conducted by implementing the outcome of this research in real businesses. Additionally, by applying other methods rather than DEMATEL the convergency of results would be examined. Besides, there exist some other BMs which could be studied with the same method in order to extensive insight.

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