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## Complexity of Changes in the Business Model: An Empirical Research

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Submitted 01/08/20, 1st revision 30/09/20, 2nd revision 22/10/20, accepted 06/11/20

Marlena Ciechan-Kujawa<sup>1</sup>, Michał Buszko<sup>2</sup>

**Abstract:**

**Purpose:** The main goal of this paper is an evaluation of the complexity of changes implemented in the business model by companies with regard to their internal attributes. In our work we intend to find which companies, considering their size, age, legal form, type, and range of operations, change their business model in more complex way. We also want to evaluate the associations between changes in the business model as well as to identify the patterns of their implementing.

**Design/Methodology/Approach:** We collected the data using own survey research conducted among 104 companies registered in Poland with CAWI technique. We used ordinal logistic regression model as well as nonparametric statistical testing.

**Findings:** Our research showed that majority of companies change their business model, and the complexity of changes is dependent on legal form, age of companies, type of activities and use of outsourcing. We find that the companies do not have common patterns in implementing changes to the business model and the changes, as a rule, are not correlated.

**Practical Implications:** The paper attempts to identify group of internal attributes of companies that make them liable to complex changes in the business models.

**Originality/value:** Most of the research to date has focused on studying changes in the business model under the influence of external factors resulting from the macroeconomic or competitive environment, without focusing on the problem of complexity of changes embedded in the organization of the company and its individual attributes.

**Keywords:** Business model, internal determinants, business model variability, change.

**JEL classification:** D22, L22, M10, M21.

**Paper Type:** Research study.

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<sup>1</sup>Professor/ Department of Management Accounting, Nicolaus Copernicus University in Torun, Poland., e-mail: [marlenac@umk.pl](mailto:marlenac@umk.pl)

<sup>2</sup>Doctor/ Department of Finance Management, Nicolaus Copernicus University in Torun, Poland., e-mail: [mibus@umk.pl](mailto:mibus@umk.pl)

## **1. Introduction**

The business model widely described in the literature is a specific concept of the organization's operation. Snihur and Zott (2013) emphasize that the properties of a business model at the system level are important not only for value creation, but also for its capturing. In their opinion, the properties provide the model with high legitimacy and, at the same time, protection against imitation by competitors. Because both the environment and the market requirements are highly volatile today, business models are not constant (Chesbrough and Rosenbloom, 2002; Mitchell and Coles, 2003). The change of the business model may apply to any of its elements, both at the level of the concept of value creation itself, as well as the structure of relations with stakeholders or management mechanisms. Due to the connections between the individual components of the business model, the introduced change may, however, require modification of other elements or significantly affect the functioning of existing solutions, limiting or increasing their functionality, efficiency or quality. Strategic and organizational adaptation activities may require, for example, process reconstruction, resource reduction or reallocation, or the acquisition of additional capabilities. Demil and Lecocq (2010) emphasize that the evolution of individual components of business model must be coherent with the entire model, because even a simple change can lead to many interrelated changes.

In the literature one can find that the determinants of changes in the business model usually include external factors resulting from changes in the macroeconomic or competitive environment (Andries and Debackere, 2007; Wirtz *et al.*, 2010). The research also confirms that the level of variability of the concept of business operation may be influenced by the attributes embedded in the business model itself and the organization of the company. The latter may constitute either a barrier to changes or a support for the business model to their implementation (Ciechan-Kujawa and Buszko, 2020). The change in the business model is essentially related to the company's internal features (attributes), i.e. size, legal form, age of operation and range of activity. A strong impact in scope of changing the business model has also been noticed in relation to the types of value created for the customer.

In the literature related to business model and its changing, it is difficult to find results of broad research addressing relations between internal features (attributes) and susceptibility of companies to changes. Usually one can find evaluation of individual cases or consequences of such changes (Matzler *et al.*, 2013; Aspara *et al.*, 2011; Siggelkow, 2002; Sosna *et al.*, 2010).

Considering the research gap described above, we decided to evaluate if the organization's approaches to managing change in the business model and its complexities are similar. In addition, our intention was to investigate whether the changes implemented as part of the business model relate to individual areas or are comprehensive in nature and what are the relationships between them. Therefore, we put forward three hypotheses:

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*H1: Changes in the business model are more often complex than simple.*

*H2: The complexity of changes in the business model is associated with internal attributes of companies.*

*H3: There is not a common pattern of changes to the business model implemented by companies.*

The research process aimed at verifying the above hypotheses was aimed at answering the following auxiliary questions: (1) Were changes in the business model made during the company's operation? (2) What was the type and number of changes in the business model? (3) What factors influenced the scope of the introduced changes to the business model?

## **2. Business Model Change as a Subject of Research**

Many authors present factors, processes and effects accompanying adaptations or innovations of business models. Some of them focus only on the key ones that are qualified as innovations. A review by Foss and Saebi (2017) indicates that there is no uniform approach in the literature on how many elements of the business model need to be changed to be considered as innovation. However, such changes should increase the existing revenue generation opportunities by attracting new customers or encouraging existing customers to buy more products or services (Markides, 2006). They should be then considered as the new way of creating and capturing value (Baron, 2006; Casadesus-Masanell and Ricart, 2011) and achieved by developing new delivery technologies that influence value by combining digital and physical infrastructure as well as by transforming services and products (Nidumolu *et al.*, 2009).

Johnson *et al.* (2008) even argue that changing a business model only makes sense if the change is a novelty not only within the company, but in some sense entails changes in the industry or market. Against this background, Applegate, Schlesinger and Delong (2001) indicate that changes in the construction of a business model do not have to be groundbreaking, they can be subtle and have no potential impact on the development of the industry, yet they can bring significant benefits to the company resulting from economies of scale and efficiency improvement and quality control (Bock *et al.*, 2012; Johnson *et al.*, 2008; Osterwalder *et al.*, 2005; Santos *et al.*, 2009).

Demil *et al.* (2015), in turn, prove that a company's decision to change the business model to take advantage of a new market opportunity and to increase the company's value does not necessarily require the involvement of new resources, but may be based on a different allocation of existing company assets, their different configuration or using them in new sets of value generation. Thus, just redesigning the business model can create the value by using separate value drivers (Amit and Zott, 2001) or creating virtual value loops (Casadesus-Masanell and Ricart, 2011).

Kim and Min (2015), indicating the sources of changes implemented in business

models, divide them into two groups: a) original - creating a model based on their own technological breakthrough or endogenous reconfiguration of business methods (b) imitative - constituting a modification of solutions used in models of other companies. In turn, Foss and Saebi (2017) attempted to classify changes in business models, considering their degree of novelty and scope of innovation. They pointed out that changes in the business model may be evolutionary, when occurring in individual components over time, or adaptive, i.e. being a result of adjusting the company's business model architecture to changes in a competitive environment. However, the changes can also be radical at the industry level and simultaneously focused on one business model module or covering a wide range of changes in the entire business model architecture (complex).

Halecker *et al.* (2014) and Low *et al.* (2011) prove that the size of the company is important for the adaptation of changes in the business model. Other researchers indicate, however, that the determinants of implementing business model changes and their consequences depend on the age of the organization (Foss and Saebi, 2017; Chesbrough, 2010), extensive organizational structures and stakeholder networks (Demil and Lecocq, 2010; Tripsas and Gavetti, 2000), as well as resources at the disposal of the organization (Bonaccorsi *et al.*, 2006), including management competences (Rerup and Feldman, 2011).

### 3. Research Methods

For the purposes of examining changes in the business model of enterprises, including evaluation of their complexity, a CAWI survey was conducted on a group of entities operating in Poland. Enterprises were drawn from a nationwide database. We started the survey in the third quarter of 2017 and completed collecting the data in 2018. We built the research model on the basis on approach of Osterwalder and Pigneur (2010). The survey was sent to 750 randomly selected entities, and the return was obtained from 104 units. The structure of the research sample is presented in Table 1.

**Table 1.** *Characteristics of participants in the survey*

Feature	Tota 1	Share	Units with chg of BM	Share	Units without chg of BM	Share
Small (10-49 people)	60	57.7	26	40,6	34	85%
Medium (50-249 people)	29	27.9	26	40,6	3	7,5%
Large (over 250 people)	15	14.4	12	18,8	3	7,5%
Natural person	41	49.4	14	21.9	27	67.5
Other partnerships	5	4.8	4	6.3	1	2.5
General partnership	9	8.7	9	14.1	0	0,0
Limited liability comp.	35	33.6	26	40.6	9	22.5
Joint-stock company	14	13.5	11	17.2	3	7.5
<2 Yrs	23	22.1	9	14,1	14	35,0
2-5 Yrs	21	20.2	9	14,1	12	30,0
6-10 Yrs	16	15.4	10	15,6	6	15,0

>10 Yrs	44	42.3	36	56,3	8	20,0
Production	24	23.1	19	29,7	5	12,5
Trade	19	18.2	11	17,2	8	20,0
Service	61	58.7	34	53,1	27	67,5
Local	39	37.5	17	26,6	22	55,0
Domestic	36	34.6	25	39,1	11	27,5
International	29	27.9	22	34,4	7	17,5

*Source: Own work.*

In our study, we used statistical modeling using IBM SPSS Statistics 25 at significance level of  $\alpha = 0.05$  (nonparametric testing) and  $\alpha = 0.1$  (ordinal logistic regression models).

## 4. Results Presentation

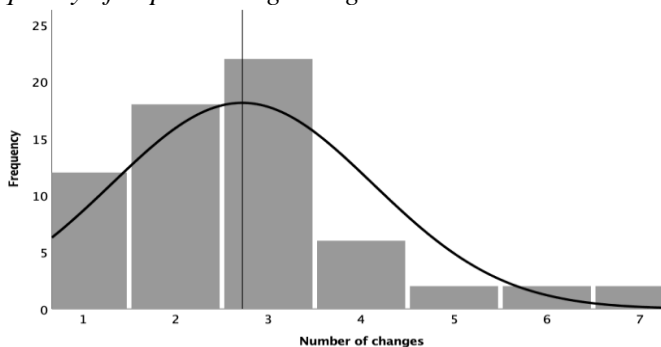
### 4.1 Characteristics of Enterprises Changing the Business Model

#### 4.1.1. Business Model Change – Number of Changes

From 104 entities that took part in the survey, 64 indicated the fact of changing business model at least once. Such result constituted 61.5% of the research sample. At  $\alpha=0.05$  and  $p=0.019$  this result present statistically significant difference between entities changing and not changing the business model.

Among 64 entities making changes to the business model, only 12 introduced changes in one element, and the remaining 52 entities declared changes from 2 to 7 areas (elements) of the business model, excluding changes in cost accounting which was the next step in business model modification in most companies. Respondents most often indicated three elements of changes in the business model. Fig 1. presents distribution of answers.

*Figure 1. Frequency of implementing changes to the business model*



*Source: Own work.*

To assess the complexity of changes in the business model introduced by enterprises, we used the ordinal logistic regression model, where the dependent variable was the

number of changes in the business model (from 0 to 7), and the independent (qualitative) variables were characteristics such as size of company, legal form, age of existence, type of activity and use of outsourcing. The choice of an ordinal logistic regression model is justified, on the one hand, by the desire to indicate how individual internal parameters of an enterprise affect the complexity of changes in the business model, and on the other hand, by the limited possibilities of quantifying the number of changed areas. We have assumed that each subsequent change in the model affects the complexity of changes in the model itself but cannot be considered quantitatively. A unit change from, for example, 0 to 1 is not equivalent to a change from 6 to 7. Table 2 presents the estimation of the model parameters.

**Table 2.** Estimation of the parameters of the ordinal logistic regression model

	B	Exp (B)	SE	95% CI		95% Exp (CI)	
				LL	UL	LL	UL
<b>CHNG = 0</b>	1,261*	3,529	0,525	0,232	2,289	1,261	9,865
<b>CHNG = 1</b>	1,981***	7,250	0,549	0,905	3,056	2,472	21,242
<b>CHNG = 2</b>	2,956***	19,221	0,592	1,796	4,116	6,025	61,313
<b>CHNG = 3</b>	4,717***	111,832	0,690	3,364	6,071	28,905	433,114
<b>CHNG = 4</b>	5,715***	303,384	0,775	4,197	7,234	66,487	1385,754
<b>CHNG = 5</b>	6,271***	529,006	0,849	4,608	7,934	100,283	2790,567
<b>CHNG = 6</b>	7,111***	1225,372	1,025	5,103	9,119	164,515	9127,070
<b>SIZE_LRG</b>	-0,789	0,454	0,722	-2,204	0,626	0,110	1,870
<b>SIZE_MED</b>	-0,123	0,884	0,566	-1,233	0,987	0,291	2,683
<b>SIZE_SML</b>	0	1,000	.				
<b>L_FORM_JSC</b>	1,324*	3,758	0,797	-0,237	2,885	0,789	17,904
<b>L_FORM_LLC</b>	1,668**	5,302	0,576	0,54	2,796	1,716	16,379
<b>L_FORM_GP</b>	3,863***	47,608	0,942	2,016	5,71	7,508	301,871
<b>L_FORM_OTH</b>	0,903	2,467	0,941	-0,942	2,747	0,390	15,596
<b>L_FORM_NP</b>	0	1,000					
<b>AGE_&gt;10</b>	1,662*	5,270	0,661	0,367	2,957	1,443	19,240
<b>AGE_6-10</b>	-0,266	0,766	0,748	-1,733	1,2	0,177	3,320
<b>AGE_2-5</b>	-0,864	0,421	0,735	-2,304	0,576	0,100	1,779
<b>AGE_&lt;2</b>	0	1,000					
<b>RANGE_INT</b>	-0,148	0,862	0,577	-1,28	0,983	0,278	2,672
<b>RANGE_DOM</b>	-0,637	0,529	0,514	-1,645	0,371	0,193	1,449
<b>RANGE_LOC</b>	0	1,000					
<b>PROD_YES</b>	0,962*	2,617	0,505	-0,027	1,951	0,973	7,036
<b>PROD_NO</b>	0	1,000					
<b>OUTS_YES</b>	1,039*	2,826	0,442	0,173	1,905	1,189	6,719
<b>OUTS_NO</b>	0	1					

**Note:** \* -  $p$ -value < 0.1, \*\* -  $p$ -value < 0.01, \*\*\* -  $p$ -value < 0.001,  $N=104$ , Pseudo  $R^2$ : Cox-Snell = 0.410, Nagelkerke = 0.426, McFadden = 0.161, Model fitting information: - 2log LR of final model 240.300 (295.138 intercept only), Wald's test  $p$ -value < 0.001, Goodness of fit: Pearson chi sq. test,  $p$ -value > 0.05, Test of parallel lines: chi sq. test 0.866

**Source:** Own work.

The estimation showed the existence of clear relationships between the dependent variable and the categories of independent variables, where the legal form, period of activity, type of activity and the use of outsourcing turned out to be statistically significant, and the size and scope of activity were insignificant. The tests of the

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significance of model parameters and goodness of fit confirmed the statistical significance of the entire model and its fit is correct. Moreover, the parallel lines test confirmed the validity of using an ordinal logistic regression model instead of polynomial logistic regression model or linear model.

The ordinal logistic regression model presents that the chances of introducing more changes in the model are reducing with the increase in the size of the company, what is confirmed by the negative coefficients of the *SIZE* variable. For both medium and large entities, the results were not statistically significant. In case of the legal form variable (*L\_FORM*), the change from a natural person to another, more advanced form, increases the chances of introducing more and more changes in the business model. The biggest change occurs in the relationship of general partnerships against natural persons. In this case, the first form is associated with a biggest chance (approx. 50 times higher than natural persons) of introducing more changes in the business model. In case of limited liability companies, the ratio of opportunities drops to over 5 times, and for joint-stock companies to less than four. Only for the second level of legal form (other companies) the ratio turned out to be statistically insignificant.

In case of the period of operation (*AGE*), there is a noticeable decrease in chances of introducing more changes in the business model for entities operating for 2 to 5 years and for 6 to 10 years compared to entities operating under 2 years. In contrary companies of the age of over 10 years represent more than 5 times greater chances of introducing more changes in the business model compared to entities operating for less than two years. It should be added that only the last relation turned out to be statistically significant. The obtained results may indicate that the increasing number of changes in the business model is represented by entities operating for a very short or for a very long time. In case of the range of activities (*RANGE*), negative regression coefficients were obtained, what indicates that with increasing coverage from local to national or international, the number of chances to increase the number of changes in the business model drops. It should be added, however, that entities operating internationally have a greater chance of changing the business model than those running domestically. None of the parameters of the considered variable turned out to be statistically significant.

Considering the type of business (*PROD*), it can be concluded that production entities show more than 2.6 chances of introducing more changes in the business model compared to trade or service entities. Also, entities that use outsourcing (*OUTS*) in their activities turned out to be more susceptible to introduce more changes in the business model. In their case, the chance for each level of the number of changes is almost 3 times greater than in the case of entities not using outsourcing. The parameter of the outsourcing variable turned out to be statistically significant. All the constants in the model also turned out to be statistically significant at  $\alpha = 0.1$ . For the base variant (a small company with a period of operation up to 2 years, in the legal form of a natural person, operating locally in trade or services and not using outsourcing) the chance that no change in the business model will take place turned out to be over 3

times higher compared to the introduction of one or more changes in the model. For the most susceptible to changes variant, i.e. a small entity operating in the form of a general partnership, with a period of activity over 10 years, local range, production nature and using outsourcing, the chance that the company will not change the business model is approx. 526 times smaller than introducing at least one change. The calculations are presented by equations 1 to 4.

$$\text{Logit}(P(\text{CHNG} \leq 0)) = 1.261 - 0 \cdot \text{SIZE} - 0 \cdot \text{L\_FORM} - 0 \cdot \text{AGE} - 0 \cdot \text{RANGE} - 0 \cdot \text{PROD} - 0 \cdot \text{OUTS} = 1.261(1)$$

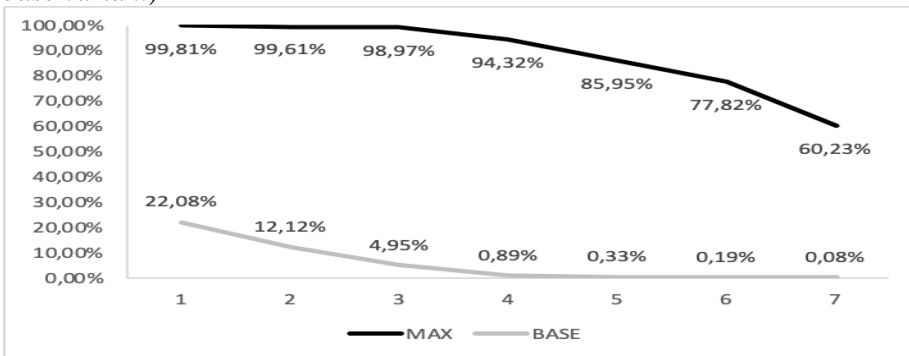
$$\text{Odds} = \exp(1.146) = 3.529 \quad (2)$$

$$\text{Logit}(P(\text{CHNG} \leq 0)) = 1.261 - 0 \cdot \text{SIZE} - 3.863 \cdot \text{L\_FORM} - 1.662 \cdot \text{AGE} - 0 \cdot \text{RANGE} - 0.962 \cdot \text{PROD} - 1.039 \cdot \text{OUTS} = -6.265 \quad (3)$$

$$\text{Odds} = \exp(-6.078) = 0.0019 \quad (4)$$

Based on equations 1 to 4 and the data from Table 2, we extended analysis of the odds ratios for the number of changes in the business model (from 1 to 7) carried out by the entity from the base variant and the variant maximally susceptible to changes. Then, using reverted odds we calculated the probabilities of introducing at least 1, 2, 3, 4, 5, 6 or 7 changes. The probability distribution of introducing 1 to 7 changes in the business model for both considered variants is presented in the Figure 2.

**Figure 2.** Probability distribution of changes in the business model (maximum vs. base variant)



**Source:** Own work.

#### **4.1.2 Complexity of Business Model Change – Type and Scope of Changes**

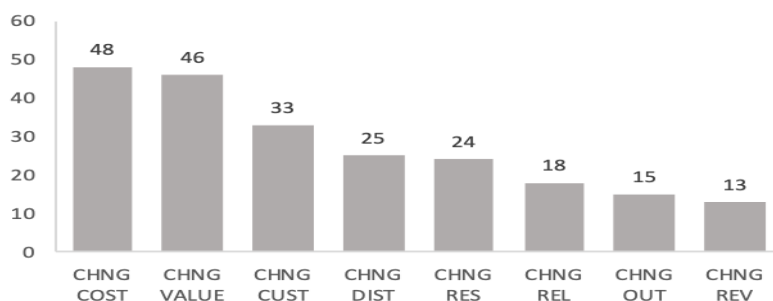
The influence of companies' characteristics on complexity of changes in the business model has been supplemented with an assessment of the type of modifications introduced in the business model elements. This study aimed to determine the frequency of introducing specific changes as well as to find whether specific changes



to the business model can be associated with the characteristics of the company. We also wanted to verify if the changes in the business model are simple (single area) or comprehensive (multi-areas), confirming their complex nature.

In the investigation firstly we analyzed number of particular type of changes implemented by the companies to the business model (i.e. elements of the business model which were changed most frequently), including following change in cost accounting. In fact, the two clearly dominant changes were the change in cost accounting and in value created for the customer by the company. The less important turned out to be changes in outsourcing as well as structure of revenues. Figure 3. presents types of changes in the business model among the investigated companies.

**Figure 3.** Most frequently changed elements of the business model



*Source:* Own work.

In the next step we analyzed relations between types of changes in the business model and internal attributes of companies. In the analysis of the type of changes we found just 6 out of 48 associations with internal characteristics of companies which were statistically significant (Table 3). Such results confirm that we cannot identify universal patterns of implementing changes among the companies according to their size, legal form, age, type, and range of operations. Maximum two associations were found for given attribute of company or changed business element. They were as follows: 1) legal form and change of the value of product or service for customer, 2) legal form and change in cost accounts, 3) age of the company and change in structure of revenues, 4) type of company and change in distribution, 5) range and change in relations with customers, 6) range and the change in structure of revenues. The strongest effect was observed for the first and fourth relation. Moreover, our research pointed that size of the company as well as outsourcing were not influencing changes in any business model element.

**Table 3.** Associations between type of changes in the business model and internal attributes of companies (Contingency coefficient)

	SIZE	LEGAL F.	AGE	TYPE	RANGE	OUT
CHNG CUST	0.256	0.232	0.219	0.056	0.138	0.060
CHNG VALUE	0.095	0.410*	0.328	0.178	0.076	0.011
CHNG DIST	0.195	0.253	0.158	0.451***	0.109	0.107
CHNG REL	0.095	0.210	0.184	0.175	0.301*	0.215
CHNG REV	0.135	0.117	0.344*	0.087	0.328*	0.009
CHNG RES	0.241	0.338	0.303	0.193	0.091	0.073
CHNG COST	0.263	0.377*	0.162	0.176	0.102	0.126
CHNG OUT	0.087	0.288	0.224	0.138	0.216	-

*Note:* \*\*\*  $p$ -value < 0.001, \*  $p$ -value < 0.05,  $N=64$ .

*Source:* Own work.

In the next step, we examined the dependencies between individual types of changes introduced to the business model to determine their functioning as systemic changes. In this field, we found just two statistically significant relations, i.e.: CHNG CUST vs. CHNG RES and CHNG REV vs. CHNG OUT (Table 4). The first one turned out to be negative while the second positive.

**Table 4.** Associations between type of changes in the business model and internal attributes of companies (Phi-coefficient)

	CHNG CUST	CHNG VAL	CHNG DIST	CHNG REL	CHNG REV	CHNG RES	CHNG COST
CHNG VAL	0.089						
CHNG DIST	-0.057	0.145					
CHNG REL	0.189	0.237	0.069				
CHNG REV	-0.055	0.057	-0.006	0.202			
CHNG RES	-0.347**	-0.090	0.107	0.090	0.010		
CHNG COST	-0.054	-0.040	0.018	0.201	0.022	0.149	
CHNG OUT	0.020	0.100	0.011	0.228	0.271*	0.029	0.149

*Note:* \*\*\*  $p$ -value < 0.001, \*  $p$ -value < 0.05,  $N=64$ .

*Source:* Own work.

## 5. Discussion

Demil and Lecocq (2010) claim that the significance of a change in the business model is a derivative of its complexity (simultaneous changes occurring in many components), rather than the type of component being modified or the level of the introduced adjustments. Based on the results of our research, it could therefore be concluded that despite large and medium-sized companies are more susceptible to introduce changes in the business model than the small companies, the changes introduced by the last ones can be considered as more important. Smaller companies, when deciding to change the operating model, they implement modifications in a

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greater number of model elements, adapting at the same time to changes in the product offer, distribution channels, methods of building relationships with customers or the cost structure. It also seems interesting to note that significant reconstruction of models can be noticed in organizations with a short or very long market experience.

However, it should be noted that mature organizations more often carry out both comprehensive and single adaptations of their models to market conditions. In turn, companies that are at the beginning of their life cycle (young) less frequently, but comprehensively optimize their business model. Such an approach - according to some researchers - is possible thanks to a lean organizational structure and a lack of attachment to the current business model (Parker *et al.*, 2010; Chesbrough and Rosenbloom, 2002). Our analysis also pointed that more changes in the business model were introduced by manufacturing companies and those that use outsourcing of their main business processes. The change in the units' approach to modifying their business models is also noticeable in the analysis of units with a simple and complex legal structure. In case of the latter, the chances of a comprehensive business reorganization are greater. As previous studies have shown, extending the scope of an organization's operation increases its susceptibility to introducing changes in the business model (Ciechan-Kujawa and Buszko, 2020), however, a detailed analysis indicates that the introduced modifications do not have to be universal, but may rather concern individual solutions (model elements).

## 6. Conclusions

The survey confirms that changing of the business model usually involves more than one area of activity (element), what may indicate that it is a comprehensive and complex process and it covers many aspects or functions of a company's business. Therefore, we positively verified hypothesis H1. Changing of the business model should be rather treated as strategic operation but not just as a single adjustment. Our research proves that number of changes in the business model (complexity of changes) is associated with internal features of the companies, especially for general partnerships that operate on the market over 10 years, deal with production and use outsourcing. Because 4 out of 6 variables describing internal attributes of companies shows statistically significant relation with number of changes, we find hypothesis H2 also positively verified. When evaluating the nature and types of changes in the business model we did not find strong and numerous associations with internal attributes of companies.

Moreover, we did not find strong as well as numerous correlations between changes implemented to the business model. It confirms that type of changes in the model as well as their range in general do not create universal patterns and models. The implemented changes are individually adjusted to the needs of particular company and as a rule they do not reflect situation of the whole industries or entities of different characteristics. Such conclusion positively verifies hypothesis H3 and confirms systemic nature of the construct of the business model which requires a

comprehensive analysis of the consequences of the changes introduced at its general level, its individual elements, and interrelationships.

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