

Small and Medium-sized Enterprises' Approach to Design Management

Jan Kramoliš ^a | Eva Šviráková ^b

^a Tomas Bata University in Zlín, Faculty of Management and Economics, Department of Economics: Zlín, Czech Republic.

^b Tomas Bata University in Zlín, Faculty of Multimedia Communications, Department of Theoretical Studies: Zlín, Czech Republic.

* Corresponding author: kramolis@utb.cz

ABSTRACT

This paper focuses on Small and Medium-sized Enterprises (SMEs) and Design Management, especially the relationship between design management and business prosperity. The study is based on quantitative research conducted in January 2019. The main issues were transformed into research questions, which were further evaluated into several hypotheses; these were statistically tested. The results suggest that (as expected) there is a correlation between well-managed design management and business prosperity. The results were analyzed across company size with regard to B2B/B2C/B2G. The limitation of the research results lies mainly in a limited number of samples only from the Czech economy. The research did not examine the term "business prosperity" in depth. Sometimes prosperity is seen as increasing profits, sales, market share, or brand value. The originality of the paper lies in the uniqueness of the research and the possibility of utilization of its results for other economies similar to that of the Czech Republic.

Keywords: Design management, SME, Czech, Business prosperity.

INTRODUCTION

Companies face a wide range of challenges in the design management area, from technological and psychological to managerial. It is the managerial aspect that includes quantification of costs, sales, returns, as well as remote indicators, such as brand value, shares, etc. The benefits of quality design are well-known in connection with business prosperity growth (Kramoliš, 2015). The authors note that it is very difficult to precisely extract the part of prosperity or profit that is achieved specifically due to quality design. The first problem is the economically well-known "ceteris paribus", another problem is that it is not possible to generalize this direct connection and say that quality design = business prosperity. It is mainly impossible for experts on quantitative indicators in companies – finances and accounting (for them, design is an unmeasurable and abstract item in the numerical outputs of companies) (Kramoliš and Staňková, 2017). Design is closely connected with all other management areas in the company.

1. THEORETICAL BACKGROUND

The relationship between design and economic value was also studied by Kristensen and Gabrielsen (2011). The authors examined these basic hypotheses: There is a connection between quality product design and increased sales (the financial performance of the company). There is a connection between the logo design and increased sales. There is a

connection between the website design and increased sales. The result of their research was that they found a significant correlation between product design and increased sales. Business prosperity can be explained in different ways, most often as: increase in sales, increase in profit, increase in brand value (Kramoliš and Staňková, 2017). Wolff et al. (2016) state that there is no doubt that the influence of design management on the economic results of companies is significant. Kramoliš (2017) also proposes an interdisciplinary overlap of design management. The main contribution lies in its focus on design as the key factor leading to long-term business prosperity. His research showed that design is an important aspect contributing to companies' prosperity, and its importance is still growing. Companies are aware of the link between business prosperity and design.

Westcott et al. (2013) explained the business approach to design. Karpissova (2009) describes the connection between brand, visual design and prosperity and presents chosen aspects (out of many factors) of internal competitiveness. They explain a way of using design management to perfect company strategy. It comprises four steps from company strategy to company activities. The authors also indicate individual levels of implemented design in a company. The following scales of design management (Žáková et al., 2015) represent four different intensity levels. They range from a purely aesthetic view (the "last touch") to the view of design as a compound influence on the entire production process (maximizing product quality and reliability while minimizing production and distribution costs, knowledge from market research and customer requirements, marketing and branding, etc.). The author states that the highest level of design implementation in a company shows its saturation point at the level of "design as an innovation." In short, design enables to achieve the reconstruction of the whole company or some of its essential business goals.

Table 1. Levels of design management (Žáková, 2016)

Level	Saturation	Description
IV	Design as an innovation	Designers work together with owners or managers to achieve the reconstruction of the whole company or some of its essential business goals.
III	Design as a process	Design is integrated into the product development process from the very beginning.
II	Design as a styling	Companies use design as a process of the last touch. Professional designers or other professionals can do these tasks.
I	Absence of design	Design plays a minimal role in the product development process, and a company does not involve professional designers.

According to Kramoliš (2017), it is possible to generally summarize the concept of design management for companies into three fundamental pillars (Figure 1). The first is "purpose"; it means that the design of both tangible and intangible products or marketing communication materials should be in keeping with the purpose for which it was created. The second pillar is "aesthetics" – all creation should be aesthetic and in agreement with the basic principles of design (such as signal-to-noise ratio, Occam's Razor, Horror Vacui, 80:20, etc.). It also synergistically affects simplification, efficiency improvement and facilitation of marketing communication. And the third pillar is of a long-term nature – "profitability". It means that good design has to generate profit for the company in the long run (e. g. due to the Veblen effect); it should primarily create a competitive advantage and distinguish the company in the market.

Kramoliš, J. & Šviráková, E. (2022). Small and Medium-sized Enterprises Approach to Design Management. *Strategic Design Research Journal*. Volume 15, number 01, January–April 2022. 13-23. DOI: 10.4013/sdrj.2022.151.03.

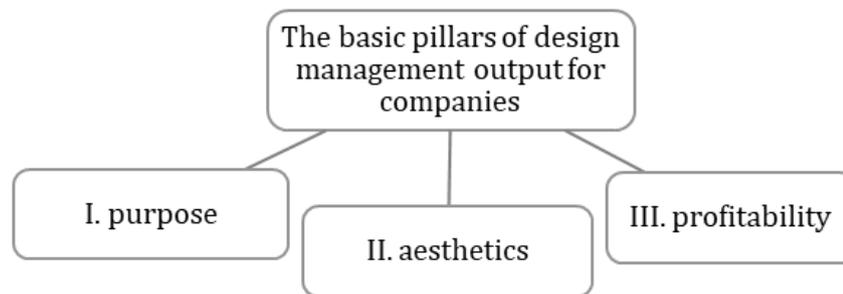


Figure 1. The basic pillars of design management output for companies (Kramoliš, 2017).

Kramoliš (2017) also emphasizes that these pillars of the design management approach comply with the 1P theory. This theory derives from the well-known Kotler's marketing mix. The 1P theory emphasizes the product relation to companies' long-term prosperity.

Wolff et al. (2016) compare different systems and approaches to design impact measuring and unambiguously state that it is difficult to set design management metrics. This opinion is in accordance with the opinions of other authors (Moultrie & Livesey (2014), BCD Barcelona Design Center (2014), Cooper, R., Hernandez, R., Murphy, E. & Tether, B. (2016), DMI: Design Value Institute (2015), Taeuscher, 2018, Moellers, T., von der Burg, L., Bansemir, B. et al. (2019), Cosenz (2017), Ganzarain, Ruiz, Igartua (2019). Therefore, the difficulty to set design management metrics is a challenge that can be researched from more points of view. Design has to become part of the company's strategic goal in the initial stages of the strategy development (Libânio et al., 2019). It has to affect all levels of company activities. Borja de Mozota (2003) sees the implementation of design management as a program of activities inside the company formally set to internally communicate the importance of design for the company's long-term goals. This approach corresponds to the model by Bruce et al. (1999), which describes a sequence of steps that should be taken in design management. The first step is to adopt measures according to which the lead designer creates the initial project concept. The second step is an evaluation of the project concept followed by the development of the solution. The next step is user research, validation of product development, revision and an assessment of the product design. Other activities are directed at the development of a prototype and its verification, followed by experimental manufacturing, production, promotion and the product launch on the market. Morales and Martínez (2018) present a critical design management approach based on three development stages; each achieves a different aim. In the first stage, the goal is to define the problem. The second stage aims to identify specific user needs by a systemic approach and to create a model of a solution. The third stage aims to design a complex systemic solution.

2. PROBLEM FORMULATION

The main issues were transformed into research questions. These research questions were further evaluated into several hypotheses, which were statistically tested. The results suggest that (as expected) there is a correlation between well-managed design management (DM) and business prosperity.

Three research questions and four linked hypotheses were set:

RQ1 – What does design mean to the company (at which level of design is the company)? (level I-IV)

H10 – Design is not an important factor for the company at least at level II.

H1a – Design is an important factor for the company at least at level II.

RQ2 – What is the willingness to invest in design in connection with the current level of DM in the company?

H20 – There is not a correlation between the willingness to invest in design today and the progress to another DM level in the company in the next period (the next three years).

H2a – There is a correlation between the willingness to invest in design today and the progress to another DM level in the company in the next period (the next three years).

H30 – Investments in design today and a change of the level of design in the future are independent.

H3a – Investments in design today and a change of the level of design in the future are not independent.

RQ3 – Does design help business prosperity?

H40 – It is not true that design helps the majority of companies to prosper.

H4a – It is true that design helps the majority of companies to prosper.

Each hypothesis shall be tested using statistical tools. The results will therefore be supported by calculations based on the level with 95% reliability.

3. METHODS

The main purpose of this paper is to clarify what design means to companies, more precisely, how companies understand this concept. This brings another question: what their view of investments in design is and at which level of design companies want to be. Another purpose of this paper is to support or disprove the statement that design helps business prosperity. The background for this research area is based on the authors' research. This research, which took place between December 2018 and January 2019 in the Czech Republic, was conducted electronically by team members of the project (TL02000255). The research sample (n=174) was selected in a random way. The research was conducted using a closed question with four options and a four-point scale. Companies had to choose one of the options when completing the questionnaire. The questionnaire was designed (so that the respondent give a certain tendency) by creating a 4-point scale (compared to the classic 5-point scale).

3.1. Statistical tests and tools

To test the hypothesis that for one classification table all classification levels have the same frequency, only one discrete variable must be identified in the dialogue box, with the null hypothesis being that all classification levels have the same frequency. The chi-squared statistic is the sum of the squares of the differences between the observed and expected frequency divided by the expected frequency for every cell (Campbell, 2007):

$$\chi^2 = \sum (\text{observed count} - \text{expected count})^2 / (\text{expected count})$$

A single classification factor for testing the hypothesis that for one single classification table, all classification levels have the same frequency, at which point only one discrete variable is identified in the dialogue form. In this case, the null hypothesis is that all classification levels

have the same frequency. If the calculated p-value is low ($p < 0.05$), the null hypothesis is rejected. In a single classification table, the mode of the observations is the most common observation or category (the observation with the highest frequency). A unimodal distribution has one mode; a bimodal distribution has two modes. Computational notes of the p-value defined the significance level, with the p-value calculated using a general z-test (Altman, 1990; Fleiss et al., 2004):

$$z = (p - p_{exp}) / (se(p))$$

where p is the observed proportion; p_{exp} is the null hypothesis (or expected) proportion; and $se(p)$ is the standard error of the expected proportion:

$$se(p) = \sqrt{(p_{exp}(1-p_{exp}))/n}$$

In some hypotheses, the term “majority” is used. This term is quantified based on the golden ratio. The threshold value for the majority was set at 61.79% calculated from ϕ (Bejan, 2009; Lidwell, 2010, Kramoliš, Šviráková and Král, 2020).

$$\phi = (1 + \sqrt{5})/2$$

Linear Regression – linear regression is a linear approach to the modeling of the relationship between a scalar response (or dependent variable) and one or more explanatory variables (or independent variables). Correlation is a degree of relation, which means it is also possible to describe the correlation strength verbally. We used Evans’s (2015) guide, which he designed for the absolute value of r :

Table 2. The strength of linear correlation in accordance with the absolute value (Evans, 2015)

Absolute value of r	Strength of correlation
0.00 – 0.19	Very weak
0.20 – 0.39	Weak
0.40 – 0.59	Moderate
0.60 – 0.79	Strong
0.80 – 1.00	Very strong

A linear regression line has the form of $Y = a + bX$, where X is the explanatory variable and Y is the dependent variable. The slope of the line is b , and a is the intercept (the value of y when $x = 0$). Simple linear regression attempts to model the relationship between two variables. For a linear relationship (Evans, 1980), we use a model of the form: $y = \beta_0 + \beta_1x + \epsilon$, where y is the dependent or response variable, and x is the independent or predictor variable. The random variable ϵ is the error term in the model.

Other statistical indicators used to compile an overall outlook included the arithmetic mean, median value, variance (s^2) and standard deviation (SD).

3.2. Research Sample Characteristics

The basic parameters of the research sample are shown in Table 3. The table shows proportions. There were 174 valid records in the sample.

Kramoliš, J. & Šviráková, E. (2022). Small and Medium-sized Enterprises Approach to Design Management. *Strategic Design Research Journal*. Volume 15, number 01, January–April 2022. 13-23. DOI: 10.4013/sdrj.2022.151.03.

Table 3. Research sample characteristics (Source: Authors)

Target Output Variable	Proportion	Business Size Variable	Proportion
B2C	0.47	XS:(5–10 empl.)	0.05
B2B	0.44	S: (11–50 empl.)	0.63
B2G	0.09	M: (51–250 empl.)	0.31

The largest group in the study group includes B2C companies (almost half of the sample). A smaller part operates on B2B. Both major areas are represented relatively in balance.

As for the size of the companies, the smallest companies with 11–50 employees were predominant (63% of the sample), followed by medium-sized companies with 50–250 employees (31% of the sample). Very small businesses were represented by just under 6%. The following variables were assigned to identify the size of companies according to employees: XS = 5–10 employees; S = 11–50 employees; M = 51–250 employees.

The research was conducted by random research samples. Every entry in the research file meets one of these parameters:

- any company, which has the potential to employ design in their marketing solutions,
- a producer with the ability to modify the product design or product,
- a company offering an intangible product, in which design can be used,
- a company that strives for market success by differentiating outputs by design.

4. RESULTS

The first research question (RQ1) was based on Žáková’s (2015) concept. It was a general concept of “what design means to companies,” more precisely how companies understand this concept. The original concept of Levels of design by Žáková (2015) was built on four categories. Therefore, the question in the research questionnaire was closed, and the respondents could only choose from these four values. In the table (Table 4), they are labeled in the following way: Level I – DM is of very small or marginal importance to the company; Level II – DM is present in the company as a form, but it is not a crucial aspect; Level III – DM is a process in the company and, at the same time, it is an important factor; Level IV – DM is a strategy in the company, it is a central and crucial element.

Table 4. Levels of DM found in the research sample (Source: Authors).

	Level I	Level II	Level III	Level IV
Proportion	0.27	0.345	0.293	0.092
Percentage	27.0	34.5	29.3	9.2

The result is that most companies are at Level II or III. To be precise, 34.5% are at Level II, which can be interpreted as design as a form. This specifically means that design is not a crucial aspect in the company, and it is used for communication or as the last touch of products. And 29.3% of companies are at Level III where design is seen as a process, and it is an important factor for business and is integrated into many processes and deliveries.

When testing hypothesis H1 in detail, the following values were measured using statistical calculations: $p < 0.01$ and $z\text{-score} = -6.249$. Therefore, the critical value (the cutoff point) is 1.645. In left-tail hypothesis testing, any $z\text{-score}$ lower than the critical value is rejected. Since -6.249 is less than 1.645, we reject the null hypothesis (H10 – Design is not an important factor for the company at least at level II). We accept the alternative hypothesis (H1a – Design is an important factor for the company at least at level II).

The second research question (RQ2) looked for a connection between the willingness to invest in design and the current level of DM in the company. The statistical method of correlation was used to solve the question. We looked for correlation across values in the questions examining “willingness to invest in design” and “the current level of DM in the company according to the model by Žáková (2015).” Specifically, hypothesis H2 examines if there is a (linear regression) correlation between the willingness to invest in design today and the progress to another DM level in the company in the next period (the next three years). The values in Table 5 were measured using statistical testing of this hypothesis with 95% confidence.

Table 5. Linear regression output data of H2 (Source: Authors)

Best fit values	95% CI	Goodness of fit	Is slope significantly non-zero?
Slope 0.1495 ± 0.05605	Slope 0.03965 to 0.2594	r square 0.03742	F 7.115
Y-intercept 1.215 ± 0.1462	Y-intercept 0.9289 to 1.502	r = 0.194	DFn, DFd 1.183
X-intercept -8.129	X-intercept -37.41 to -3.626	Sy.x 0.7293	p-value 0.0083
1/Slope 6.688		Very weak positive linear regression	Deviation from horizontal? Significant

When looking at $r = 0.194$, it is possible to classify the strength of correlation as a very weak positive correlation type following the definition by Evans (1996). The consistency of the data shows a standard deviation, which equals 1.183. This low value of standard deviation shows that the sample is consistent (ranging from $\min = 1$ to $\max = 4$).

H20 – Therefore, the above-mentioned calculations confirm hypothesis H2a. The hypothesis states that there is a very weak correlation between the willingness to invest in design today and the progress to another DM level in the company in the next period (the next three years). At the same time, the null hypothesis – which states there is not a correlation between the willingness to invest in design today and the progress to another DM level in the company in the next period (the next three years) – is rejected.

Another hypothesis (H3) investigated the relationship between “the willingness to invest in design in the company” and the progress to another level of design in the future (specifically in the next three years). The statistical indicators of chi-square, degrees of freedom (DF) and p-value were used to verify this hypothesis.

The hypothesis verification process went as follows: So, in our example, we take a chi-square value of 4 and a DF of 1, which gives us a p-value of 0.0083. This is interpreted as a 0.83% likelihood that the null hypothesis is correct. Now, $p < 0.05$ is the usual test for dependence. In this case, p is greater than 0.05, so we believe the variables are independent (i.e. not linked together). The result is that the alternative hypothesis, which states that investments in design today and the change of the level of design in the future are not independent, is true. Therefore, both quantities are mutually dependent.

Kramoliš, J. & Šviráková, E. (2022). Small and Medium-sized Enterprises Approach to Design Management. *Strategic Design Research Journal*. Volume 15, number 01, January–April 2022. 13-23. DOI: 10.4013/sdrj.2022.151.03.

The last examined area verifies whether design helps companies to prosper (RQ3). Company prosperity means any concept that companies associate with the company's success. Even though each company may see prosperity differently, this finding is important. The results of the relative shares show that 43.7% of companies state that design helps them to prosper; in contrast, 16.7% of companies believe that it is not so. The remaining 39.7% are not able to determine whether design helps the company to prosper or not.

Hypothesis H4 (design helps the majority of companies to prosper) was subjected to statistical testing in which the term "majority" was quantified using the golden ratio value. Further statistical calculations characterize the values in the following way: mean = 0.728, Variance (s^2) = 0.19974 and Standard Deviation (SD) = 0.44691. Tests of the set hypothesis show the p-value = 0.000 (2.23-28), and the value of z-score = -10.986. When we interpret the measured values, we can say the alternative hypothesis (H4a) is true. The critical value (the cutoff point) is 1.645. In left-tail hypothesis testing, any z-score lower than the critical value is rejected. Since -10.986 is less than 1.645, we reject the null hypothesis. We accept the alternative hypothesis. This means that design helps the majority of companies to prosper.

5. DISCUSSION

The main purpose of this paper was to clarify what design means to companies, more precisely how companies understand this concept. Another issue was if there is a connection between the willingness to invest in design and the current level of design in the company. At the same time, the authors wanted to either confirm or reject the statement (which had already been published) that design helps business prosperity. This question is related to problems with measuring the impact of design management on companies' economic results.

The aim of the first research area (RQ1) was to find out at which level of design (according to Levels of design (Žáková, 2015)) the examined companies are. The results were of the "self-evaluation" type, and 34.5% of companies stated that they were at Level II of design. The second most common was the higher Level III of design, precisely 29.3%. Therefore, it can be concluded that approximately a third of companies use design as a process of the last touch. Professional designers or other professionals can do these tasks. In another third of companies, design is integrated into the product development process from the very beginning. 27% of companies are only at Level I of design. The situation of companies in the Czech Republic is quite good, and at the same time, there is a great potential for 27% of companies to leave Level I and progress to a higher level of design. It is completely understandable that Level IV of design is used only by less than a tenth of companies. It is a highly sophisticated level that is not suitable for many products and companies, and that would probably cause some companies to fall behind in other strategic areas. Hypothesis (H1) was assigned to this research question. Based on statistical testing, it was confirmed with a 95% confidence interval that design is an important factor for companies at Level II and higher.

The second research question (RQ2) focused on the willingness of companies to invest in design and its connection with the current level of design in the company. The results clearly show that there is a connection. It was hypothesis (H2) that investigated the existence of a correlation between the willingness to invest in design today and the progress to another level of design in the company in the next three years. We expected to find a correlation. The testing results indeed confirmed the existence of a very weak correlation between the willingness to

invest in design today and the future progress to another level of design. Therefore, it is possible to claim that companies also invest in design to improve the current level of design in the company. There is a long-term aspect to this change; it is not possible to expect significant progress under a year (the companies stated a period of three years). This is related to the fact that companies classified themselves most often (approximately two-thirds of companies) at Level II or III. Both of these levels allow for further progress. Only Level IV does not allow for further progress (a tenth of companies is at this level). At the same time, it was examined whether “investments today” and “the progress to a higher level of design” are independent. Following statistical testing (H3), the alternative hypothesis was confirmed. Therefore, the result is that investments in design and the change of the level of design are mutually dependent. Therefore, the authors’ expectation that there is a dependence was confirmed.

The last research issue of this paper examined whether the statement “design helps business prosperity” still holds true. The statement had already been confirmed by research in the past years (Kramoliš, 2015). In this case, business prosperity is an aggregate concept. Some companies see prosperity as an increase in profit, others as an increase in sales or an increase in the number of units sold. It is also necessary to mention that some companies see it as more abstract concepts, such as brand growth, market share growth, product value growth. Based on the research results using statistical tools, it is possible to confirm (H4) the validity of the original thesis once again. It holds true that design helps the majority of companies to prosper. Although approximately a third of companies are not able to express their opinion on this issue, almost a half of companies agree with this statement. It is possible to summarize that companies indeed connect the concept of “design” with the potential for prosperity.

6. CONCLUSIONS

Companies in the Czech Republic see themselves most commonly at the second level of Žáková’s Design Management theory – design as a styling. Companies use design as a process of the last touch. Professional designers or other professionals can do these tasks. This finding constitutes a considerable potential for stronger integration of design management into companies and progress to a higher level III. The important thing is that companies realize that with the correct design management they can improve their company results and achieve the required business prosperity. Future research could focus more on brand or products indicators. It is necessary to examine in detail the connection to specific individual marketing concepts, such as brand value change, product value change, positioning against the competition or brand awareness. Brand value change and product value change are closely related to research that focuses on the measurement of the impact of design management on companies economic results. When measuring the impact of design management on company productivity, it is necessary to consider what, how and why we are going to measure (Mrázek et al., 2011). It is necessary to set the company’s strategic goals and to involve interested parties. All these goals result from the needs of the company’s customers and product users. Therefore, the metrics must be connected with the company’s goals. Monitoring of final results in the market is possible only through partnerships with customers. It is also necessary to monitor and analyze all failures. An organization can learn from its mistakes only through results documentation using both qualitative and quantitative data collection. A valuable overview of what works and what does not work can only be achieved by consistent observation of design processes. A well-designed measurement system is not important only

for the measurement itself. The system can serve as a catalyst for stronger cooperation of all interested parties in the company during the product development process. For creative teams, the system can serve as a compass that assures them that they are going in the right direction.

Limitations: The first known limitation is that it was entirely up to the companies' subjective assessment to decide at which level of design they are. Therefore, there may have been a distortion due to companies stating a specific level incorrectly for two reasons: The first reason is that they did not understand the classification of the levels of design. The second reason may be that companies considered themselves to be at a higher level of design than at the one they were really at due to great confidence. Another known problem with H4 is the fact that 16.68% of companies were not able to answer the question if design helps them to prosper or not. This problem may be caused by the companies' indecisiveness or their unfamiliarity with specific company indicators over a long-term period. For example, it is possible that the questioned managers have worked in the company for a short time, or they may not have known the values due to their lack of time.

ACKNOWLEDGMENTS

This paper was completed with the support of the Technology Agency of the Czech Republic (Project No.: TL02000255; A Managerial Model of Design Value for Competitiveness of SME in the Czech Republic).

REFERENCES

- Altman, D. G. (1990). *Practical Statistics for Medical Research*. Boca Raton: Chapman & Hall/CRC.
- BCD Barcelona Design Centre. (2014). € Design – Measuring Design Value: Guidelines for collecting and interpreting design data. Retrieved 4 June, 2020, from <https://www.bcd.es/wp-content/uploads/2020/03/Eurodesign-Version-Brussels.pdf>.
- Bejan, A. (2009). The golden ratio predicted: Vision, cognition and locomotion as a single design in nature. *International Journal of Design & Nature and Ecodynamics*, 4(2), 97-104. DOI: <https://doi.org/10.2495/dne-v4-n2-97-104>.
- Borja de Mozota, B. (2011). *Design management: using design to build brand value and corporate innovation*. New York: Allworth.
- Bruce, M., Cooper, R., & Vazquez, D. (1999). Effective design management for small businesses. *Design studies*, 20(3), 297-315. DOI: [https://doi.org/10.1016/S0142-694X\(98\)00022-2](https://doi.org/10.1016/S0142-694X(98)00022-2).
- Campbell, I. (2007). Chi-Squared and Fisher-Irwin Tests of Two-by-Two Tables with Small Sample Recommendations. *Statistics in Medicine*, 26(19), 3661-3675. DOI: <https://doi.org/10.1002/sim.2832>.
- Cooper, R., Hernandez, R., Murphy, E. & Tether, B. (2016) Design value: The role of design in innovation. Retrieved 7 April, 2020, from http://imagination.lancs.ac.uk/news/Design_Value.
- Cosenz, F. (2017). Supporting start-up business model design through system dynamics modelling. *Management Decision*, 55(1), 57-80. <https://doi.org/10.1108/md-06-2016-0395>.
- Design Council (2015). *The Design Economy: The Value of Design to the UK. Executive Summary*. Retrieved 21 January, 2019, from <https://www.designcouncil.org.uk/sites/default/files/asset/document/The%20Design%20Economy%20executive%20summary.pdf>.
- DMI: Design Management Institute (2015). *Design Value*. Retrieved 3 June, 2020, from <https://www.dmi.org/page/DesignValue/The-Value-of-Design-.htm>.
- Dunlap, R. A., & Dunlap, R. A. (1997). *The golden ratio and Fibonacci numbers*. Hackensack, NJ: World Scientific.
- Evans, M. (2016). Measuring statistical evidence using relative belief. *Computational and structural biotechnology journal*, 14, 91-96. DOI: <https://doi.org/10.1016/j.csbj.2015.12.001>.
- Evans, M., & Fraser, D. A. S. (1980). An optimum tolerance region for multivariate regression. *Journal of Multivariate Analysis*, 10(2), 268-272. DOI: [https://doi.org/10.1016/0047-259x\(80\)90018-4](https://doi.org/10.1016/0047-259x(80)90018-4).

- Fleiss, J. L., Levin, B., & Paik, M. C. (1981). The measurement of interrater agreement. *Statistical methods for rates and proportions*, 2(212-236), 22-23. Retrieved 4 June, 2020, from <https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.456.3830&rep=rep1&type=pdf>.
- Ganzarain, J., Ruiz, M., & Igartua, J. I. (2019). Testing successful Business Model using System Dynamics. *International Journal of Production Management and Engineering*, 7(Especial), 91-100. DOI: <https://doi.org/10.4995/ijpme.2019.10807>.
- Karpissová, E. (2009). Environmental Management and its Influence on a Company Performance. *New Economic Challenges*, 420. Retrieved 4 June, 2020, from http://is.muni.cz/do/1456/sborniky/2009/New_Economic_Challenges.pdf.
- Kramolis, J. (2015). Design as a Condition for Prosperity in Czech Businesses - A Comparative Study. *Journal of Competitiveness*, 7(4). 33 – 47. DOI: <https://doi.org/10.7441/joc.2015.04.03>.
- Kramoliš, J., & Staňková, P. (2017). Design and its Impact on The Financial Results of Enterprises (Based on Managers Opinions). *Journal of Competitiveness*, 9(2). 62 – 77. DOI: <https://doi.org/10.7441/joc.2017.02.05>.
- Kramolis, J. (2017). Design management in Czech companies. Czech Republic: Tomas Bata University in Zlín
- Kramoliš, J., Šviráková, E., & Král, D. (2020). Design management as crucial creative essence for business success in small and medium-sized enterprises. *Creativity Studies*, 13(1), 87-98. DOI: <https://doi.org/10.3846/cs.2020.9904>.
- Kristensen, T., & Gabrielsen, G. (2011). Design Economy – Value Creation and Profitability. *The Handbook of Design Management*. DOI: <https://doi.org/10.5040/9781474294126.ch-022>.
- Libânio, C.S. Amaral, F.G. Migowski, S.A. Zitkus, E. (2019). Determinant Moments in Design Management. *Strategic Design Research Journal*, 12(1), 62-76. DOI: <https://doi.org/10.4013/sdrj.2019.121.05>.
- Lidwell, W., Holden, K., & Butler, J. (2010). *Universal principles of design, revised and updated: 125 ways to enhance usability, influence perception, increase appeal, make better design decisions, and teach through design*. USA: Rockport Pub.
- Moellers, T., von der Burg, L., Bansemir, B., Pretzl, M., & Gassmann, O. (2019). System dynamics for corporate business model innovation. *Electronic Markets*, 29(3), 387–406. DOI: <https://doi.org/10.1007/s12525-019-00329-y>.
- Morales, L. R., Angélica Martínez de la Peña. (2018). Design for all as a research and education strategy. *Strategic Design Research Journal*, 11(3): 241-246. DOI: <https://doi.org/10.4013/sdrj.2018.113.08>.
- Moultrie, J., & Livesey, F. (2014). Measuring design investment in firms: Conceptual foundations and exploratory UK survey. *Research Policy*, 43(3), 570–587. DOI: <https://doi.org/10.1016/j.respol.2013.08.005>.
- Mrazek, D., Lucente, S., Wakid, K., Sato, S., Wai, C., Menter, A., Hartley, P. (2011) The Holy Grail of Design Measurement. *Design Management Review*, 22(2), 6-16. DOI: <https://doi.org/10.1111/j.1948-7169.2011.00121.x>.
- Täuscher, K. (2017). Using qualitative comparative analysis and system dynamics for theory-driven business model research. *Strategic Organization*, 16(4), 470–481. DOI: <https://doi.org/10.1177/1476127017740535>.
- Westcott, M., Sato, S., Mrazek, D., Wallace, R., Vanka, S., Bilson, C., & Hardin, D. (2013). The DMI Design Value Scorecard: A New Design Measurement and Management Model. *Design Management Review*, 24(4), 10–16. DOI: <https://doi.org/10.1111/drev.10257>.
- Wolff, F., Dutra, F.P., Ribeiro, V.G., (2016). Design metrics: A systematic review of the scientific production of the Design Management Institute. *Journal of Strategic Design Research Journal*, 9 (1), 27 – 33. DOI: <https://doi.org/10.4013/sdrj.2016.91.03>.
- Žáková, E., Čísař, J., Dohnalová, L., Faltus, J., Hadaš, J., Hejduk, M., Mošna, P., Nekolný, B., Peterka, I., Raabová, T., Sedláková, R., Sedmerová, Z., & Skřivánek, J. (2015). *Kulturní a kreativní průmysly v České republice [Culture and creative industry in the Czech Republic]*. Prague: Arts and Theatre Institute.

Kramoliš, J. & Šviráková, E. (2022). Small and Medium-sized Enterprises Approach to Design Management. *Strategic Design Research Journal*. Volume 15, number 01, January–April 2022. 13-23. DOI: 10.4013/sdrj.2022.151.03.