Post-print version of the paper by Y Dahle, H Dybvik, M Steinert - 2019 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)
https://doi.org/10.1109/ICE.2019.8792598

A dynamic and a static approach to the business model - Investigating the potential difference in business model focus

Yngve Dahle
Department of Mechanical and Industrial Engineering (MTP)
Norwegian University of Science and Technology (NTNU)
Trondheim, Norway
yngve.dahle@ntnu.no

Henrikke Dybvik
Department of Mechanical and Industrial Engineering (MTP)
Norwegian University of Science and Technology (NTNU)
Trondheim, Norway
henrikke.dybvik@ntnu.no

Martin Steinert
Department of Mechanical and Industrial Engineering (MTP)
Norwegian University of Science and Technology (NTNU)
Trondheim, Norway
martin.steinert@ntnu.no

***Abstract*—This white paper is conducted for Lean Business encompassing a first attempt at empirical testing of data extracted from the Lean Business database. Lean Business adhere to the Lean Startup Movement, where the core principle is that static business planning should be replaced with a continuous dynamic business model development and that doing so increases chances of success. To begin to understand lean startup and entrepreneurial behavior the potential differences in focus on the different business model canvas elements have been investigated. Based on two samples, one for dynamic use and one for static use of the business model canvas, differences were investigated statistically. A distinction in focus on the different business model elements between a dynamic and a static approach could not be found. However, statistical testing of quantitative data represents an important step towards understanding entrepreneurship.**

Keywords— Business Model, Business Model Development, Lean Startup, Static Approach, Dynamic Approach, Business Model Canvas, Lean Canvas, Quantitative Data

I. INTRODUCTION

This is a white paper conducted for Lean Business encompassing a first attempt at empirical testing of data extracted from the Lean Business database, the Entrepreneur Platform. An in-depth depth description of the Entrepreneurship Platform and database development can be found in previous work [1]. The Entrepreneurship Platform has been built as a structured model for entrepreneurship consisting of a clearly defined terminology [1]–[3] and it is a part of an attempt at developing a quantitative and longitudinal approach to entrepreneurship research. In an attempt to further understand entrepreneurship, entrepreneurial and startup behavior, this paper begins an empirical investigation on quantitative company data regarding the business model [4]–[6].

Lean Business adhere to the Lean Startup Movement, which advocates an agile behavior in terms of business model development and product development. The core principle here is that static business planning or development should be replaced with a continuous dynamic development, and that by doing so increasing the chances of success [1], [7]–[10]. In the Entrepreneurship Platform [1], Lean Business incorporate and illustrate these notions as follows; Companies with frequent changes in their Business Idea and Model, Project Development and Customer Interaction will have a greater chance for success:

$$\Delta S = \Delta f(BI) + \Delta f(BM) + \Delta f(PD) + \Delta f(CI)$$

Where S = Success, BI= Business Idea, BM = Business Model, PD = Project Development and CI = Customer Interaction. This means that any positive change in BI, BM, PD and CI improves the level of Success. It is of Lean Business interest to investigate if there are differences between companies, organizations or entrepreneurs that iterate and change often, (that is; have a dynamic approach to developing a business) and those who do not change as frequently (that is; have a static approach). This can increase our understanding of what it is that make companies, organizations, entrepreneurs, or even startups successful. Moreover, it could begin to investigate if the underlying principles in the Lean Startup Movement hold.

To begin such an investigation of differences between a dynamic and a static approach, this paper focuses on investigating the Business Idea and Model. In the Entrepreneurship Platform, the Business Idea is a part of the Business Model, which consists of nine elements. These nine elements, from here on out called the business model elements have been created by combining the elements from the Business Model Canvas of Osterwalder and Pigneur [5], [9] and the Lean Canvas created by Maurya [8]. The elements are; KeyContribution, KeyMarket, Distinction, EarlyMarketCustomer, UniqueValueProposition, ProductFeature, Partner, HowToSell and HowToGetPaid, and they contain similar information as the Business Model Canvas and Lean Canvas. We refer to Dahle et al. [1], [2] for a thorough description of their development and what they encompass. A sample have been constructed to represent a static approach and a dynamic approach to using the nine business model elements in the Entrepreneurship Platform. Case companies were extracted from the Lean Business database and information on actions conducted in each of the nine elements analyzed. The amount of actions conducted in each business model element is used as a proxy for the attention and time a company spend on that element, that is to what extent they focus on that element. The hypothesis is that focus on the business model elements will be different in companies with a static approach compared to companies with a dynamic approach. Therefore, the amount of actions in each Business Model Element have been statistically tested for differences between companies representing a static and a dynamic approach.

Following this introduction, the remainder of the paper consists of a theoretical background, where the basic assumptions of the Lean Startup Movement are presented, in addition to the theoretical underpinning of these. The research question is stated and operationalized into testable hypotheses before presenting the results. Lastly, results and limitations are discussed, before providing concluding remarks.

II. Existing Theories & Previous Work

Lean Business adhere to the Lean Startup Movement, which is based on notions from Blank's "Customer Development process" [7] that were incorporated Ries' "Lean Startup" methodology [10]. Furthermore, it utilizes ideas and tools from Maurya's "Running Lean" [8] and "Business Model Generation" by Osterwalder and Pigneur [5], [9].

In a Lean Startup, an agile behavior in terms of business model development and product development is promoted, aided by iterations and learning as fast as possible. Mantras such as "learn fast, fail fast" [8] and "fail early, fail cheap" occur frequently and describes the mindset and methodology to the Lean Startup Movement. The core principle is that static business planning or development should be replaced with a continuous dynamic development and that by doing so increasing the chances of success. Therefore, the success of a startups depends on the following abilities inherent to the startup. First, a startup must have the ability to change the business idea and subsequently its business model this is necessary [1]. This needs to be recognized by the entrepreneurs, who have to make necessary changes accordingly. Key to the process of recognition is seeking feedback through frequent customer interaction and continuously iterating on business offerings and business model by incorporating feedback. Here, the term business offerings is selected to capture the range of possible offerings to the customer, from a pure product offering to pure service offering, since this depends greatly on the nature of the business. In an effort to make changes in the business model easier and facilitate business model development, Ostewalder and Pigneur [5], [9] and Maurya [8] have developed a visual one-page tool. These tools, labeled Business Model Canvas and Lean Canvas respectively, have been widely accepted and adopted due to their flexibility. Both described the business model as a series of elements and have a strong focus on the interrelations of elements, seeing how conducting changes in one element affects the other. Making decisions and taking actions necessary to realize what is described in the canvas is what should cause success. As mentioned in the introduction, Lean Business combines these two tools in their Entrepreneurship Platform, which provides a visual tool with a defined terminology [1], [2] a canvas available for startups and entrepreneurs.

Theoretical foundation for investigating differences in a dynamic and a static approach can be found in an argument of investigating a company's dynamic capabilities [11] and dynamic entrepreneurial learning capabilities [12]. An ability to dynamically adapt to changing customer and market requirements is necessary to sustain a position in the market place and to continue to serve value to the customer [4], [6]. This can be aided by experimentation, organizational change or product development, and should be reflected in the business model. Business model development represent changes in the business model. Therefore, indications of a company's dynamic capabilities could be provided by understanding the elements, the relations between the elements and how changes affect one another. Using the description of the business model as a series of elements and their interrelations is in line with the business-model elements research perspective [13]. The ability to learn and change are likely to be among the most important capabilities a firm can possess and therefore empirical attention should be devoted to the topic [11], [14].

Demil and Lecocq [15] note the different uses of the concept business model, notably there are two distinct uses of the term reflecting the static approach and the transformational approach to the business model. The static approach emphases the `model`, the business model functions as a blueprint enabling description and classification. This focus on the coherence between the core components of the business model in the static approach have been useful for managers and entrepreneurs as it provides a consistent picture of the business model components and their interrelations to communicate to others. Furthermore, the static approach allows for creating topologies and research relationships between these and their success. The transformational approach describes the process of business model development or evolution, which the static approach cannot do. The business model is here used as a tool for addressing change and innovation in the company or in the business model itself. This approach advocates iterative refinements to develop a sustainable business model and/or adapt to the environment. Acknowledging that the business model is a subject of change, continuously making changes and discussing how it changes is essential to the transformational approach, which corresponds to a dynamic business model approach.

III. Methods

A. Presented study, Research question & Hypothesis

Our interest is to investigate whether there are differences between the case companies have a dynamic approach to business model and the ones that have a static approach to business model, with regard to their focus on the different Business Model elements. This led to an overarching research question.

Research Question:
Do entrepreneurs or companies that have a dynamic approach to the business model focus on other elements of the business model than companies that have a static approach?

The research question stated above is operationalized into testable hypotheses. To create hypotheses so, the ratio of actions conducted in the nine business model elements have been used as a proxy for the focus of the entrepreneur. Therefore, we have used the percentage of actions conducted in the nine business model canvas elements. This percentage-value corresponds to the ratio of actions in the element, which we argue could indicate the time and attention the entrepreneur devotes to that specific element. For all nine business model elements, the null hypotheses and alternative hypotheses are stated below.

KeyContribution:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "KeyContribution-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "KeyContribution-element" between dynamic and static use of the canvas.

KeyMarket:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "KeyMarket-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "KeyMarket-element" between dynamic and static use of the canvas.

Distinction:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "Distinction-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "Distinction -element" between dynamic and static use of the canvas.

EarlyMarketCustomer:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "EarlyMarketCustomer-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "EarlyMarketCustomer -element" between dynamic and static use of the canvas.

UniqueValueProposition:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "UniqueValueProposition-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "UniqueValueProposition-element" between dynamic and static use of the canvas.

ProductFeature:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "ProductFeature-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "ProductFeature-element" between dynamic and static use of the canvas.

Partner:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "Partner-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "Partner-element" between dynamic and static use of the canvas.

HowToSell:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "HowToSell-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "HowToSell -element" between dynamic and static use of the canvas.

HowToGetPaid:

H_0: There is not a statistically significant difference in the percentage of actions conducted in the "HowToGetPaid-element" between dynamic and static use of the canvas.

H_A: There is a statistically significant difference in the percentage of actions conducted in the "HowToGetPaid -element" between dynamic and static use of the canvas.

B. Applied Research Methods

Classical statistical methods were used to test for differences between independent samples. Statistical tests were selected based on the characteristics of the data

Sampling two Independent Groups

From the Lean Business database we sampled cases for statistical analysis. The total database population was separated in two independent groups, the static group and the dynamic group. The static group contained all companies having used the canvas over the course of one, initial 24-hour period. The dynamic group contained all other companies, which used the canvas over multiple 24-hour periods. An additional requirement was the actual existence of the company, which had been manually controlled by the database operators.

Random sampling of static cases:

From the static group, a random sample of 17 companies was made. Company data for each of the companies in the sample was checked again, to ensure that the assumptions were met.

Stratified sample for dynamic cases:

From the dynamic group, the 17 companies having the most 24-hour periods were selected. This translates to those companies having revisited and iterated on the canvas the most. Company data for each of the companies in the sample was checked again, to ensure that the assumptions were met.

IV. Findings

A. Statistical Analysis

The results from the statistical tests are presented here. Data from a total of N = 34 cases (17 for dynamic sample and 17 for static sample) were analyzed in SPSS Statistics [16] to investigate the potential statistical differences in percentage of actions conducted in the nine business model canvas elements between dynamic and static use. The percentage of actions conducted in each of the elements was compared between the dynamic group and the static group. Differences in percentage-values between the two groups were the foundation for the statistical tests. Statistical tests were chosen based on the characteristics of the data, i.e. outliers, normal distribution, homogeneity of variances, and distribution shape. Independent-Samples T-Test was used for normally distributed data, without outliers and exhibiting homogeneity of variances. For data violating homogeneity of variances Welch T-Test was used. For data violating the assumption of outliers or normality Mann-Whitney U Test was used. Outliers are defined by SPSS Statistics as values more than 1.5 box-lengths from the edge of a box in a box plot. The box plots were visually inspected. Shapiro-Wilk test for normality

TABLE I. DESCRIPTIVE STATISTICS

Variable (BM Element)	Dynamic			Static				
	Samples	*Mean ± SD*	*Median*	*Samples*	*Mean ± SD*	*Median*	*Difference Mean ± Std. Error*	*Difference Median*
KeyContribution	17	24.7% ± 12.8%	23.1%	17	21.7% ± 8.3%	21.1%	2.9% ± 3.7%	2.0%
KeyMarket	17	17.2% ± 5.6%	17.2%	17	20.8% ± 10.8%	16.7%	-3.6% ± 2.9%	0.5%
Distinction	17	21.0% ± 11.6%	19.5%	17	22.8% ± 6.9%	22.2%	-1.7% ± 3.3%	-2.7%
EarlyMarketCustomer	15	5.6% ± 2.8%	6.3%	15	6.2% ± 3.5%	5.6%	-0.7% ± 1.2%	0.7%
UniqueValueProposition	15	6.6% ± 4.6%	6.1%	16	5.9% ± 2.7%	6.4%	0.7% ± 1.3%	-0.3%
ProductFeature	14	7.4% ± 4.2%	6.6%	13	7.4% ± 3.6%	6.8%	0.0% ± 1.5%	-0.2%
Partner	17	9.3% ± 6.8%	7.9%	13	6.8% ± 3.6%	5.6%	2.5% ± 2.1%	2.3%
HowToSell	16	7.3% ± 9.2%	5.2%	16	7.2% ± 3.0%	8.1%	0.2% ± 2.4%	-2.9%
HowToGetPaid	15	4.6% ± 3.6%	3.7%	16	5.9% ± 3.3%	4.6%	-1.3% ± 1.2%	-0.9%

TABLE II. STATISTICAL TESTING FOR DIFFERENCE IN PERCENTAGE OF ACTIONS CONDUCTED IN THE BUSINESS MODEL (BM) ELEMENTS, BETWEEN DYNAMIC AND STATIC SAMPLE

Variable (BM Element)	Dynamic		Static					
	Outliers	*Normality (Shapiro-Wilk test)*	*Outliers*	*Normality (Shapiro-Wilk test)*	*Homogenity of variances (Lavenes's Test for Equality)*	*Similarly shaped distributions*	*Statistical test*	*Sig. (2-tailed)*
KeyContribution	Yes	No (($p<0.05$)	Yes	Yes ($p=0.198$)	N/A	Yes	Mann-Whitney U Test	0.563
KeyMarket	No	Yes ($p=0.968$)	No	Yes ($p=0.074$)	No ($p<0.05$)	N/A	Welch t-test	0.236
Distinction	Yes	No ($p=0.001$)	Yes	Yes ($p=0.238$)	N/A	Yes	Mann-Whitney U Test	0.193
EarlyMarket-Customer	No	Yes ($p=0.322$)	No	Yes ($p=0.422$)	Yes ($p=0.506$)	N/A	Independent-Samples T-Test	0.578
UniqueValue-Proposition	Yes	Yes ($p=0.051$)	No	Yes ($p=0.606$)	N/A	Yes	Mann-Whitney U Test	0.83
ProductFeature	No	Yes ($p=0.107$)	Yes	Yes ($p=0.108$)	N/A	Yes	Mann-Whitney U Test	0.905
Partner	No	Yes ($p=172$)	No	No ($p=0.020$)	N/A	Yes	Mann-Whitney U Test	0.385
HowToSell	Yes	No ($p<0.001$)	No	No ($p=0.44$)	N/A	Yes	Mann-Whitney U Test	0.287
HowToGetPaid	Yes	No ($p=0.006$)	No	No ($p=0.031$)	N/A	Yes	Mann-Whitney U Test	0.358

was used to assess whether data were normally distributed, where significance values larger than 0.05 indicate a normal distribution. Similarly shaped distribution was inspected visually using histograms. An exact sampling distribution was used for U [17]. Independent-Samples T-Test and Welch T-Test evaluates differences in means between independent groups. Mann-Whitney U Test evaluates differences in medians between independent groups, if the groups have a similar distribution shape. Table 1 contains descriptive statistics. Table 2 contains metrics associated with assumptions deciding which statistical tests to use, along with the corresponding test and result. As shown in Table 2, the nine elements are not statistically significant. Thus, the alternative hypotheses are not accepted, and the null hypotheses are retained.

B. Discussion

As the results describe statistical tests for all nine variables, i.e., the nine business model elements constituting the business model turned out not be statistically significant. This was based on two samples, one stratified sample for dynamic use of the business model canvas and one random sample for static use of the business model canvas.

As such, a distinction in focus on the different business model elements between those who use the business model canvas in a dynamic manner, compared to those who used the canvas only once could not be found. This might be due to a similar focus among entrepreneurs with a dynamic and iterative approach and entrepreneurs with a static approach to the business model. Their consideration of what the important elements are might be similar and therefore both groups have devoted similar attention to it. This could indicate that the behavior is not so different in the two groups of entrepreneurs in this aspect of developing a business. One can also speculate if this is an appropriate way to distinguish between companies who exhibit a lean behavior and those who don't. There could be other aspects that are more representative of a lean behavior and therefore more interesting to investigate.

The total sample size of N = 34 cases is relatively small. This sample size does not allow for generalization. A larger sample size would give a more accurate result and representation of how the case companies use the canvas. Furthermore, if there actually is a difference in entrepreneurial behavior that is reflected in dynamic and static use of the Lean Business canvas this might show up in a larger sample size in terms of a different significance level. A larger sample size might have been statistically more significant.

The definition of static and dynamic use of the canvas as presented here might not be true for all startups. For younger startups it may be natural to revise the business model more often than mature startups, yet both companies might see themselves as dynamic. For developed startups quarterly or

biannual revision of business model might still reflect a dynamic behavior, however, the dynamic sample selected here might not capture those companies.

This first attempt at empirical testing of entrepreneurial data considered Business Model and Business Idea. Product Development and Customer Interaction is also an important part of the equation as described in the introduction and should also be considered in future work. It is important to retain this holistic perspective also in managing a startup. From general lean behavior principles it may be possible to derive company specific aspects, by which they can be compared to appropriately distinguish lean and non-lean startups.

V. Conclusion

A. Limitations

The study is limited by a small sample selection. Though results were not statistically significant, the sample size does not allow for generalizations had this been the case.

Despite the limitations, it is shown how one can begin to use data from the Entrepreneurship Platform in combination with existing entrepreneurial and business model research to further investigate entrepreneurs and startups. We do believe that careful statistical testing as we have conducted it can be used to analyze entrepreneurial behavior provided that the research question is properly operationalized into testable hypotheses. As such, it is and represents a step towards understanding entrepreneurship.

B. Concluding remarks

This white paper conducted for Lean Business encompassing a first attempt at empirical testing of data extracted from the Lean Business database. Lean Business adhere to the Lean Startup Movement, which advocates an agile behavior in terms of business model development and product development. Here, static business planning or development should be replaced with a continuous dynamic development, since it increases the chances of success. It is of Lean Business interest to test if the principle holds in a series of quantitative studies based on data collected from their database. This paper begins such an investigation by examining potential differences between companies with frequent changes, that is one with a dynamic approach, and companies who do not change frequently, that is a static approach. A sample have been constructed to represent a static approach and a dynamic approach to using the Business Model elements in their online platform. Information from case companies were extracted from the database, and statistically tested for differences. Statistical tests investigating differences in mean and median for independent groups were conducted. Statistical tests for all nine elements constituting the business model turned out not statistically significant. As such, we did not find a distinction in focus on the different business model elements between those who use the business model canvas in a dynamic manner (by an iterative development) compared to a static manner (single occasion use of the canvas). The statistical analysis conducted as a small, yet important step as a starting discussion for how data and empirical evidence can aid in understanding business modelling, how business models develop and by doing so, understand entrepreneurship.

Acknowledgment

We would like to thank Lean Business for access to data.

References

[1] Y. Dahle, A. N. Duc, M. Steinert, and P. Abrahamsson, ‘Building an entrepreneurship data warehouse’, in *2017 International Conference on Engineering, Technology and Innovation (ICE/ITMC)*, Funchal, 2017, pp. 100–110.

[2] Y. Dahle, A. N. Duc, M. Steinert, and R. Chizhevskiy, ‘Resource and Competence (Internal) View vs. Environment and Market (External) View When Defining a Business’, in *2018 IEEE International Conference on Engineering, Technology and Innovation (ICE/ITMC)*, 2018, pp. 1–9.

[3] A. Nguven-Duc, Y. Dahle, M. Steinert, and P. Abrahamsson, ‘Towards Understanding Startup Product Development as Effectual Entrepreneurial Behaviors’, in *Product-Focused Software Process Improvement*, vol. 10611, M. Felderer, D. Méndez Fernández, B. Turhan, M. Kalinowski, F. Sarro, and D. Winkler, Eds. Cham: Springer International Publishing, 2017, pp. 265–279.

[4] H. Chesbrough, ‘Business Model Innovation: Opportunities and Barriers’, *Long Range Plann.*, vol. 43, no. 2, pp. 354–363, Apr. 2010.

[5] A. Osterwalder, Y. Pigneur, and C. L. Tucci, ‘Clarifying Business Models: Origins, Present, and Future of the Concept’, *Commun. Assoc. Inf. Syst.*, vol. 16, p. 28, 2005.

[6] C. Zott and R. Amit, ‘Business Model Design: An Activity System Perspective’, *Long Range Plann.*, vol. 43, no. 2, pp. 216–226, Apr. 2010.

[7] S. Blank, ‘Why the lean start-up changes everything’, *Harv. Bus. Rev.*, vol. 91, no. 5, pp. 63–72, 2013.

[8] A. Maurya, *Running lean: iterate from plan A to a plan that works*. O’Reilly Media, Inc., 2012.

[9] A. Osterwalder and Y. Pigneur, *Business model generation: a handbook for visionaries, game changers, and challengers*. John Wiley & Sons, 2010.

[10] E. Ries, *The lean startup: How today’s entrepreneurs use continuous innovation to create radically successful businesses*. Crown Books, 2011.

[11] J. Barney, M. Wright, and D. J. Ketchen, ‘The resource-based view of the firm: Ten years after 1991’, *J. Manag.*, vol. 27, no. 6, pp. 625–641, Nov. 2001.

[12] O. Jones, A. Macpherson, and D. Jayawarna, *Resourcing the start-up business: Creating dynamic entrepreneurial learning capabilities*. Routledge, 2013.

[13] T. Ritter and C. Lettl, ‘The wider implications of business-model research’, *Long Range Plann.*, vol. 51, no. 1, pp. 1–8, Feb. 2018.

[14] G. George and A. J. Bock, ‘The Business Model in Practice and its Implications for Entrepreneurship Research’, *Entrep. Theory Pract.*, vol. 35, no. 1, pp. 83–111, Jan. 2011.

[15] B. Demil and X. Lecocq, ‘Business Model Evolution: In Search of Dynamic Consistency’, *Long Range Plann.*, vol. 43, no. 2, pp. 227–246, Apr. 2010.

[16] *IBM SPSS Statistics 25*. NY: IBM Corp.: IBM Corp., 2017.

[17] L. C. Dinneen and B. C. Blakesley, ‘Algorithm AS 62: A Generator for the Sampling Distribution of the Mann- Whitney U Statistic’, *J. R. Stat. Soc. Ser. C Appl. Stat.*, vol. 22, no. 2, pp. 269–273, 1973.