



“Entrepreneurial design thinking and business success: Empirical evidence from Nigeria”

AUTHORS	Henry Inegbedion 
ARTICLE INFO	Henry Inegbedion (2022). Entrepreneurial design thinking and business success: Empirical evidence from Nigeria. <i>Problems and Perspectives in Management</i> , 20(2), 186-198. doi: 10.21511/ppm.20(2).2022.16
DOI	http://dx.doi.org/10.21511/ppm.20(2).2022.16
RELEASED ON	Wednesday, 04 May 2022
RECEIVED ON	Tuesday, 04 May 2021
ACCEPTED ON	Thursday, 17 June 2021
LICENSE	 This work is licensed under a Creative Commons Attribution 4.0 International License
JOURNAL	"Problems and Perspectives in Management"
ISSN PRINT	1727-7051
ISSN ONLINE	1810-5467
PUBLISHER	LLC “Consulting Publishing Company “Business Perspectives”
FOUNDER	LLC “Consulting Publishing Company “Business Perspectives”



NUMBER OF REFERENCES

29



NUMBER OF FIGURES

3



NUMBER OF TABLES

7

© The author(s) 2022. This publication is an open access article.



BUSINESS PERSPECTIVES



LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Received on: 4th of May, 2021
Accepted on: 17th of June, 2021
Published on: 4th of May, 2022

© Henry Inegbedion, 2022

Henry Inegbedion, Ph.D., Department
of Business Administration, College
of Social and Management Sciences,
Bowen University, Nigeria.



This is an Open Access article,
distributed under the terms of the
[Creative Commons Attribution 4.0
International license](https://creativecommons.org/licenses/by/4.0/), which permits
unrestricted re-use, distribution, and
reproduction in any medium, provided
the original work is properly cited.

Conflict of interest statement:
Author(s) reported no conflict of interest

Henry Inegbedion (Nigeria)

ENTREPRENEURIAL DESIGN THINKING AND BUSINESS SUCCESS: EMPIRICAL EVIDENCE FROM NIGERIA

Abstract

Entrepreneurial activities seek to fill the gaps created by the government's inability to employ their citizens globally. However, design thinking, which is a human-centered and solution-based approach to problem-solving can enhance entrepreneurial success. This study investigates design thinking and business success in Nigeria. The purpose was to determine how design thinking influences business success using the five-stage model of design thinking as its framework. The study employed a quantitative methodology. The design was a cross-sectional survey of 224 out of 350 randomly selected online respondents that were invited. The respondents, who were either entrepreneurs or people with knowledge of entrepreneurial education at the undergraduate or post-graduate levels, were contacted through social media (Facebook and WhatsApp) and a structured questionnaire was used to elicit information from them. The data were analyzed using the structural equation modeling technique. Empathy, problem definition, ideation, prototyping, and product testing were found to be positively related to business success. However, while the positive relationships between empathy, problem definition, prototyping, and product testing were found to be significant at a 1% level, that of ideation was not significant at all; thus, empathy, problem definition, prototyping, and product testing are predictors of business success. Consequently, at a 99% confidence level, it is concluded that empathy, problem definition, prototyping, and product testing, and by implication, entrepreneurial design thinking, are significant predictors of business success.

Keywords

empathy, problem definition, prototyping, product testing, design thinking

JEL Classification

M13, M10

INTRODUCTION

One of the major goals of macroeconomic policy is the full employment level of income given its relevance to national income and the attendant economic growth as well as the general wellbeing of the entire citizenry in an economy owing to the trade circles that occurred in the Western economies in the early nineteenth century. It exposed the inadequacies of the macroeconomic theories as well as the policy responses by policymakers at the time. Keynes (1934) came up with the macroeconomic policy recommendation of the need for government to use a budget to direct the economy towards the desired growth path (fine-tuning) to ensure that the economy does not significantly drift away from equilibrium. This is because people regard the government to be significantly responsible for employment creation at the time.

Although the government has a responsibility to reduce the level of unemployment through employment creation, current happenings in the global scene like population explosions, dwindling government

revenues occasioned by political instabilities, economic recessions, rising security concerns, and investments aimed at bridging the digital divide, among others, have shown that government cannot guarantee full employment alone.

It is largely believed that involvement in entrepreneurship initiatives will significantly reduce the level of unemployment and enhance the national income, especially among the developing economies (Akiri et al., 2016; Anyadike et al., 2012; Igwe et al., 2013; Fatoki, 2018; Onyeizugbe et al., 2015). For entrepreneurs to make the desired impact on employment creation, it is necessary to imbibe the culture of entrepreneurship, including entrepreneurial thinking and its associated design thinking, which has been described as one of the most relevant skills for the 21st-century workforce (Bacigalupo et al., 2016). It is the perceived importance that has informed its popularity in most educational curricula (Saavedra & Opfer, 2012). Beyond entrepreneurship, design thinking (DT) permeates all strata of human capital, employability, and competitiveness (Bacigalupo et al., 2016) because every genuine entrepreneur, consciously or unconsciously, engages in design thinking because the creation of a product to meet an unsatisfied need is perceived to involve design thinking and commitment. To this end, the purpose of the study was to determine the extent to which design thinking influences business success.

1. LITERATURE REVIEW

Every good product is a reflection of effective design. This explains why product design is now an integral component of the production process in manufacturing organizations. In the same vein, the thought process of an effective entrepreneurial response to customer needs must be designed to ensure that the entrepreneur understands the needs of the consumers thoroughly in a manner that will predispose him to see through the minds of the target customers. With this mindset, the entrepreneur is likened to the one who wears the same shoe as the consumers and thus able to conceive the appropriate product to satisfy their needs as it is often said that “he who wears the shoe knows where it pinches”. Thus, entrepreneurial design thinking enhances the likelihood that the thought process outputs the desired product required to satisfy a particular need.

Design thinking has been conceptualized from various perspectives ranging from entrepreneurship education, human resources development, and, among others, entrepreneurship. The series of conceptualizations differ but not with any loss in meaning. Design thinking has been defined as the way designers approach a design problem (Val et al., 2019). DT provides a human-centered and solution-based approach to solving problems. It has found application in many educational settings with its attendant benefits such as the positive shift in knowledge and understanding of de-

sign responsibilities that has been noticed among the students (Bosman, 2019; Behm et al., 2014). DT improves metacognitive skills and competencies when used as a formalized process (Scheer et al., 2012). It is for this reason that DT has been viewed as a departure from traditional problem-solving methods to a collaborative solution-focused approach (Bosman, 2019). Concisely, DT is a plan or drawing that shows how an entrepreneur intends to meet a particular need. It is the design of an entrepreneur’s response intention to an identified need. Design thinkers exhibit curiosity and empathy in their efforts to interpret how target populations engage with their world. They deploy various investigative techniques that have the potential to illuminate problems in new ways and indicate effective client-focused solutions (Robbins, 2018).

While entrepreneurs are committed to creating products to satisfy needs, they also seek to meet their needs through entrepreneurial activities and the returns they expect from the sale of their products. To this end, they expect their entrepreneurial actions to be profitable. This implies that successful outcomes of business activities are the main factor expected to stimulate entrepreneurial commitment to businesses. *Business success* is critical to a firm’s going concern, while business failure precipitates corporate collapse. *Business success* means different things to different people and the perspectives are as varied as the number of authors. It can be examined from the financial, productivity, growth, and market shares perspec-

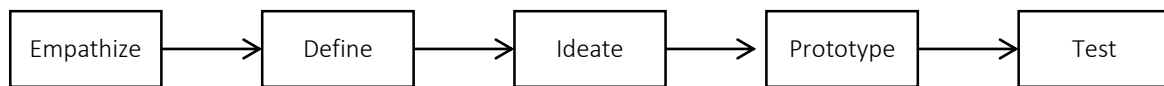


Figure 1. Design thinking process

tives. Nevertheless, virtually all the perspectives are related, as a firm growth is likely to be related to its market share of the industry and thus its financial performance. Oftentimes, the focus on financial performance is viewed by some pundits as insufficient (Leszczyński, 2014).

Even among those who use financial performance as a measure of business performance, financial performance indicators vary. Operationally, this study views business performance as the ability of the business to achieve set goals and remain competitive. The set goals cut across financial and non-financial realms but in the final analysis, the financial strength of the business is critical to the attainment of these goals and to the ability of the business to remain competitive. Thus, a successful business can weather the storm by overcoming all challenges, grow despite all obstacles, and thus preserve its going concern.

1.1. Theoretical framework

This study adopts the five-stage design thinking model as its framework. The model sees the design thinking process as consisting of five stages: *empathy*, *definition*, *ideation*, as well as *prototyping* and *testing*. *Empathy* helps the entrepreneur

and his team to observe, engage and share people’s feelings to understand their experiences and motivations (Dam & Siang, 2020). *Problem definition* is where the design thinker assembles the information created during the empathy stage and utilizes the same to define the problem in a manner that will lead to an effective solution to human problems. *Ideation* consists of the generation of ideas to identify new solutions to the problem statement created as well as generate alternatives using the ideation techniques (*brainstorming*, *brain-writing*, *SCAMPER brainstorm*, and *worst possible idea sessions*) (Dam & Siang, 2020). *Prototyping* is the translation of the design imagination to something tangible through the production of several samples of the products thought out the design thinking process. *Testing* is the last stage of the five-stage model of design thinking. It allows the design thinker (s) to use the best solutions identified during the prototyping phase to test the complete product (Figure 1).

The testing stage will determine whether the product should be accepted with minor or major modifications or whether it should be rejected. Thus, modifications are still possible at this stage and such modifications can be done at any of the stages of the iterative process (Figure 2).

Source: Dam and Siang (2020).

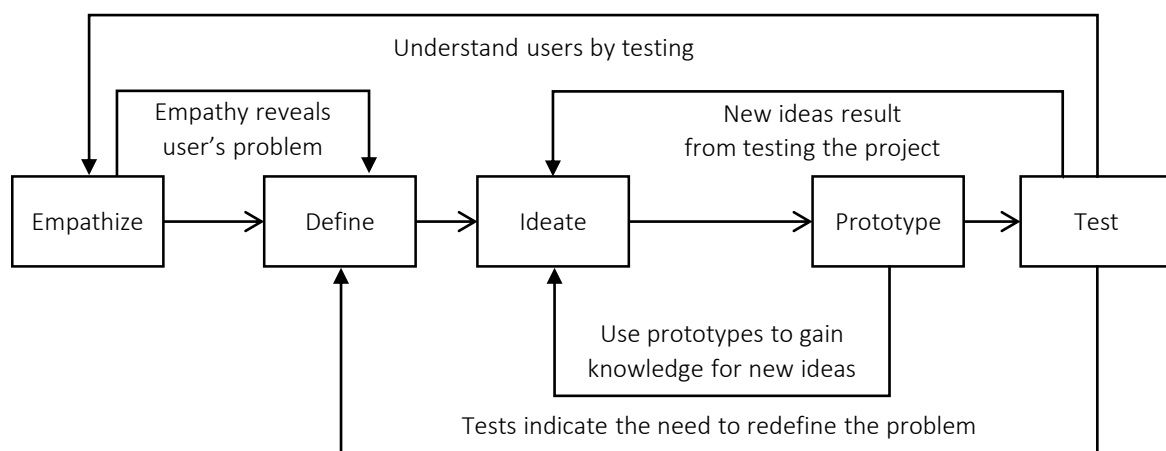


Figure 2. Design thinking as a non-linear process

1.2. Empirical review

Volkova and Jākobsonsone (2016) examined design thinking as a business tool to ensure continuous value generation. It was concluded that design thinking plays critical roles in adding value to customers and fostering management thinking from chaotic fluctuations in external turbulence and thus enables sustainable order in actions. Jenkins (2019) examined design thinking for business success. It was concluded that “design thinking helps businesses to create user-centric products and services by discovering insights into user needs, applying these insights to their business model and generating innovative ideas.” Kolko (2015) stated that design thinking helps to find ideal solutions based on the real needs of real people. To this end, design thinking is aimed at value creation for customers and is thus critical to business success.

Dunne (2018) explored how design thinking can be implemented by organizations in all sectors of the economy by exploring organizations’ goals in adopting design thinking coupled with the challenges they encounter, and the strategies they employ in dealing with the challenges. Results showed that unclear goals, the need to build legitimacy, cultural resistance, and leadership turnover can compromise the work of design programs. The remedies include the employment of technological and collaborative platforms, as well as the extension of design thinking into the implementation process. Liedtka (2011) investigated the leadership strategies for “learning to use design thinking tools for successful innovation” to find out how the design thinking approach makes the difference between two managers with similar motivations and dispositions. The design was a demonstration of the use of journey mapping, assumption testing, co-creation, and rapid prototyping, which are four known tools routinely practiced by successful innovation firms. The need for managers to implement assumption testing that structures the process to be patronized by managers was emphasized. Results showed that learning only occurs when one steps away from the familiar and accepts the uncertainty that inevitably accompanies new experiences.

Kleinsmann et al. (2017) examined the value of design thinking in different innovation practices.

Thus, four studies that capture the value of design thinking in different early-stage innovation practices were presented together. The studies covered design thinking as the basis of an agreed domain of discourse in innovation, validation of the shared domain of discourse, provision of the input for study by the shared domain, which summed up as the image of design thinking; and finally, the successful validation of the four images. The outcome of the validation of the four images indicates that the combination of the images and the agreed domain of discourse can facilitate the capturing of the value of design thinking in early-stage innovation. Ghosh (2018) investigated the role of design thinking and creative cognition in the growth of digital entrepreneurship. The purpose was to find out the attributes related to design thinking and creative cognition that can stimulate innovation as well as ascertain the nature of the interrelationships between these attributes. The qualitative methodology was employed. Grounded theory formed the specific methodology while the research design was a survey.

A sample size of 30 students was used and the research instrument featured open-ended questions. Results linked business model creation to creative intelligence and other attributes like productive risk-taking and navigation through complexity, communication, empathy, and emphasis on process as well as deep user understanding and prediction.

Bailey et al. (2019) investigated designing a design thinking approach to HRD to ascertain how design thinking adds value to HRD. Design, development, and delivery of a design thinking workshop was examined as they were created to elicit and develop ideas from students and fresh graduates about the fundamental training and skills requirements of future employment. Findings indicate that focus on the end-user, problem-solving, feedback, and innovation resonate with those required from HRD. It was concluded that DT is likely to serve as a critical mindset to enhance HRD practice. Colombo et al. (2017) investigated new design thinking tools for the next generation of designer-entrepreneurs. Start-ups that focus on design were analyzed as the primary source for their development, which is known as ‘design-intensive start-ups’. Multiple case studies protocol

was adopted. Results show that design-intensive start-ups differ from new-technology start-ups on several dimensions and represent an alternative entrepreneurial model that is not backed by extant literature.

1.3. Gaps in literature

Some extant studies have examined aspects of design thinking in the literature. Dunne (2018) explored how design thinking can be implemented in organizations. Liedtka (2011) investigated the leadership strategies for “learning to use design thinking tools for successful innovation”. Kleinsmann et al. (2017) examined the value of design thinking in different innovation practices while Ghosh (2018) investigated the role of design thinking and creative cognition in the growth of digital entrepreneurship. Colombo et al. (2017) investigated new design thinking tools for the next generation of designer-entrepreneurs. Volkova and Jākobsonsone (2016) examined design thinking as a business tool to ensure continuous value generation. Therefore, not much attention has been given to the relevance of design thinking to business success since only Ghosh (2018) appears to relate design thinking to business success. Besides, none of the empirical studies tested the significance of the stages of design thinking. This study sought to fill these gaps. Given the foregoing, with specific cognizance to the five-stage model of design thinking, the hypotheses were formulated and tested to examine the significance of the stages of the design thinking process to business success.

2. AIM AND HYPOTHESES

This study aims to investigate the extent to which design thinking influences business success with a focus on Nigerian businesses.

Following the literature review and the aim of the study, the following hypotheses are tested:

H₀1: There is no significant relationship between empathy and design thinking.

H₀2: There is no significant relationship between problem definition and design thinking.

H₀3: There is no significant relationship between ideation and design thinking.

H₀4: There is no significant relationship between prototyping and design thinking.

H₀5: There is no significant relationship between product testing and design thinking.

H₀6: There is no significant relationship between design thinking and business success.

3. METHODOLOGY

The study employed the quantitative method with a conclusive research design. The population of the study consisted of graduate students of management programs, and postgraduate students who have taken courses in entrepreneurial education, as well as practicing entrepreneurs. A random sample of 224 online respondents out of 350 invited respondents was used. The respondents were contacted through social media (Facebook and WhatsApp). The participants cut across geographical regions of Nigeria, with the majority of them being from the southern parts. The study employed a structured questionnaire in eliciting responses from the respondents (Appendix A). The question response format of the items was of the five-point Likert type.

3.1. Operational definition of variables

3.1.1. Independent variables

The independent variables of the study are those used in explaining design thinking and those used in explaining business success. Five constructs were employed in measuring entrepreneurial design: empathy, problem definition, ideation, prototyping, and product testing.

3.1.2. Dependent variables

The dependent variable of the study is business success. However, entrepreneurial design served as the dependent variable in the models of entrepreneurial design and its predictors.

3.2. Validity and reliability of the instrument

3.2.1. Validity of the instrument

The instrument was given to management and entrepreneurial experts from the University of Benin and the Landmark University (both in Nigeria) to determine the extent to which the contents sampled all the aspects of design thinking. This was done to validate the sampling adequacy. In addition, the questionnaire was pilot tested on ten respondents from the population. Based on the pilot test, content validity index (CVI) estimates were computed to determine the validity of the instrument (Table 1). The scale content validity index (S-CVI) was 0.714 while the item content validity indexes (I-CVI) were 0.76, 0.659, 0.72, 0.69, and 0.65 for empathy, problem definition, ideation, prototyping, and testing respectively, thus indicating that the instrument is valid since the CVIs are approximately 0.7 or more in all cases.

Table 1. Validity tests

Number of items	S-CVI	I-CVI
Comprehensive questionnaire	0.674	
Empathy		0.66
Problem definition		0.649
Ideation		0.72
Prototyping		0.69
Testing		0.65

3.2.2. Reliability of the instrument

The reliability of the instrument was determined using Cronbach's alpha. The corresponding values of the constructs were 0.72, 0.65, 0.66, 0.65, and 0.78 for empathy, problem definition, ideation, prototyping, and testing respectively, thus indicating that all the items were approximately reliable (Table 2).

Table 2. Reliability statistics

Variable	Cronbach's alpha
Empathy	0.72
Problem definition	0.65
Ideation	0.65
Prototyping	0.66
Testing	0.78

3.3. Measurement of variables

The study employed one dependent and five independent variables in model (1), which was a structural equations model, and subsequently had a dependent variable and an independent variable in model (2).

Business success was treated as a latent variable, as is consistent with latent variables no measurement was assigned to it. *Design thinking* was measured using the constructs of empathy, problem definition, ideation, prototyping, and product testing. Three items (concern for people's feelings and needs, observing people's feelings and needs, as well as engaging and sharing people's feelings to understand their experiences) were used to measure *empathy* consistent with the theoretical conceptualization of empathy in the five-stage model of design thinking. *Problem definition* was measured by two items (ability to define a problem properly and adequate comprehension of the problem), consistent with its conceptualization. *Ideation* was measured using three items (brainstorming for product ideas, brain-writing for product ideas, and the use of the worst possible idea for product ideas). The items used were some of the major items enshrined in the five-stage model of design thinking. *Prototyping* was measured using three items (translation of the design imagination to something tangible before launching the final product, production of some samples of the products thought out the design thinking process to enable the choice of the most appropriate product, as well as using prototyping to arrive at the most suitable product) in line with the theoretical viewpoint of prototyping in the five-stage model of design thinking. As the last stage of the five-stage model of design thinking, three items (enhancement of product conformance, alterations, and refinements in testing stage as well as product validation after testing) were used to measure *testing*, consistent with theory.

The data elicited from the respondents were analyzed using structural equation modeling. The choice of this technique was informed by the latent nature of business success. Since structural equation modeling primarily involves factor analysis and regression analysis, the confirmatory factor aspect helped to elicit the principal components of

the constructs while the regression aspects help to determine the predictive power of the explanatory variables.

The model hypothesized relationships between design thinking constructs and business success is presented by (1).

$$BS = f(DT) = f(emp, probd, idt, prt \text{ and } tst) \tag{1}$$

Thus,

$$BS = \beta_0 + \beta_1 emp + \beta_2 probd + \beta_3 idt + \beta_4 prt + \beta_5 tst + e, \tag{2}$$

Where *BS* – business success, *DT* – design thinking, *emp* – empathy, *probd* – Problem definition, *idt* – ideation, *prt* – prototyping, *tst* – testing, β_0 – Proportion of the variation in business success that is not explained by the explanatory variables (*emp*, *probd*, *idt*, *prt*, and *tst*), and $\beta_i (i = 1, 2, \dots, 5)$ are the regression coefficients, which represent the proportion of the variations in business success that is explained by each of the explanatory variables (*emp*, *probd*, *idt*, *prt* and *tst*).

The structural equation model is:

$$sem(emp, probd, idt, prt, tst < -L1), \tag{3}$$

Where *sem* – structural equation model, *L1* – business success (latent variable), *emp*, *probd*, *idt*, *prt*, *tst* are as in (2).

4. RESULTS

Results of the SEM indicate that the computed *Z* and associated asymptotic probabilities were 3.01 (0.0083), 4.57 (0.002), 1.23 (0.087), 12.7 ($P < 0.001$), and 14.63 ($P < 0.001$) for empathy (*emp*), problem definition (*probd*), ideation (*idt*), prototyping (*prt*), and product testing (*tst*) respectively, thus indicating that empathy, problem definition, ideation, prototyping, and product testing were all positively related to business success. However, while the positive relationships between empathy, problem definition, prototyping, and product testing were found to be significant at a 1% level, that of ideation was not significant at all; thus, empathy, problem definition, prototyping, and product testing are predictors of business success (Table 3). Consequently, it can be concluded that at a 99% confidence level empathy, problem definition, prototyping, and product testing are significant predictors of business success.

The coefficients of the predictors were found to be 0.424, 0.835, 0.0266, 0.602 and 0.790 for empathy, problem definition, ideation, prototyping and testing respectively. Thus, model (4) is elaborated.

$$DT = \beta_0 + \beta_1 emp + \beta_2 probd + \beta_3 idt + \beta_4 prt + \beta_5 tst + e. \tag{4}$$

The hypothesize relationships between entrepreneurial design thinking and the predictors is given by (5).

$$DT = 0.424 emp + 0.835 probd + 0.027 idt + 0.602 prt + 0.790 tst + e. \tag{5}$$

Table 3. Summary of results

Variable		Coeff.	S.E	Z	Sig. P	Results
Latent	Measured path					
Business success	(L1) <i>emp</i>	0.424	0.087	3.01	0.0083	Significant
	Constant	3.242	0.021	156.9	0.00	
Business success	(L1) <i>probd</i>	0.8351	0.0974	4.57	0.002	Significant
	Constant	2.742	0.0295	92.98	0.000	
Business success	(L1) <i>idt</i>	0.0266	0.0569	1.234	0.087	Not significant
	Constant	3.115	0.0255	122.2	0.000	
Business success	(L1) <i>prt</i>	0.602	0.0676	12.70	0.000	Significant
	Constant	2.986	0.0310	96.33	0.000	
Business success	(L1) <i>tst</i>	0.7895	0.0623	14.63	0.000	Significant
	Constant	3.637	0.0213	170.79	0.00	

Equation (5) indicates that a unit change in empathy will stimulate a 42.4% change in BS, a unit change in problem definition will lead to 83.5 % change in BS, a unit change in ideation will cause a 2.66% change in BS, a unit change in prototyping will stimulate a 60.2% change in BS and a unit change in testing will cause 79% change in design thinking (Table 3). The confidence interval for the coefficients of the explanatory variables in the variance table indicates that all the coefficients were within the lower and upper limits (Table 4). With a computed chi-square of 3.25 and a P value of 0.079, the likelihood ratio test was not significant. Consequently, the hypothesis of a good fit is not rejected. The implication is that the model is a good fit for the data (Table 4).

The equation level goodness of fit test shows that all the fitted variances are higher than the predicted variances (Table 5). The overall goodness of fit is 0.96, thus indicating that 96% of the variation in entrepreneurial design thinking is explained by variations in the explanatory variables (Table 5). In addition, the stability analysis indicates that the structural adjustment model satisfies the stability condition (Table 6). Since all the values are within the unit circle. Lastly, a test for the relationship between respondents' perception of entrepreneurial design thinking and categorical variables indicated that the computed F values and associated asymptotic significant probabilities were 0.439 (0.645), 0.416 (0.660), 0.924 (0.398), and 1.33

Table 4. 95% confidence interval for the coefficients

	Coeff.	Std. Error	95% conf. interval			
Variance						
emp	.42413	.00244	.41536	.62503		
probd	.83512	.01389	.52098	.97577		
idt	.26571	.00308	.11831	.73051		
prt	.6027	.00402	.61253	.82873		
tst	.78954	.00542	.64580	.76716		
L1	.37909	.00915	.26305	.39921		
Covariance						
L1	.0737682	.0419361	2.00	0.046	.001575	.1859614

Note: LR test of model vs. saturated: $\chi^2_3 = 3.75$, prob. > $\chi^2 = 0.079$.

Table 5. Equation level goodness of fit

depvars	Variance			R-squared	mc	mc2
	fitted	predicted	residual			
Observed						
emp	.098698	.0790871	.0196109	.801304	.8951559	.801304
probd	.2009707	.0551487	.1458221	.2744115	.523843	.2744115
idt	.1501341	.126499	.0236351	.8425736	.9179181	.8425736
prt	.2219111	.2029369	.0189742	.9144963	.956293	.9144963
tst	.1047584	.0492983	.0554601	.4705907	.6859961	.4705907
Overall				.9552522		

Note: mc = correlation between depvar and its prediction, mc2 = mc^2 is the Bentler-Raykov squared multiple correlation coefficient.

Table 6. Stability analysis

Stability analysis of simultaneous equation systems, Eigenvalue stability condition	
Eigenvalue	Modulus
0	0
0	0
0	0
0	0
0	0
Stability index	0
All the Eigenvalues lie inside the unit circle. SEM satisfies stability conditions.	

Table 7. Categorical variables and respondents' perception of design thinking

Statistic	Knowledge of		Respondents'	
	Gender	Entrepreneurial education	Category	Age bracket
F	0.439	0.416	0.924	1.33
Sig.	0.645	0.660	0.398	0.259

(0.259) for gender, knowledge of entrepreneurial education, respondents' category and age bracket respectively, thus indicating that respondents' category had no significant influence on their perception of entrepreneurial design thinking (Table 7).

5. DISCUSSION

The results of the study show that empathy, problem definition, prototyping, and product testing have a positive significant influence on business success. Although a significant positive relationship was found between ideation and design thinking, this positive relationship was not found to be significant. The significance of empathy is consistent with theory as it indicates that for an entrepreneur to respond adequately to a need it is vital to have empathy for the target users of the product. An entrepreneur must feel their pains and be genuinely committed to meeting their needs. The positive and statistical significance of problem definition to entrepreneurial design thinking is suggestive that part of the problem definition stage may be concentrated on understanding the target users (empathy). Thus, the significance of empathy and problem definition is a reflection of the perceived degree of involvement in each of these stages by Nigerian entrepreneurs.

The non-significance of ideation tends to suggest that most of the time entrepreneurs in Nigeria, after searching for and finding a need, do not follow the conventional procedure of ideation. It is not as if they do not generate ideas to create the product but that the idea generation is not consistent with brainstorming, brain-writing, and the worst possible idea procedure in the course of creating a product to satisfy the needs. The non-significance of ideation is inconsistent with the theory but it is a reflection of the euphoria that comes with trying to respond to a need as early as possible. The results are consistent with Ghosh (2018), as well as the theoretical expectation as reflected in the five-stage model of design thinking (Dam & Siang,

2020). Prototyping and product testing were also found to be positive and significant predictors of entrepreneurial design thinking.

This suggests that entrepreneurs understand the need to ensure the suitability of the product to the target users' needs to minimize complaints. The results of the coefficient of the determination indicate that design thinking is very critical to business success in the Nigerian context as 95.52% of the variation in business success was found to be explained by the explanatory variables. This is consistent with the theory as the outcome of a product that is thought out consistent with design thinking stages is more likely to be consistent with target customers' needs in line with the five-stage model of design thinking. The results are also consistent with Dam and Siang (2020), Ghosh (2018), Val et al. (2019), Ling (2017), and Foster (2019).

5.1. Proposed model of entrepreneurial design thinking and business success

Based on the findings, a model of design thinking and business success was proposed. The model shows that empathy, need identification, problem definition, prototyping and product testing all predict influence business success (Figure 3).

5.2. Implication of findings

These outcomes imply that potential entrepreneurs should be empathic towards their target audience at all times; this will enable them to have a deeper understanding of the needs that they are to satisfy. Once the need is identified, entrepreneurs should define the problem appropriately to ensure that the problem definition is consistent with the expectations of customers. Thereafter, fashioning out the product and engaging in, prototyping and testing to ensure that the end product (offering) reflects what was captured at the problem definition stage. The non-significance of ideation does not rule out the relevance

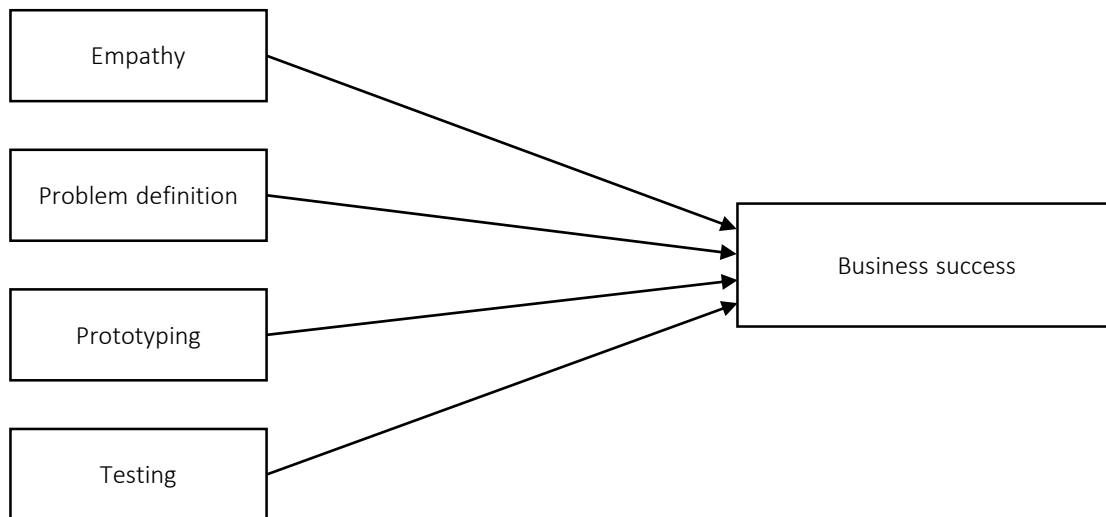


Figure 3. Proposed model of entrepreneurial design thinking and business success

of ideation but implies that the ideation undertaken may not be consistent with the process indicated in this study. Lastly, since entrepreneurial design thinking is a significant predictor of business success, entrepreneurs and potential entrepreneurs should learn to implement design thinking so that they will enhance the chances of their business success.

CONCLUSION

The study investigated the extent to which design thinking influences business success with a focus on Nigerian businesses. The results indicate that empathy, problem definition, prototyping, and product testing have a positive and statistically significant influence on entrepreneurial design thinking. Thus, empathy, problem definition, prototyping, and product testing can be used to predict design thinking. Furthermore, entrepreneurial design thinking has a significant positive influence on business success. Consequently, the study concludes that entrepreneurs' involvement in design thinking through empathy, problem definition, prototyping, and product testing has a significant influence on business success.

This study has made a significant contribution to knowledge by validating the majority of the components of the five-stage model of design thinking in Nigerian settings. Furthermore, unlike most extant studies, this study has demonstrated that entrepreneurial design thinking significantly influences business success. This is a major point of departure from most previous studies, which did not categorically relate design thinking to business success.

The study encountered some constraints. Firstly, the COVID-19 induced lockdown owing to the coronavirus pandemic and made physical administration of the research instrument impossible. Consequently, this study relied wholly on the online data collection method. It was impossible to undertake physical distribution of the instrument infringed on the randomization of the sampling of respondents. This limitation was, however, mitigated by the deliberate administration of the instrument to different categories of online respondents concerning their statuses and stage of knowledge of entrepreneurship. A second limitation was the dearth of empirical studies on the replication of the five-stage model of design thinking. However, this limitation was viewed as a justification of the study and a potential contribution to knowledge.

AUTHOR CONTRIBUTIONS

Conceptualization: Henry Inegbedion.
 Data curation: Henry Inegbedion.
 Formal analysis: Henry Inegbedion.
 Investigation: Henry Inegbedion.
 Methodology: Henry Inegbedion.
 Project administration: Henry Inegbedion.
 Supervision: Henry Inegbedion.
 Validation: Henry Inegbedion.
 Visualization: Henry Inegbedion.
 Writing – original draft: Henry Inegbedion.
 Writing – review & editing: Henry Inegbedion.

REFERENCES

1. Akiri, S. E., Onoja, E., & Kunanzang, P. S. (2016). Entrepreneurship and job creation in Nigeria. *International Journal of Economics and Business Management*, 2(3), 61-67. Retrieved from <https://iiardpub.org/get/IJEBM/VOL.%202%20NO.%203%202016/ENTREPRENEURSHIP.pdf>
2. Anyadike, N., Emeh I. E. J., & Ukah, F. O. (2012). Entrepreneurship development and employment generation in Nigeria: Problems and prospects. *Universal Journal of Education and General Studies*, 1(4), 88-102. Retrieved from <https://nairametrics.com/wp-content/uploads/2013/02/entrepreneurship-development-in-Nigeria.pdf>
3. Bacigalupo, M., Kampylis, P., Punie, Y., & Brande, G. (2016). *EntreComp: The entrepreneurship competence framework* (Report). Luxembourg: Publication Office of the European Union. <https://doi.org/10.2791/593884>
4. Bailey, M., Harney, B., & Pearce, A. (2019). Designing a design thinking approach to HRD. *International Journal of HRD Practice, Policy and Research*, 4(2), 9-23. Retrieved from https://www.researchgate.net/publication/351416319_Designing_a_Design_Thinking_Approach_to_HRD
5. Behm, M., Culvenor, J., & Dixon, G. (2014). Development of safe design thinking among engineering students. *Safety Science*, 63, 1-7. <https://doi.org/10.1016/j.ssci.2013.10.018>
6. Colombo, S., Cautela, C., & Rampino, L. (2017). New design thinking tools for the next generation of designer-entrepreneurs. *The Design Journal*, 20(sup1), S566-S580. <https://doi.org/10.1080/14606925.2017.1353004>
7. Dam, R. F., & Siang, T. Y. (2020). *5 Stages in the Design Thinking Process*. International Design Foundation. Retrieved from <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>
8. Bosman, L. (2019). From doing to thinking: Developing the entrepreneurial mindset through Scaffold Assignments and self-regulated learning reflection. *Open Education Studies* 1(1), 106-121. <https://doi.org/10.1515/edu-2019-0007>
9. Dunne, D. (2018). Implementing design thinking in organizations: an exploratory study *Journal of Organization Design* 7(1), 1-16. <https://doi.org/10.1186/s41469-018-0040-7>
10. Fatoki, O. (2018). The impact of entrepreneurial resilience on the success of small and medium enterprises in South Africa. *Sustainability*, 10(7), 2527. <https://doi.org/10.3390/su10072527>
11. Foster, M.K. (2019). Design thinking: A creative approach to problem solving. *Management Teaching Review*, 6(2), 123-140.
12. Ghosh, S. (2018). Role of design thinking and creative cognition for the growth of digital entrepreneurship. *International Journal of Recent trends in Business and Tourism*, 2(4), 53-57. Retrieved from <https://ejournal.lucp.net/index.php/ijrtbt/article/view/177>
13. Igwe, C. N., Adebayo, M. S., Olakanmi, O. A., Ogbonna, I. G., & Aina, O. S. (2013). Promoting wealth and job creation in Nigeria – Review of the role of entrepreneurship. *Journal of Sustainable Development Studies*, 3(1), 80-100. Retrieved from <https://www.semanticscholar.org/paper/Promoting-Wealth-and-Job-Creation-in-Nigeria-%E2%80%93-of-Igwe-Adebayo/1423c6020b22456bbfde92ec759a621cca0c45e4>
14. Jenkins, L. (2019, July 4). *Design thinking for business success: Design thinking for innovation*. BusinessWest. Retrieved from <https://www.businesswest.co.uk/blog/design-thinking-business-success-design-thinking-innovation-part-1-5>
15. Keynes, J.M. (1964). *The General Theory of Employment, Interest and Money*. New York: Harcourt, Brace, and Company.
16. Kleinsmann, M., Valkenburg, R., & Sluijs, J. (2017). Capturing

- the value of design thinking in different innovation practices, *International Journal of Design*, 11(2), 1-11.
17. Kolko, J. (2015, September). *Design Thinking Comes of Age*. Harvard Business Review. Retrieved from <https://hbr.org/2015/09/design-thinking-comes-of-age>
 18. Leszczyński, D. (2014). The investigation into motivations, success factors and barriers among women small business owners: An overview of extant literature. *International Journal of Management and Economics*. <https://doi.org/10.2478/ijme-2014-0024>
 19. Liedtka, J. (2011). Learning to use design-thinking tools for successful innovation, *Strategy & Leadership*, 39(5), 13-19. <https://doi.org/10.1108/108785711111161480>
 20. Ling, D. (2017). *Complete design-thinking guide for successful professionals*, CreateSpace Independent Publishing Platform (Revised 2017). Retrieved from <https://www.amazon.com/Complete-Design-Thinking-Successful-Professionals/dp/1514202735>
 21. Linton, G., & Klinton, M. (2019). University entrepreneurship education: a design thinking approach to learning. *Journal of Innovation and Entrepreneurship*, 8, 3. <https://doi.org/10.1186/s13731-018-0098-z>
 22. Luo, J. (2015). The united innovation process: Integrating science, design, and entrepreneurship as sub-processes. *Design Science*, 1, E2. <https://doi.org/10.1017/dsj.2015.2>
 23. Onyeizugbe, C. U., Orogbu, O. L., & Oyigbo, M. C. (2015). Entrepreneurial development and job creation in selected local government areas in Enugu State, Nigeria. *International Journal of Managerial Studies and Research (IJMSR)*, 3(7), 41-53. Retrieved from <https://www.arcjournals.org/pdfs/ijmsr/v3-i7/5.pdf>
 24. Robbins, P. (2018). From design thinking to art thinking with an open innovation perspective – a case study of how art thinking rescued a cultural institution in Dublin. *Journal of Open Innovation: Technology, Markets and Complexity*, 4(57), 1-18. Retrieved from <https://core.ac.uk/display/297030118?source=4>
 25. Saavedra, A. R., & Opfer, V. D. (2012). Learning 21st-century skills requires 21st-century teaching. *Phi Delta Kappan*, 94(2), 8-13. <https://doi.org/10.1177%2F003172171209400203>
 26. Scheer, A., Noweski, C., & Meinel, C. (2012). Transforming constructivist learning into action: Design thinking in education. *Design and Technology Education: An International Journal*, 17(3). Retrieved from <https://ojs.lboro.ac.uk/DATE/article/view/1758>
 27. Val, E., Gonzalez, I., Iriarte, I., Beitia, A., Lasa, G., & Elkoro, M. (2017). A design thinking approach to introduce entrepreneurship education in European school curricula. *The Design Journal*, 20(sup1), S754-S766. <https://doi.org/10.1080/14606925.2017.1353022>.
 28. Val, E., Gonzalez, I., Lauroba, N., & Beitia, A. (2019). How can Design Thinking promote entrepreneurship in young people? *The Design Journal*, 22(sup1), 111-121. <http://doi.org/10.1080/14606925.2019.1595853>
 29. Volkova, T., & Jākobsone, I. (2016). Design thinking as a business tool to ensure continuous value generation. *Intellectual Economics*, 10(1), 63-69. <https://doi.org/10.1016/j.intele.2016.06.003>

APPENDIX A

QUESTIONNAIRE

Part One

Instruction: Mark [X] as appropriate

1. Gender: Male [...] Female [...]
2. Knowledge of entrepreneurial Education: Undergraduate [...] Postgraduate [...]
3. Respondents Status: Graduate [...] Postgraduate Student [...] Entrepreneur [...]
4. Age Bracket: 21-30 [...] 31-40 [...] 41-50 [...] above 50 [...]

Part Two

Instruction: Indicate the extent to which you agree with the following.

	1	2	3	4	5
	Strongly disagree	Disagree	No view	Agree	Strongly agree

S/N	Item	1	2	3	4	5
A. Empathy						
1	Concern for people's feelings and needs					
2	Observing people's feelings and needs					
3	Engaging and sharing people's feelings to understand their experiences					
4	Concern through observing, engaging and sharing people's feelings					
B. Problem definition						
5	Ability to define a problem properly					
6	Adequate comprehension of the problem					
C. Ideation						
7	Brainstorming for product ideas					
8	Brain-writing for product ideas					
9	Use of the worst possible idea for product ideas					
D. Prototyping						
10	Translation of the design imagination to something tangible before launching the final product					
11	Production of several samples of the products thought out during the design thinking process to enable the choice of the most appropriate product					
12	Using prototyping to arrive at the most suitable product					
E. Testing						
13	Product testing helps to ascertain conformance					
14	Alterations and refinements in the testing stage					
15	Product validation after testing					