

Models for Viable and Sustainable Architectural Practice in North Central Nigeria

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Abstract— Firm viability while implied in architectural practice is a relatively recent concept. Against a backdrop of a diminished role for architects in practice, this study identified factors affecting viability in architecture practice with a view to developing models. Using regression analysis Chi Square and ANOVA, 102 firms sampled from the Architects Registration Council of Nigeria (ARCON) Register of firms North Central Nigeria were analysed. Two models (architectural and corporate ideology) were developed providing the best fit. The study revealed firms ideologies that performed better in proactively addressing the negative effects of inherent problems militating against viable architectural practice in North Central Nigeria.

Keywords— architectural practice, architectural ideology, corporate ideology, regression, viability model

I. INTRODUCTION

Viability in its simplest definition means the ability of an entity to survive. Core concepts of viability are Economic Viability, Ethical Viability, Sociological Viability and Sustainability. Economic viability of an organisation relates to its profitability. Ethical viability refers to organisations ability to operate within standard acceptable morals dictated by society. Profit therefore cannot be at the expense of the organisation’s ethics. A sociologically viable organisation is socially viable if it provides enough value to justify any internal or external social costs^[16]. Other characteristics of sociological viability include manageability and system viability, defined in Figure 1 as the relationship between systems and the environment in which the system operates. Sustainability is viability in a projected future. Sustainable organisations ensure sustained resource consumption, pursuing a social mandate and monitoring the environmental impact of the organisation. Sustainability also ensures political support for the organisation and its image. In running a business, viability ultimately culminates in profit.

Where a business is not currently profitable, there is a future expectation of profitability particularly in the early stages of business inception, and when a firm is undergoing economic challenges. Viability and sustainable practice is the unwritten goal of every professional organisation and architecture profession is not an exception^[15].

Sustainability in practice ensures issues of continuity and ownership succession are anticipated addressed.

The aim of the study is the application of architectural ideologies to enhance firms’ viability and sustainability in architectural practice through identifying the prevalent ideologies in architectural firms in North Central Nigeria; relating firm ideologies to practice viabilities and sustainability and developing models for viable and sustainable architectural practice in Nigeria.

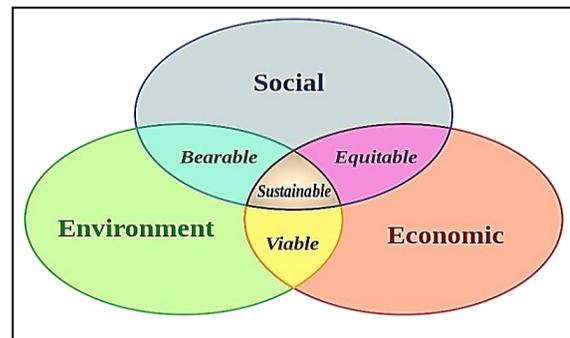


Figure 1: The Relationship Between Sustainability and Viability
Source: ^[1]

II. LITERATURE

Architecture firms are knowledge-based professional organisations with an expectation of economic, ethical, sociological, and sustainable viability. Available literature points to Sustainability and Green architecture as the current movements in architecture. The concepts present ideologies that drive the Eco Architecture movement, laying much emphasis on design functionality with the goal of zero energy consumption in material, construction technology, maintenance, and building energy usage. Thus, the contemporary architecture firm should ultimately be sustainable (profitable). Organisations as systems undergo life cycles, and architecture firms as professional organisations undergo business life cycles.

The viability of the business in each stage of the business life cycle will determine the health and profitability of the business as it grows. Profitability is not limited to the economic sense. For instance, non-profit institutions, like non-governmental organisations, may not be profit seeking but are viable if the company can deliver social or another value. Research has recognised four dimensions of viability, namely: Robustness, Niche viability, Sustainability and Time - delimited Viability. The dimension of robustness refers to the viability that spans across a range of environmental conditions. Niche viability refers to the viability when operating in a single speciality environment. Viability measured over time (into the future) is sustainability, while viability for a defined period, with no requirement for survival after the period has ended, is called time-delimited viability^[16]. Table 1 outlines the factors determining viability which include profitability, market value, growth, system (organisational) strategies, survival strategies, and culture (ideology, beliefs, and myths).

TABLE I
FACTORS FOR DETERMINING VIABILITY

Factors from Reviewed Literature	Empirical Measures	
Profitability		Perception of firms' profitability
Market value		Perception of firms' market value
Growth		Perception of firms' growth
Organisational strategies	System strategies	Ability to increase skills and innovation
	Survival strategies	Diversification of services
Culture	Ideologies	Architectural ideologies
		Corporate ideologies

Source: ^[12]

A. Ideology as a Factor for Viability in the Practice of Architecture

Ideology is a system of ideas and ideals, which forms the basis of economic or political theory and policy ^[5]. Ideology is also the body of doctrine, myth, belief that guides an individual, social movement, institution, class, or large group. In the same vein, several approaches to ideology to include political ideology, economic ideology and business ideology^[15]. This explains why Smith^[12] opines that Architecture is a knowledge-based professional organisation or business, and studies have shown that businesses are driven by ideologies whether formally established or otherwise.

Ideology in architectural practice consists of architectural ideologies or the ideas that drive the styles and designs and the corporate ideology or the shared belief of the principal architects that guide the running of the architectural firm. Corporate ideologies play a significant role in strategy formulation, as an organisations' core ideology is essentially the 'glue' that holds the organisation together. Studies have also shown that ideology has an effect on the firms' management structure^[10]. Ideologies can also illuminate the core values of an organisation. This is why Lee and Shafer^[6] assert that core values are important tools of measurement when determining if organisational approaches are viable. Firm ideology (as a component of firm culture) is, by implication a critical factor for determining viability of the firm. For example, the famous maxim 'less is more' defined the design expression of Mies van der Rohe in the use of steel and glass. Application to the firm's core ideology also ensured lean design management principles^[7].

Blau^[2] conducted an extensive study into organisational cultures of architecture firms in the United States of America. Results from this study reveal that American architecture firms differ on ideological lines. Two decades later, these assertions were reaffirmed^[13]. Ola-Adisa^[7] identifies architectural and corporate ideologies, further investigating their respective roles in enhancing the viability of architecture practice in North Central Nigeria. Ola-Adisa^[7] also evaluates the factors set forth to determine practice viability as outlined in Table I and specifically examines the role of ideology in architectural practice viability. There is an interrelationship between the factors that determine viability and the components of ideology. Figure 2 illustrates the two components of ideology, namely architectural and corporate.

Architectural Ideologies consist of Firm Design philosophy, Firm Design style and Firm Practice ideology. While Corporate Ideologies consist of Ethics or Shared Beliefs, Policies or Strategies and Attitudes^[7].

Architectural Ideologies of design philosophies and design style while existing in architectural practice may not be present in all firms, though all firms operate Practice Ideologies. Practice ideologies are evident in the form of ownership and management type of firms; therefore, Practice ideologies are a vital factor in measuring the enhancement of viability in a firm. On the other hand, while corporate ideologies of ethics, strategies and attitudes exist in architectural practice, strategies are the measurable aspect of Corporate Ideology. In fact, organisational strategies also play a major role in determining viability in architectural practice (see Table I). The interrelationship between factors that determine viability and the components of ideology is also evident in the relationship between profitability and growth and ideology, where ethics, strategies and attitudes each play a significant role in the profitability and growth of an organisation.

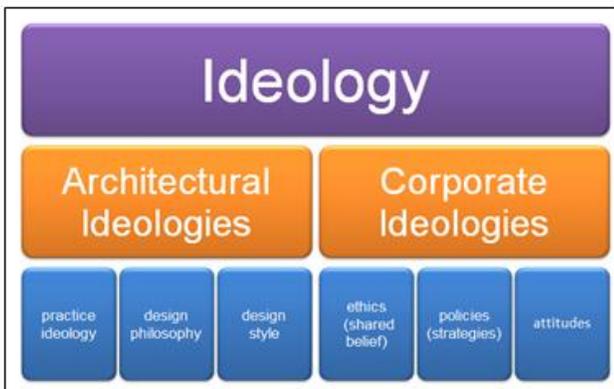


Figure 2: Concept of Components of Ideology in Architectural Practice

Core values of the management principles of architecture firm are expressed through the firms' ideologies^[3]. Qualifying the use of the term ideology in this context is necessary because the main hypotheses postulated seek to establish a significant relationship between architectural ideologies and enhanced viability in practice with a view to developing models.

Ola-Adisa^[7] approaches ideology from the standpoint of viable professional organisations using the architectural firm as the focus. Utilising the Contingency Theory which states that the organising strategy an organisation adopts will vary according to circumstances or situations^[12]; the theory implies the organisations carry unique characteristics and ideologies thus providing a framework for study and evaluation. Organisations exist for various reasons, and the organisational core values and ideologies are affected by societal values and ideologies.

B. Classifications of Architectural Practices into Models, Types and Structures

Architectural management or control extends between the management of the design process, construction and project management, and facilities management of buildings in use^[4]. The types of practice outlined in Table II can also be categorised by several management strategies^[17]. Most forms of practice have the following management approaches: Ownership, Control of practice and Liability.

Architectural firms can be classified based on ownership. Ownership refers to the state of having complete legal control of the Architectural firms. There are five forms of classified companies namely; Sole Proprietorship, Unlimited Partnership, Unlimited Firms, Limited Partnership and Limited Firms. The less common types of practice also classify architectural firms. These forms of practice state what controls the practice. The controllers usually include multiple experts would be architects and diversified professionals. Specialised forms of practice include Group Practice, Collaborative Practice, Consortium, Community Practice, University Based Project Office, Subsidiaries / Affiliates of Corporation and Multi-Disciplinary Practice. Other forms of Architecture Firms include non-profit making organisations, including: Government, Quasi-governmental bodies / Institutional Bodies and Public-Private Partnership Initiatives. Classification of Architectural Firms by Liability is either Limited Liability Companies or Unlimited Liability Companies.

Table II
Recommended Standards “Forms Of Practice”

Basic Form of Practice	Ownership	Composition of Board of Directors	Responsibility	
			For management	For practice
Sole Proprietor	Registered Architect	Registered Architect	Registered Architect	Registered Architect
Unlimited Partnership	Registered Architect as Unlimited Partner	Registered Architect as Unlimited Partner	Registered Architect as Unlimited Partner	Registered Architect as Unlimited Partner
Unlimited Firms	Registered Architect as Unlimited Firms Member	Registered Architect as Unlimited Firms Member	Registered Architect as Unlimited Firms Member	Registered Architect as Unlimited Firms Member
Limited Corporation / Limited Partnership / Limited Firms	Majority of shares to be owned by registered architects.	A majority of the board of directors to be registered architects.	Registered architect	Registered architect

Source: ^[17]

III. METHODOLOGY

Ideologies are the driving force in architectural firms and these ideologies are the leading cause of differences ^[2]. The conceptual approach conceived called for a holistic view of ideology in basic interpretation rather than approaching the study of architecture firm ideology from a particular or reductionist approach. Utilising this general approach enabled the study to have a platform from which to analyse, describe, and predict the relationship between ideology and organisational strategies. Within the conceptual approach, the architectural firms were studied in terms of various subsystems^[8]. The subsystems consist of core values and ideologies, technology, management patterns (ownership structure, practice ideology or the management strategy adopted) and physical as found in Table II. A framework of organisational theories examined architectural firms ideologically. The ideologies employed by the different companies and principals were measured and quantitatively analysed to develop taxonomy of ideologies. The results established the relationships between ideology and viability in architectural

In establishing the relationship between architecture firm ideologies and viability in architectural practice, the study identified taxonomies of architectural firms practice ideologies in North Central Nigeria.

The taxonomy approach used the logic of empirical analysis based on multivariate analysis of empirical data on multiple dimensions or variables. The variables consisted of organisational structures, processes, strategies, and specifically the firms’ ideologies.

The study postulated two hypotheses namely:

Hypothesis One:

Ho There is no significant relationship between ideologies and enhanced viability in sustainable architectural practice.

H1 There is a significant relationship between ideologies and enhanced viability in sustainable architectural practice.

Hypothesis Two:

Ho There is no significant relationship between organisational strategies and viability in sustainable architectural practice.

H1 There is a significant relationship between organisational strategies and viability in sustainable architectural practice.

An online questionnaire was administered in the six states in the North Central Zone and the Federal Capital Territory. The collection was undertaken electronically and captured using the online survey software. 102 valid questionnaires were subsequently analysed in by means of the Statistical Package for Social Scientists (SPSS version 17).

Questionnaires were administered and analysed to develop models for enhancing viability in architecture firms and test the hypotheses postulated. The statistical analyses used in the study reflected the aim and specific objectives of the study and data obtained from the survey. A five-point Likert scale was used to analyse and align various factors. Number values were assigned to measure and examine the factors on the practical attitudinal scale utilised by the study. The numbers values featured on an attribute scale (Five points to examine financial profile of firms and two points for yes and no questions. The data generated in the research were tabulated and analysed using percentages.

Data were also analysed using frequencies, cross tabulations, the coefficient of correlation (Pearson’s product-moment correlation coefficient), and Multiple regression analysis. The computer software programme Microsoft Excel and Statistical Package for Social Sciences (SPSS) were also used to summarise the data and test the hypotheses.

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The variables were operationalized and for each objective, the data required, the location of data, the instruments used in obtaining data and methods of data analysis included Analysis of Variance (ANOVA) which was used to uncover the main and interaction effects of categorical independent variables. One-way ANOVA was used to test the differences in a single interval dependent (viability) variable among two groups formed by the categories of a single categorical independent variable^[9].

The second instrument used was Regression Analysis. The Multiple regression analysis technique was selected to analyse the relationship between dependent variable, viability and a set of independent or predictor variables, ideology and architectural practice. The computation of multiple regression analysis in this study allowed for good handling of the independent variables. The dependent variable viability was regressed against the factors of ideology and sustainable architectural practice (independent variables). The technique enabled the study to evaluate prediction accurately and to control for other confounding factors in order to evaluate the contribution of the specific variable, viability and the set of variables, ideology and sustainable architectural practice. This technique was also selected to measure the consistency in the result given by the same variables (viability, ideology and sustainable architectural practice) and the stability, dependability and predictability of accuracy or precision of the variables^[11].

The researcher assumed that values between the observed values of the explanatory variables were also possible values of the explanatory variables using EQUATION 1

$$Y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + U \text{ -EQUATION 1}$$

Where Y - The value of the dependent variable what is being predicted and explained

α - (Alpha) is a constant or intercept

β_1 - The slope (beta coefficient) for x_1

x_1 - First independent variable that is explaining the variance in Y

β_2 - The slope (beta coefficient) for x_2

x_2 - Second independent variable that is explaining the variance in Y

β_3 - The slope (beta coefficient) for x_3

x_3 - Third independent variable that is explaining the variance in Y

s. e. β_1 - Standard error of the coefficient β_1

s. e. β_2 - Standard error of the coefficient β_2

s. e. β_3 - Standard error of the coefficient β_3

U - Sum of the error terms or stochastic variable

The computation of multiple regression analysis enabled the researcher handle the large number of independent variables in the study, applying the multiple regressions to evaluate the model predictions accurately and to control for other confounding factors in order to evaluate the contributions of the dependent variable or the set of independent variables. The Multiple Regression assumed that errors are normally distributed; the mean of the errors is zero; errors have a constant variance and the model errors are independent.

IV. RESULTS

The results of the study were analysed to address the hypotheses and research questions and determine the relationship between ideology and viability in sustainable architectural firms in North Central Nigeria. The discussions outlined analysis using ANOVA, and regression analysis. Two models (on architectural ideology and corporate ideology) were developed using regression analysis. Results are presented in Tables III to VIII. The Linear Regression model summary for Architectural Ideology showed $R=0.960$. From Table III, the regression equation model (EQUATION 1), $Y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + U$ can be written as $Y = -8.375 + 1.471x_1 + 2.639x_2 + 1.633x_3 + U$. The model estimate showed that the value of the constant is -8.375 and negative. This implies that in the absence of firm's design philosophy, design style and architectural practice ideology, the viability in practice would be negative. The coefficient and the slope of the design philosophy (x_1) is 1.471 and positive. This indicates that design philosophy will influence viability in practice positively by the size of the coefficient. Also the coefficient of the design style is 2.639. This is also positive and will influence viability in practice positively by that magnitude. The coefficient value for architectural practice ideology is 1.633 and this variable impacts viability in practice positively.

The correlation coefficient (R) value is .960 (96%) (from Table V). This indicates the existence of a very strong correlation between the dependent variable (Viability in practice) and the Independent variables (Design philosophy, design style and architectural practice ideology).

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The coefficient of determination R^2 is .921. This implies that 92.1% variation in the dependent variable is jointly due to the variation in the independent variables. In other words, the independent variables account for 92.1% of variation in dependent variable, while the error term or the stochastic variable (U) accounts for .079 (7.9%) variation in the dependent variable (Viability in Practice).

The second Linear Regression model summary for Corporate Ideology showed $R=0.762$ (Table IV). A regression analysis was performed using viability as the criterion and organisational strategies of diversification of services (e.g. arbitration) as predictors in order to determine if viability in practice could be predicted as a function of diverse services rendered in architectural firms. The analysis was found to be statistically significant. The correlation coefficient is 0.762, while the coefficient of determination is 0.581. $F(118) = 68.66, p < .01$, indicating that diverse architectural services are good predictors of viability in practice. This regression accounted for 58.1% of the variability, as indexed by the adjusted R^2 statistic.

The Correlation coefficient for the model in general revealed a very strong correlation between Enhanced Viability and the Organisational (survival) strategy of diversification of services rendered in architectural firms (Table V). The value for $R = 0.762$, meaning 76.2 %, while the coefficient of determination R^2 which measured the extent to which variation in the independent variable (Enhanced Viability) was explained by the dependent variables (organisational strategy of diversification of services rendered in architectural firms), is 0.581, that is 58.1 %. The model summary can be interpreted to mean that provision of diversified services by the firms had influenced the level of viability up to 58.1 %. The remainder of this value, 0.419, or 41.9 % was due to the unexplained variation which is represented by U in the model. The Sig. F-change showed that there is a significant relationship between organisational strategies of diversification of services rendered in architectural firms and enhanced viability in practice (Table VII). The significance is noted because the value obtained .000 is less than the confidence level of 0.05. In carrying out the test, the researcher has made the following assumptions:

1. Five factors characterise viability in architectural practice: Profitability, Market value, Growth, Organisational Strategies (System and Survival) and Culture (Ideology).
2. The strategy of diversification of services has a significant relationship with viability.

3. The results indicate a significant and strong positive correlation between diversification of services and viability, so the null hypothesis is rejected.
4. The strategy of increased skill and innovation a significant relationship with viability.
5. The results indicate a significant and strong positive correlation between increased skill and innovation and viability, so the null hypothesis is rejected.

The significance of each factor in the models was determined using the Standard Error (SE) and t-test. The Standard Error test and the t-test measure the validity and the statistical significance of the factor estimate. All the factor estimates were found to be valid and statistically significant. The decision rule for the SE test is that if half the value of the coefficient of the factor estimate is greater than the SE of the factor estimate (that is, $\frac{1}{2}B > SE$), the estimate is statistically significant, otherwise, it is insignificant. The decision rule for the t test is that the test is significant where the p-value (t-sig) is less than the critical level of .05 (that is, p-value < .05). The F-stat (ANOVA) test the overall significance of the model. From the ANOVA Table VII, the F-sig = .000.

Table III
Model Summary For Hypothesis One^a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.960 ^a	.921	.918	3.519

a. Predictors: (Constant), Firm's design style, Firm's design philosophy, Firm's Architectural Practice Ideology

Table IV
Anova^b For Hypothesis One^a

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	17690.279	4	4422.570	357.122	.000 ^a
	Residual	1523.221	123	12.384		
	Total	19213.500	127			

a. Predictors: (Constant), Firm's design style, Firm's design philosophy, Firm's Architectural Practice Ideology

b. Dependent Variable: Viability in practice

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Table V
Coefficients For Hypothesis Two^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
1 (Constant)	-8.375	1.470		-5.696	.000	-11.286	-5.465
Firm's design philosophy	1.471	.617	.201	2.384	.019	.250	2.692
Firm's design style	2.639	.210	.431	12.559	.000	2.223	3.055
Firm's Architectural Practice Ideology	1.633	.662	.223	2.466	.015	.322	2.944

a. Dependent Variable: Viability in practice

Table VI
Model Summary^b For Test Of Hypothesis Two

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.761a	.579	.575	6.596
2	.762a	.581	.573	.751

a. Predictors: (Constant), ability to diversify in services
b. Predictors: (Constant), ability to increase in skill and innovation, ability to diversify in services

Table VII
Anova^b For Test Of Hypothesis Two

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5991.924	1	5991.924	137.738	.000 ^a
	Residual	4350.243	100	43.502		
	Total	10342.167	101			
2	Regression	77.454	2	38.727	68.660	.000 ^a
	Residual	55.840	99	.564		
	Total	133.294	101			

Table VIII
Coefficient For Test Of Hypothesis Two^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
1 (Constant)	4.266	.283		15.059	.000	1.286	7.465
Diversification of Services	.026	.009	.272	2.905	.005	.250	2.692
Increased Skill and Innovation	.085	.015	.543	5.789	.000	2.223	3.055

a. Dependent Variable: Corporate Ideology

V. DISCUSSION

The objective of the study was to develop models for viable and sustainable architectural practice in Nigeria Two models (on architectural ideology and corporate ideology) were developed using regression analysis. The first Linear Regression model summary showed R=0.960

The regression equation model (EQUATION 1)

$$Y = \alpha + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + U$$

$$Y = -8.375 + 1.471x_1 + 2.639x_2 + 1.633x_3 + U.$$

The model estimate showed that the value of the constant is -8.375 and negative. This implies that in the absence of firm's design philosophy, design style and architectural practice ideology, the firm viability would be negative. The coefficient and the slope of the design philosophy (x1) is 1.471 and positive. This indicates that design philosophy will influence viability in practice positively by the size of the coefficient. Also, the coefficient of the design style is 2.639. This is also positive with similar influence on viability. The coefficient value for architectural practice ideology is 1.633 and impacts viability in practice positively.

The second Linear Regression model summary showed R=0.762

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From Table 2, the regression equation model (EQUATION 1)

$$Y = \alpha + \beta_1 x_1 + \beta_2 x_2 + U$$

$$Y = 4.266 + 0.026x_1 + 0.085x_2 + U$$

The model estimate showed that the value of the constant is 4.266 and positive. This implies that organisational strategies would be a positive influence on viability in practice. The coefficient and the slope of the (x_1) is 0.026 and positive. This indicates that diversification of services will influence viability in practice positively by the size of the coefficient. Also the coefficient of increased skill and innovation is 0.085. This is also positive and will influence viability in practice positively by that magnitude. The correlation coefficient (R) value is .762 (76%). The coefficient of determination R^2 is .581. This implies that 58.1% variation in the dependent variable is jointly due to the variation in the independent variables. In other word, the independent variables account for 58.1% of variation in dependent variable, while the error term or the stochastic variable (U) accounts for .419 (41.9%) variation in the dependent variable (Viability in Practice). The research supported the theoretical model of ideology identified in empirical studies as a partial mediator in the relationship between organisational strategies and firm viability and also established direct and indirect effects of architectural firm characteristics on performance and revealed the existence of additional intervening mechanisms. The study also confirmed a link between two dimensions of ideology and firm performance which was identified in literature. Firms that emphasised diversification as a strategy for viability showed enhanced financial performance. The study emphasised a search for opportunities through increased skill acquisition and innovation versus traditional architecture practices where firm were conservative by maintaining the status quo. Increasing skills and innovations may have contributed to firm viability by assisting the firm principal architects in gaining an edge (niche viability), particularly through the use of Computer Aided Design and Drafting (CADD).

VI. CONCLUSION

The study revealed that design in architectural firms should be perceived in a random and dynamic nonlinear manner rather than the current sequential view as pre-design, design and post design stages. They study also showed firms should also view design as an inclusive (rather than exclusive) system where design puts actual buildings in the context, rather than using the context.

Architecture firms could also address remunerations and firm retention strategies to clarify personnel's management of their resources. Addressing financial resources to create the framework for these resources to be invested into research and development (at least 1% of the firm's turnover) or stabilisation firms was a rare undertaking for architecture firms, as few firms believed they could save for a rainy day. However, no firm that wished to be viable could afford not to. The study also showed that firms should find ways to integrate the entire building process from material procurement to project financing, which one hand could mean architecture firms metamorphosing into design - build (D & B) firms or just independently adapting to accommodate changes rapidly. These survival and systems strategies utilising diversification of services yielded more income than conventional architectural practice. These diversified activities include Arbitration, Architectural Advisory Services, Engineering Services, Feasibility Studies, Interior Design Services, Landscape Architectural Services, Modelling, Project Management, Project Site Master Planning Services, Sales of Building Materials, Urban Planning Services, and Valuation.

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