A Model of Virtual Organization for Corporate Visibility and Competitiveness

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Abstract

This paper considers the existing numerous research in business, Information and Communication Technology (ICT), examines a theoretical framework for value creation in a virtual world. Following a proposed model, a new strategic paradigm is created for corporate value; and virtual organization (VO) apply the use of information and advanced ICT to ensure corporate visibility and competitiveness in the global marketplace. The concept of VO introduces an ICT business model that links and integrates enterprise strategic, operational and tactical issues for corporate competitiveness.

Keywords: Virtual Organisations, Virtual Enterprises, Business Process Outsourcing, Corporate Value, Value Creation, Information Systems, ICT Strategy

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1.0 Introduction

Virtual Organisation (VO) refers to an organisational business concept which includes major elements of collaboration among a consortium of member companies, and integration of their core competencies needed to develop new and customized products or services. This concept is based on responses to the customers' ever-increasing demand or changing value, prompt reaction to changes in the market conditions, and shareholders' wealth creation expectancy. **O**ver the years, all consumers and enterprises have been delimited by renowned social and geographical constraints that defined their individual industry environments and marketplaces until 1993, when the Internet and the World Wide Web (WWW) emerged.

A. The evolution of the internet eliminated or greatly alleviated many of these constraints, hence, facilitated the global business environment which has net organisations and customers in proximity all over the world than ever before, thus, creating new business avenues. This paper considers the existing numerous research in business and Information and Communication Technology (ICT), examines a theoretical basis for value creation in a virtual world. Following a proposed model, a new strategic paradigm is created for corporate value; and virtual organization (VO) apply the use of information and advanced ICT to ensure corporate visibility and competitiveness in the global marketplace. The concept of VO introduces an ICT business model that links and integrates enterprise strategic, operational and tactical issues. The methodology takes a quantitative (hypothetic deductive) approach to test two established hypotheses of the study. The results of the quantitative analysis were discussed and interpreted in relation to the value drivers (key parameters) in the prescribed model to achieve research aim of the paper. And the outcome of the study underpinned a virtual value creation model of Virtual Organisation that ensure corporate visibility for the established organizations via collaboration and leveraging on the core competencies of their partners to further position them for competitiveness in the global digitized marketplace.

The concept of the Virtual Organisation (VO) was traced to have sprung up since 10–15 years ago, according to [12]. The report asserted that many of its practices could be traced back at least four decades. He further clarified by citing [18] description on how many of the features of VOs could be identified within the organization of the housing construction industry in Western Australia in the early 1960's [14]. In support of this, [7] as cited in [10] traced the origin of VO to the developments and emergence of ICT and the internet respectively. According to the publication, many definitions of VO are specifically relevant to the industrial sector where main drive for its formation is the need to reduce costs through collaborations in Western Australia. The economic concept is that costs can be minimized and value be created where partners pull complementary expertise in working together for some corporate objectives. For example, the infrastructural costs for a small group will probably experience reduction in total than the corresponding cost to a large group [14].

Background of study

The problem of many organizations which defines the purpose of their existence has remain how to boost the economic value of the organisation corporately in other to maximally increase organisational value and shareholders' wealth while improving customers' value. The basis of economics theory has been on the efficient use of the factors of production, such as land, labour and capital [10]. Information, therefore, has remained the livewire for the existence

and re-evaluation of these resources without which their development is impaired. Information has equally contributed vitally to management and value creation practices such that the developments of the twentieth century have kept most of these other theories (e.g. economic theory) improper or insufficient in the face of its explosion.

ICT accessibility and user friendliness have promoted the ease of access and lowered cost of every kind of information haven provided the necessary infrastructure for high speed computing and digitization, thereby, transforming the way that information is accessed, manipulated, transmitted and stored. This has helped to increase the level of it global distribution for decision making and strategic position of enterprises involved. Recent changes in economic conditions, organizational structures, and enterprise processes are based not just on information availability and asymmetry, but on the way of its distribution. Furthermore, enhanced communication and distribution channels opened up by the advent of the Internet and other related communication technology has net organizations and customers in proximity all over the world than ever before, thus, creating new business avenues [10].

Over the years, all consumers and enterprises have been delimited by renowned social and geographical constraints that defined their individual industry environments and marketplaces until 1993, when the Internet and the World Wide Web (WWW) emerged. The evolution of the internet eliminated or greatly alleviated many of these constraints, hence, facilitated the global business environment. The rules of competition were swiftly changed as traditional enterprises, such as Encyclopaedia Britannica were caught off guard as their dependence on conventional print, distribution and sales systems in the production and marketing of its high-priced multi-volume collection was nearly eradicated overnight when its alternatives on-lines, such as Encarta which were bundled with Microsoft software with much multi-media capability, but at very low costs and made available globally. Amazon Books is another new venture among others which was purposely designed to take advantage of the new environment of ICT, and flourished.

Most existing collaborating enterprises such as the project based organisations are now beginning to appreciate the need to operate with the support of ICT network so as to break their geographical barriers, and create effective information systems to gain and sustain their competitiveness in the marketplace. This had resulted into the recent emergence of project outsourcing and project team collaborations.

In view of the importance of ICT today and its relation to VO, this is possible due to the growth and expansion of globalisation and the global marketplace. The resulting challenges and concerns, therefore, have remained core in the minds of most corporate leadership. These seek to interrogate on how any organisation can survive and boom in this emerging electronic business environment.

1.2 Problem Statement

This research is primarily concerned with - *"How can an organisation create corporate value to ensure corporate visibility and competitiveness in the global business environment by deploying a Virtual Organization Model?"* In suggesting answer to the above question, the research is not limited to the direct deployment of ICT alone. It further depends an understanding of how a virtual organization model will enhance a corporate information system and sharpen corporate strategy for global competitiveness.

2.0 Virtual Organization Model: Conceptual and Theoretical Framework

Insight from [17] maintains that as ICT overcome the constraints of time and distance, creating VOs becomes a possibility. According to him, virtual is usually taken to be something that does not exist in reality. Hence, a typical definition of a virtual enterprise or corporation (taking the dimension of time) is: "a *temporary network of independent companies linked by IT to share skills, costs, and access to one another's markets* (Business Week as cited by [17])".

He further provided another definition which relates to an organisation not having a clear physical locus. Here a typical definition is: "an organisation distributed geographically and whose work is coordinated through electronic communications" [17].

However, [4] pointed out that inherent in VOs are not the concepts of trailblazing, standalone solutions but rather using and combining existing organisational and technological solutions such as supply chain management, workflow management, electronic data exchange, and virtual marketplaces. According to him, all of these rely on, and are supported by ICT.

Virtual enterprises therefore provide an important improvement such as higher flexibility. The increased changeability of the environment of organisations has to necessitate a corresponding changeable business strategies and processes. So, by focusing on core competences and interacting with auxiliary, external partners or company can use its resources most effectively. Furthermore, different degrees of virtualization can be distinguished to harness the benefits evolving by new concepts. Certainly, most companies are applying some of them nowadays. These interactions between companies are increasingly realised through networks coordinated and enabled by ICT [4].

The issue of value, its creation or appropriation has in no doubt been thoroughly examined by past researches from business and other related disciplines, such as economics, mathematics, sociology, psychology, etc. Several useful views and theoretical frameworks have been established following the rigorous efforts accompanying them. But justifiably, the limitations of disciplinary boundaries or narrow single view of the subject have undoubtedly affected the propagation of these contributions in this information age.

Surprisingly the contributions of ICT industry in economic value and organisational competitiveness seemed not

to have been explored by most enterprises for a long while. The recent advents of e-commerce, e-business and e-marketing greatly pioneered lots of ICT innovations that have had revolutionary impact on business in modern times.

Consequently, interdisciplinary research works on the subjects of value; business and ICT have undoubtedly remained on the minimal. In addition, previously developed theories (as in management, and marketing) lack the perspective to sufficiently handle the issue of value, and wealth creation organisationally, in the ever emerging information society which, [10] in reference to [8] highlighted as the reason behind enterprise existence.

2.1 Integrated Virtual Value Creation Framework

The framework adopted by the researcher is Virtual Value Creation (VVC) framework which theories address customer value and shareholder wealth creation in a virtual organisation or virtual world setting as had been proposed by Hales [10] in a research. Organisational Practice and the previous research works on creation of corporate value, indicates the need for an integrated approach that combines already existing conventional theories from strategy, marketing, finance and information systems with new viewpoints that highlights the uncertainty of information resources. The integrated VVC framework answers to the said need.

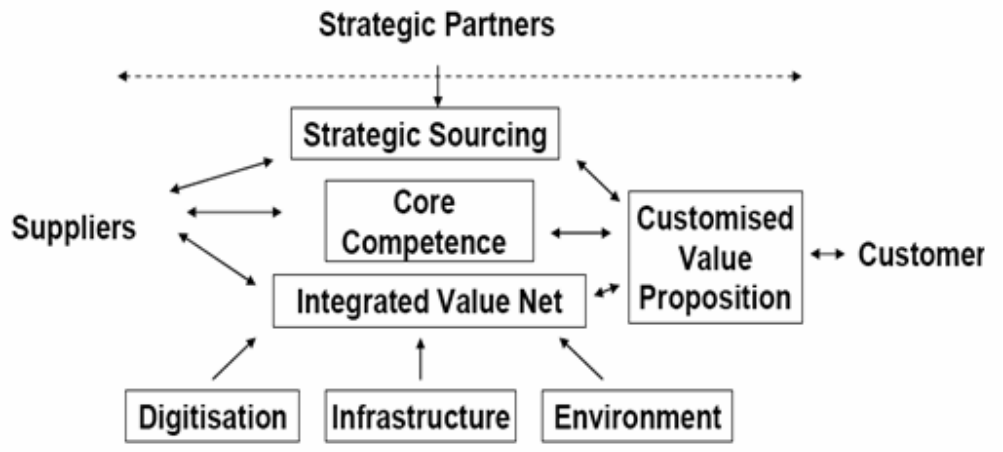

Figure 2.1: Integrated Virtual value creation framework [10]

The Figure 2.1A above is a customer focused VVC framework that strategically appreciates value creation comprising the customer, and customer value. It depicts the interlinking between customer value and a customised value proposition, classifying the vital functional and foundational drivers' requirements of value creation, pictorially expounded in Figure 2.1B following.

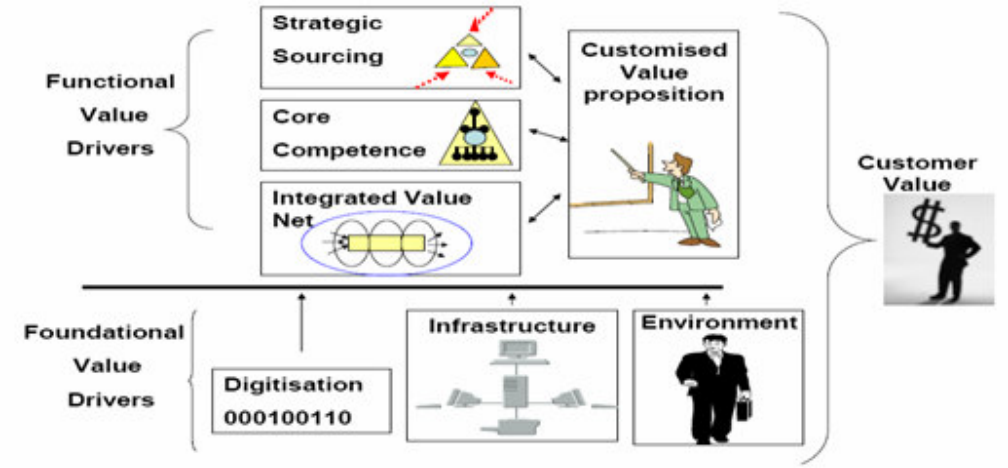

Figure 2.1B: Virtual value creation framework [10]

B. The functional drivers of value creation consist of customer value, customisation, strategic sourcing, core competence and the integrated value chain. Three foundational drivers provide support for these functional drivers. They are digitisation, infrastructure and environment. Jointly, these two drivers form a strategic framework the organisation may use to assess its value creation capability. Core elements of business theory in the functional drivers and core elements from IS/IT are integrated in the VVC. Though suited for an information rich commercial environment, this new model approach centred on the organisation's use of information does not seek the replacement of the other researchers' inputs in strategy and value creation but rather an integration into the said approach. So far known, no other model has been able to take such integrated path to intimately correlate with virtualisation building on digitisation, infrastructure and the prevailing ICT environment [10].

Since the long term existence of any firm anchor back to the existence of its customers, the VVC framework deliberately and unashamedly maintains customer focus. Converse to the demand of the short term enterprise goal of creation of competitive advantage without customer focus, the long-term goal of developing sustainable competitive advantage, customers' satisfaction and loyalty becomes of high demands. And as [10] rightly asserted, "*successful value creation is essential for building sustainable competitive advantage and its success is directly contributions to the shareholder's valuation of the firm.*"

Hales' concept of VVC [10] agrees with [3] in his research on the new logic of value creation which cited [16] development of a model for a virtual value chain. According to the research, value creation at any given stage of the VVC entails a series of five activities: gathering,

selecting, organizing, synthesizing and distributing information which in combination with the VVC forms a value matrix that enables enterprises to effectively recognize customers' value and satisfy them more efficiently.

Values being a subjective issue depicting customers' perceived value which recognizes the features of a product or service that are the most imperative and thus most extremely valued by the customer. The enterprises' value proposition need to mirror the set of perceived value requirements of the customer by ensuring full customer participation in the development and production processes, thereby reducing the risk of producing inappropriate products and services. It is the goal of the enterprise to make that match more consistently and profitably than its competitors [10].

In order for the organisation to acquire the best available pool of resources competencies, strategic sourcing and core competence are necessary. An integrated value chain depends on information to integrate both suppliers and customers into the logistics and transformational processes in order to ensure efficient production and delivery of mass customised. Virtual organisation (VO) use of ICT to integrate these sources of value creation (discussed in detail in chapter two) into a single coherent strategy is the basis of the functional drivers of VVC [10].

The existences of the three essential foundational drivers provide needed support to the value creation process. Firstly, digitisation of the firm's value proposition and its transformational processes set limits to the degree to which information can be utilised to create value and gain competitive advantage. Secondly, adequate ICT infrastructures to guarantee the required connectivity with high speed information transmission across the value networks occurring in a timely and secure manner should be in place to facilitate and manage effective capture, storage, and manipulation of information, and swift and seamless occurrence of information integration organisational, and internetwork based applications should also be in place. Finally, [10] added "*the extent that information and ICT can contribute strategically and operationally to value creation is a matter of managerial attitude within the enterprise, the value chain and industry"*. Though it is vital for VVC that management be familiar with ICT strategic capabilities, yet successful value creation also entails an integrated consortium of clients, partners and suppliers in a VO formation to ensure that the best possible mixture of resources are used to produce customised best value customers products and services at all times.

C. *The relevance of information as upheld by [10] in determining commercial relationships, defining organisation structures, developing information based products and services, and creating a new business environment generally can never be overemphasised. This implies the need for a new set of management concepts needed to justify the creation of value. VO is, therefore, one such concept providing VVC model that sits properly within that paradigm. Although the VVC is somewhat speculative, it is firmly grounded in existing theory and practice and it provides a realistic description of the organisations instant capacity in corporate value*

creation as well as a recommendation of its value creating potential [10].

D. 2.2 Definitions and assumptions

Book Value-

"Book value is the worth of a company based on its financial statements. This means the net asset value of a company [19].

Electronic Marketplace-

Electronic Marketplace is a virtual, online environment (a website, for example) that allows individuals or firms to conduct business electronically [6].

Information-

Information represents data offered in a form that is valuable in a decision-making activity. The information diminishes uncertainty and enhances knowledge about a given area of concern, hence useful to the decision maker [9].

Information Systems-

Information Systems are the formal group of processes that, operating on a collection of data structure according to the needs of a company compiles, elaborates and distributes part of the information necessary for the decision-making processes necessary to carry out the business functions of the company [2].

Information Systems are a "man-made system that consists of an integrated set of computer-based and manual components established to facilitate an organisation's operational functions and to support management decision making by providing information that managers can use to plan and control the activities of the firm" [9].

Knowledge Management-

Refers to strategies and processes designed to identify, capture, structure, value, leverage, and share an organization's intellectual assets to enhance its performance and competitiveness. It is based on two critical activities: (1) capture and documentation of individual explicit and tacit knowledge, and (2) its dissemination within the organization [6].

Marketplace-

Alternative term for market: It is actual or conceptual place in commercial world where forces of demand and supply operate, and where buyers and sellers interact (directly or through intermediaries) to trade goods, services, or contracts or instruments, for money or barter. Markets include mechanisms or means for (1) determining price of the traded item, (2) communicating the price information, (3) facilitating deals and transactions, and (4) effecting distribution. Marketplace for a particular item is made up of existing and potential customers who need it and have the ability and willingness to pay for it. All markets, ultimately, consist of people [6].

Market Value-

"Market Value is the price at which buyers and sellers trade similar items in an open marketplace [19]."

New Economy-

'An economic model founded on the set of interrelated policies observed to achieve maximum sustainable long-term growth, in which networked information technologies dramatically increase the amount and value of information available to individuals, firms, markets and governments, allowing them to make more effective choices, and leading to superior performance' [12].

Project-

Project is a temporary endeavour undertaken to create a unique product, service, or result [15].

Project Management-

Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements. Project management is accomplished through the application and integration of the project management processes of initiating, planning, executing, monitoring and controlling, and closing [15].

Value-

Value refers to "precise signification; import; as, the value of a word; the value of a legal instrument." Or Value could be defined as "Esteem; regard." [5].

Virtual Organisation / Virtual Enterprise-

A temporary consortium of partners from different organisations established to fulfil a value adding task, for example a product or service to a customer. The lifetime of a Virtual Organisation (VO) is typically restricted: it is created from the network for a definite task and dissolved after the task has been completed [20].

3.0 Methodology

The research questions of this study concentrated on the process of creating corporate value in an enterprise by the deployment of VO system in the global marketplace. The identification of needed variables of sources of value in the enterprise as well as description of the degree of operation of these value drivers (key parameter) aided this study.

This research adopted both Positivist and Quantitative approaches which has to do with quantity and measurement as well as interaction with stakeholders [13]. The researcher used questionnaires and observation instruments of the survey methods of research. This approach is considered competent as data collected was randomly sampled from the identified population. There was consistency in the characteristics of the population with regards to the research question.

3.1 Sampling Frame

The population of this study comprised stakeholders from some selected organisations with those in a project based setting inclusive. The selected organisations were those in or with prospect of multi-organisational project management, some form of strategic outsourcing, suppliers, and virtual collaborative venture with other enterprises.

The sample population was 200 people which comprised stakeholders sampled from the following organizations shown in Table 3.1 below:

Table 3.1 Table showing the components of the sampledpopulation

Type of Organisation	No of Respondents
Virtual/ Network Organisations	100
Organisations with Outsourced projects	50
Multi-organisational collaborative firms	40
Others	10
Population (Total)	**200**

3.2 Respondents

Of the 200 population sample, 133 respondents were selected to constitute the required respondents using Yaro Yammeh's standard formula as cited by [1] for the determination of the sample size from the population. This is given as:

Standard Formula and Determination of Sample Size

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size
N = study population
e = level of significance chosen analysis.

The researcher has chosen 5% to represent the level of significance. This mean that n will be determined as:

$$n = \frac{200}{1 + 200\,(0.05)^2}$$ Thus n = 133,

Therefore n = 133

Figure 3.2: Standard formula for the determination of sample size [1]

They included 80 Employees, 10 Shareholders, 20 Customers, 13 Suppliers and 10 Strategic Partner Organisations including local and international partners. These constitute a fair representation of the Stakeholders. Thus, of a total of the hundred and thirty- three copies of the questionnaire distributed by the researcher,

only 45% (representing a total of 60 copies) were properly filled and returned.

3.3 Method of Data Analysis

The statistical data has been sorted, presented and analyzed according to the research's interest using Microsoft Office Excel computer software package. The frequency distribution and percentage method of analysis were used to analyze the data. Just as [11] puts it "the percentage method is widely used in managerial and social researches". According to him the formula is:

Standard formula/ determination of percentages

$$A\% = \frac{a \times 100}{N}$$

Where:

A% = the percentage of responses to one option over the total responses to the item.

a = number of responses to one option of each item of the questionnaire

N = total number of responses to an item.

For example, assume the total number of responses (N) is 100 and the number of responses to one option (a) is 50 then.

$$A\% = \frac{a \times 100}{N} = \frac{50 \times 100}{100} = 50.$$

Figure 3.3A: Showing standard formula and determination of percentages

Also, the hypotheses drawn from the research questions were tested in the relevant section of this paper using the chi-square (X^2), which measures the differences between the expected frequencies and the observed frequencies. It has been calculated using the formula

Standard formula of Chi-square value		
X^2	=	$\frac{E\,(Fo - Fe)^2}{Fe}$
Where: Fo =	Observed Frequency	
Fe =	Expected Frequency	
E =	Summation, (and the level of significance is 5 %.)	

:

Figure 3.3B: Showing standard formula for calculating chi-square

4.0 Research Questions and Hypotheses

4.1 Research Questions

The following research questions has been answered by this research paper:

- Is there any relationship between the size and degree of virtualisation of an organisation?
- Is there any relationship between the nature of business and the degree of virtualisation of an organisation?

4.2 Research Hypotheses

Sequel from the above research questions, the following research hypotheses sufficed and had been duly tested:

H_O: There is no relationship between the degree of virtualisation and the size of organisation and the nature of business

5.0 Data Presentation and Hypotheses Testing

5.1 Based on the Size of Organization

The statistical data on the frequency distribution of the respondents under the different classified sizes of organisation who responded to the measures of the degree of virtualisation are relevant in conducting this test. The data presented in table 6.1 following, provides the sum of the frequency of responses under the three degrees of virtualisation for this question set against the different sizes of organisation.

Hypothesis 1:

$H_{O\text{-}A}$: There is no relationship between the degree of virtualisation and the size of organisation.

Table 5.1: Frequency of response on degree of virtualisation against size of organisation

Size of Organisation	High	Medium	Low	Total
Small (10- 50)	0	12	9	**21**
Medium (50- 100)	32	52	10	**94**
Large (>= 100)	41	11	11	**63**
Total	**73**	**75**	**30**	**178**

Hint: *At Degree of Freedom = 4 and Significance level = 0.05, the Table or Critical Chi-square value = 9.49*
For details of the calculated value of Chi-square, refer to Test of Hypothesis 1: H_{O-A} in Appendix G.

Thus, the calculated value of Chi-square is 43.39. This is obtained from the calculations of the required expected frequency, and frequency deviation/ chi-square computation under Test of Hypothesis 1: H_{O-A} within Table A5.1a and Tables A5.1b respectively. Refer to Appendix A of this report for details.

Decision Rule:

Since the calculated value of Chi-square 43.39 is more than the tabulated value of Chi-Square 9.49 as graphically illustrated in Figure 5.1, the alternative hypothesis is hereby accepted. And so, there is relationship between the degree of virtualization and the size of organisation.

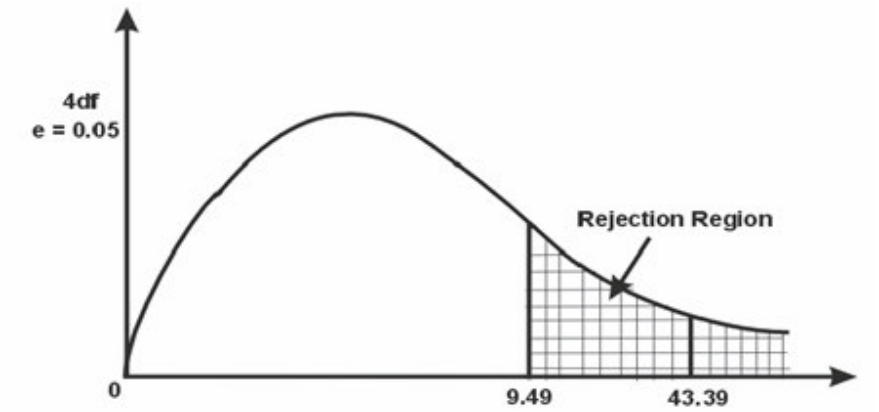

Figure 5.1: Graph showing the table and the calculated value of chi-square computation for hypothesis 1 (H_{O-A})

5.2 Based on the Nature of Business

The statistical data on the frequency distribution of the respondents under the nature of business who responded to the assessment against the degree of virtualisation are also relevant in conducting this test. Table 5.2 below contains the sum of the frequency of responses under the named three degrees of virtualization.

Hypothesis 2:

$H_{O1\text{-}B}$: There is no relationship between the degree of virtualisation and the nature of business.

Nature of Business	High	Medium	Low	Total
Education	4	18	2	**24**
Manufacturing	4	23	12	**39**
Service	44	21	7	**72**
Finance	23	7	3	**33**
Agriculture	0	6	6	**12**
Total	**73**	**75**	**30**	**180**

Hint: *At Degree of Freedom = 8 and Significance level = 0.05, the Table or Critical Chi-square value = 15.51*

For details of the calculated value of Chi-square, refer to Test of Hypothesis 2: $H_{O\text{-}B}$ in Appendix G.

Table 5.1: Frequency of response on degree of virtualisation against nature of business

Also, the calculated value of Chi-square is 60.38. This is obtained from the calculations of the required expected frequency, and frequency deviation/ chi-square computation under Test of Hypothesis 2: $H_{O\text{-}B}$ within Table G5.2A and Tables G5.2B respectively as detailed in Appendix A of this paper.

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Decision Rule:

Since the calculated value of Chi-Square **60.38** is more than the tabulated value of Chi-Square 15.51 as graphically illustrated in Figure 5.2, the null hypothesis is hereby rejected. This implies an acceptance of the alternative hypothesis with the conclusion that there is relationship between the degree of virtualisation and the nature of business

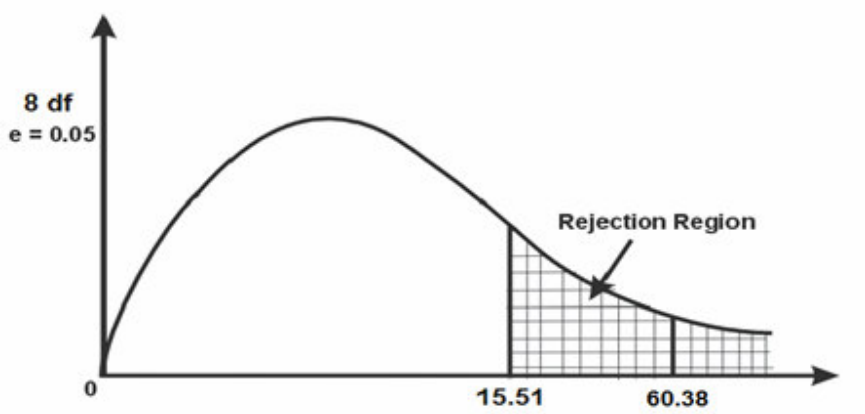

Figure 5.2: Graph showing the table and the calculated value of chi-square computation for hypothesis 2 (H_{O-B})

6.0 Analysis of Results

Therefore, evident from the first test result, that there is relationship between the degree of virtualization and the size of organization, it is justifiable that as organizations increase in size, their activities and business processes broadens requiring more data/ information with effective information management to create better knowledge of the existing opportunities and challenges in the business environment. In order to properly manage these situations and justify corporate purpose of existence, effective and efficient IS management integrated with exploitation of available complimentary expertise under the platform of advanced ICT usually become a mandatory requirement. The result of this among most medium and large-sized organisations is the need for break the barrier of geographical restrictions with dispersed workers, including mobile workers, road warriors, teleworkers, and those in remote offices, needing to secure business and collaboration to ensure same level of 'presence' and service as in working within the geographical company premises with their office colleagues. This need satisfaction has propelled many medium and large-sized organisations to introduce secure real-time, anytime, and anywhere business operations and communications to these collaborative workers. The implication of taking advantage of this form of collaboration for small size organization include maximum impact and improvement on their corporate image and profile, bring them to the global arena as key players in the competitive market thus creating outstanding customers virtual value and shareholder's wealth.

Furthermore, our second hypothesis test proves that there is relationship between the degree of virtualization and the nature of business. Justifiably, this could be investigated by due consideration of the information needs or dependence of

organizations of these nature. Among service, finance and educational organizations where business inputs and outputs are that of the intangibles for example, higher dependence definitely will be on raw data and information. The need for effective and efficient IS causes the urgency for ICT infrastructure and environment; as well as some inter-organizational or international IS that would necessitate alliance, merger, or collaboration among complementary businesses so as to keep concerned organizations strategically positioned, visible, accessible, relevant and competitive in the global marketplace harnessing its incurring enormous value and benefits. Therefore, the satisfaction of customers value proposition, shareholder wealth, and overall stakeholder value creation remain an urgent factor of the degree of virtualization, and strategic partnership formed for efficient services, pulling of core competences and knowledge management to sustain high level of competitiveness within the changing market conditions.

7.0 Conclusions and Recommendations

7.1 Summary of Findings

The degree of implementation of the Virtual Organization strategy (such as virtualization technologies) increases as organization's size increaxes, and this has a direct relationship with the extent to which corporate value is created to ensure the visibility and competitiveness of the organizations in the globally digitized marketplace. The improvement on the degree of virtualization and value creation as organizations move from small to medium-size reflects the execution of a business strategy to integrate inherent organizational and technological solutions, like management of workflow systems, supply chain management with electronic data exchanges, and electronic marketplace rather than seeking for concept of popular, standalone solutions. Smaller-sized organizations capitalize more on the value creation strategy of VO than most larger-sized organizations do so as to secure the strength and corporate image of the highly competitive firms to their advantage.

The results on the degree of virtualization, and experience of the functional VVC drivers (i.e. strategic sourcing, customized value proposition, core competence, and integrated value net) among the medium and large-sized organizations, as observed during the research field survey, suggest the existence of some form of virtual groupings, such as virtual network organizations and virtual teams. Researchers' observations also affirm this with the presence and reliance on mobile workers, road warriors, and tele-workers in the said organizations. Evident among the different sizes of organizations is the fact that various degrees of virtualization can be notable to exploit the benefits evolving by this new concepts.

The nature of business of an organization determines the degree of virtualization and the resultant corporate value creation. Virtualization in VO begins with digitization and ICT infrastructural support: the more information based an organization is, the

more its tendency for higher degree of virtualization and the more efficient its value creation strategy is.

7.2 Conclusion

The virtual value creation framework offered by Hales (2005) has been described, demonstrated and prescribed as a multidisciplinary model that fits properly within the paradigm of instant capacity and potential in corporate value creation to facilitate corporate visibility and sustainable competitiveness for organizations in the digitized marketplace. Its focus on customer value makes it unique not just for gaining but sustaining competitive advantage in a rapidly changing business environment.

7.3 Recommendation

From the output of this research, findings and conclusions so far drawn, the following recommendations are proposed:

- Virtual Organisation systems should be incorporated and practised as core organisational culture in Nigeria to promote multi-organisational collaboration and virtualisation by enterprises wishing to sustain their competitive edge in this emerging digitalized marketplace.
- Multinational and Project based organisations should maximize the inherent potential benefits for economic value creation through the establishment of VO to digitise all project deliverables for efficient inter-organisational IS management, using the support of their existing ICT infrastructure.
- Partners in VO systems should formalize their agreement to create better understanding among all parties in the collaboration in order to instill and develop trust and promote greater supply of core competencies.

7.4 Recommendation for Further Research

It is recommended that the follow-up of this research be conducted with the analysis and design of how to develop the next generation Operating Systems (OS), which are capable of providing VO management support in a secure and scalable way, should be sufficiently undertaken.

Further studies should be focused on VO formation under the cloud computing framework for reduced corporate IT expenditure and increased participation in the virtual market place.

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Appendix A:
CHI-SQUARE CALCULATION

The tables below details the steps and results from the calculation of the expected frequencies, frequency deviation, and chi-square computations for the section 5.0 of this report: Presentation and analysis of data according to tests of hypothesis.

TEST OF HYPOTHESIS 1:

H_{O-A}: There is no relationship between the degree of virtualisation and the size of organisation.

Please refer to the table for frequency of response on degree of virtualisation against size of organisation (represented by Table 5.1) of this report.

$$Fe = \frac{RT \times CT}{N}$$

Where:
RT = Row total
CT = Column total
N = Grand total
Fe = Frequency Expected
The Degree of Freedom is given by (R-1)(C-1)
Level of significance is taken at 5%

Degree of Freedom (R-1) (C-1) = (3-1) (3-1) = 4

Chi-square for 4df at 0.05 level of significance (tabulated value- Refer to Appendix F) = **9.49**

Calculation of all Required Frequency Expected

$$Fe;\ R_1C_1 = \frac{21 \times 73}{178} = 8.61$$

$$Fe;\ R_1C_2 = \frac{21 \times 75}{178} = 8.85$$

$$Fe;\ R_1C_3 = \frac{21 \times 30}{178} = 3.54$$

$$Fe;\ R_2C_1 = \frac{94 \times 73}{178} = 38.55$$

$$Fe;\ R_2C_2 = \frac{94 \times 75}{178} = 39.61$$

$$Fe;\ R_2C_3 = \frac{94 \times 30}{178} = 15.84$$

$$Fe;\ R_3C_1 = \frac{63 \times 73}{178} = 25.84$$

$$Fe;\ R_3C_2 = \frac{63 \times 75}{178} = 26.55$$

$$Fe;\ R_3C_3 = \frac{63 \times 30}{178} = 10.62$$

Table A5.1a: Table showing the calculation of all required frequency expected

Fo	**Fe**	**Fo – Fe**	**$(Fo - Fe)^2$**	$(Fo - Fe)^2 / Fe$
0	8.61	-8.61	74.13	8.61
12	8.85	3.15	9.92	1.12
9	3.54	5.46	29.81	8.42
32	38.55	-6.55	42.90	1.11
52	39.61	12.39	153.51	3.95
10	15.84	-5.84	34.11	2.15
41	25.84	15.16	229.83	8.89
11	26.55	-15.55	241.80	9.11
11	10.62	0.38	0.14	0.01
Total				**43.39**

Table A5.1b: Frequency deviation/ Chi-square computation

Therefore, from the computation in the Table A5.1b above, the calculated value of Chi-square = 43.39.

TEST OF HYPOTHESIS 2:

H_{O-B} : There is no relationship between the degree of virtualisation and the nature of business.

Please refer to the table for frequency of response on degree of virtualisation against size of organisation (represented by Table 5.2) of this report.

$$Fe = \frac{RT \times CT}{N}$$

Where:
RT = Row total,
CT = Column total,
N = Grand total,
Fe = Frequency Expected,
The Degree of Freedom is given by (R-1) (C-1), and
Level of significance is taken at 5%

Degree of Freedom (R-1) (C-1) = (5-1) (3-1) = 8
Chi-square for 8df at 0.05 level of significance (tabulated value- Refer to Appendix F) = **5.51**

Calculation of all Required Frequency Expected

Fe; R_1C_1	=	$\frac{75 \times 24}{180}$	=	10
Fe; R_1C_2	=	$\frac{75 \times 24}{180}$	=	10
Fe; R_1C_3	=	$\frac{30 \times 24}{180}$	=	4
Fe; R_2C_1	=	$\frac{75 \times 39}{180}$	=	16.25
Fe; R_2C_2	=	$\frac{75 \times 39}{180}$	=	16.25
Fe; R_2C_3	=	30 x 39		

$$\text{Fe; } R_3C_1 = \frac{75 \times 72}{180} = 6.5$$

$$\text{Fe; } R_3C_2 = \frac{75 \times 72}{180} = 30$$

$$\text{Fe; } R_3C_3 = \frac{30 \times 72}{180} = 30$$

$$\text{Fe; } R_4C_1 = \frac{75 \times 33}{180} = 12$$

$$\text{Fe; } R_4C_2 = \frac{75 \times 33}{180} = 13.75$$

$$\text{Fe; } R_4C_3 = \frac{30 \times 33}{180} = 13.75$$

$$\text{Fe; } R_5C_1 = \frac{75 \times 12}{180} = 5.5$$

$$\text{Fe; } R_5C_2 = \frac{75 \times 12}{180} = 5$$

$$\text{Fe; } R_5C_3 = \frac{30 \times 12}{180} = 5$$

$$\text{Fe; } R_5C_3 = \frac{30 \times 12}{180} = 2$$

Table A5.2a: Table showing the calculation of all required frequency expected

Fo	**Fe**	**Fo – Fe**	**$(Fo - Fe)^2$**	$(Fo - Fe)^2 / Fe$
4	10	-6	36	3.6
18	10	8	64	6.4
2	4	-2	4	1
4	16.25	-12.25	150.06	9.24
23	16.25	6.75	45.56	2.80
12	6.5	5.5	30.25	4.65
44	30	11	121	4.03
21	30	-9	81	2.7
7	12	-5	25	2.08
23	13.75	9.25	85.56	6.22
7	13.75	-6.75	45.56	3.31
3	5.5	-2.5	6.25	1.14
0	5	-5	25	5
6	5	1	1	0.2
6	2	4	16	8
Total				**60.38**

Table A5.2b: Frequency deviation/ Chi-square computation

Thus, resulting from the computation in the Table A5.2b above, the calculated value of Chi-square = 60.38.