
The Impact of Software Development Outsourcing on the Growth of the IT Sector in Developing Countries

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Abstract: This paper investigates the impact of Software Development Outsourcing on the growth of the IT sector in developing countries, especially Nigeria. It identifies major software outsourcing drivers and studies the relationship between them and the growth of the IT industry. The study became necessary owing to the obvious decline in IT implementation in most developing countries despite exponential growth of the sector in some developed countries of the world where outsourcing is practiced, and the attendant economic boast in those nations. From a review of existing literature focusing on selected small and medium scale enterprises and IT firms in Nigeria, five driving factors behind the adoption of software outsourcing were identified which include: cost saving/reduction, delivery time, technical skills, software quality and risk management. Randomly gathered data were analysed using multiple regression and the ANOVA test. The aim was to evaluate the collective effect of these driving factors on the level of outsourcing by the various IT firms in Nigeria and the consequent growth of the sector in the country. It was discovered that the five factors collectively contribute to software development outsourcing and the growth of the IT industry. However, it was discovered that three factors, technical skills, risk management and software quality were the most significant going by the result of the t-test. It was therefore concluded that software development outsourcing has impacted the growth of the IT sector and the level of its implementation can be further increased. Government and the organised labour should make concerted effort towards the development of IT firms by encouraging software outsourcing. This will enhance efficiency of indigenous IT firms and inspired them to obtain up-to-date skills that meet globally accepted standards. In the long run, it will translate to increase in revenue potential.

Keywords: Software Outsourcing, Developing Countries, IT Industry, Software Quality, Delivery Time

1. Introduction

1.1. Software Development Outsourcing

Software is another name for computer programs. Outsourcing means passing the responsibility of developing the software to a vendor [14]. According to Gurbaxani [13], IT software outsourcing refers to the use of third party vendor to provide IT services that were previously provided internally. For companies finding the project running behind schedule or exceeding budget, outsourcing is an option. The entire project can be outsourced or a portion of the project can be outsourced. The major question that is frequently asked is whether to outsource the activity or to carry out the

development in-house. Several factors are considered before making a decision in this regard. The decision is made based on cost benefits and the value addition [14]. Skills available and time of delivery are the other factors considered before making a decision for or against outsourcing. With the emergence of cloud computing, IT software outsourcing is gaining stronger momentum in most developed countries around the world [10]. The major reason for software outsourcing is the potential for cost reduction due to vendors' production cost advantage.

Software is required for the effective use of ICT - in PCs, handhelds, mobile phones, the Internet, GSM, wireless telephony, network devices, telecom equipment, etc. In most developing nations of the world, Nigeria inclusive, local

software industry needs to grow in order to make the required impact and to cope with current trend globally. In Nigeria for instance, System software - operating systems, network software, development tools - is 100% imported. The same goes for packaged applications (word processing and spreadsheets). This is not too unusual - in other countries, most System software and packaged applications in use are those manufactured by global industry leaders like Oracle and Microsoft for reasons of support, manufacturer's Research & Development (R&D) investment and compatibility. The most obvious opportunities for the local software industry therefore are the specialized application development markets producing software for accounting, legal, banking, financial services, personnel, payroll, information management, games, etc.

With the economy driving towards globalization, many companies are hard bound to gain a competitive advantage by cutting their costs, optimizing efficiency, and providing better customer service, all this against the backdrop of limited time. Hence software Outsourcing has become an increasingly popular trend among many IT companies and this has proven in many cases to be a great success for companies in Nigeria and indeed the entire world, where globalisation has forced many companies to constantly improve their competitive edge.

Software Outsourcing is still at its developing phase in most developing countries of the world and the practice is yet to gain widespread acceptance in spite of the frequent media mention. Ironically, it has been observed that in these countries, software outsourcing has often become more expensive than in-house development by full time-staff in absolute terms. Meanwhile global consideration in term of cost of expertise and flexibility would show that outsourcing always provides economic value if the right provider is engaged. Many people who would otherwise be unemployed have secured employment through outsourcing among several other related social benefits of software outsourcing as a business model.

There is need therefore to ascertain the level of impact of the major driving factors of software outsourcing and their relationship to the growth and implementation of IT in Nigeria and in other developing countries of the world.

1.2. Objectives of Study

The main objective of this study is to examine the impact of software development outsourcing to the growth of the IT industry in Nigeria and other developing countries of the world. Specifically, the study strives to achieve the following objectives:

1. To identify the nature of software development outsourcing practiced in Nigeria, challenges and prospects.
2. To analyze the significant effect of the software outsourcing drivers on the growth of the IT industry.
3. To ascertain whether software outsourcing has helped

boost efficiency of indigenous firms and inspired them to obtain up-to-date skills that meet globally accepted standards.

2. Theoretical Framework and Empirical Literature

2.1. Theoretical Framework

2.1.1. Development of Software Outsourcing – An Overview

Offshore software development outsourcing (OSDO) is an emerging concept in the IT industry which is geared at developing high quality software at low cost into low wage countries. In OSDO, a contract-based relationship is established between the vendor(s) and client(s) organizations, whereby the vendor(s) organization may develop full or partial software for client(s) organization and take remuneration in return [4].

The software development outsourcing activities has been in existence for more than ten years [4]. Development of offshore software outsourcing has seen India, China, Ireland and Russia as the prime outsourcing vendor countries, while the key software outsourcing client countries are the USA, the UK and Japan that grant outsourcing software projects to the above mentioned offshore countries [27]. In the offshore software development outsourcing, India is considered as the leading country providing in offshore services than other countries [24].

OSDO is a famous and innovative business strategy adopted by many organizations in developed countries by outsourcing their software development work to low-wages countries [16].

In the early stage of computing, software development was considered an internal affair by almost all technology firms. Those companies tended to have their own development departments producing software to meet internal demands. This approach is known as 'in-house development'. During the 1990s, software development outsourcing not just replaced the in-house development, but also became one of the fastest growing industries around the world. Most IT firms and IT related organizations have depended so much on outsourcing for quality software development.

Software development during the earlier days was of monolithic type, bestowing the task of hardware design and implementation, construction of operating systems, and development of application software on a single establishment. For monolithic simple applications, software architecture is not a major issue. But now different types of software are required. Current software has to work in heterogeneous platforms on diverse protocols and to provide different application integration [14]. This necessitates different software architecture depending on the need. Architecture of web-based applications is different from that of scientific or Enterprise Resource Planning (ERP) applications; architecture used for database-driven web applications differs from that used for developing static web

pages. ERP applications are driven by long-term objectives unlike scientific applications which concentrate on the accuracy of the result and their graphical representation rather than having well-defined and clear methods of strategic planning. ERP applications equally have facilities for measuring performance and to make comparisons with targets.

Globally, software outsourcing is growing at the rate of 20%-25% per annum, with little evidence of slowing [5]. Indeed, while most enterprises experience initial resistance, most technical issues are readily resolved and geopolitical risk is deemed insignificant after careful evaluation.

In Nigeria and in most developing countries around the world, the lack of standardization in software design has hampered easy integration with IT firms in developed countries and has made it difficult for small companies to compete in the software development market, thereby making only large software companies to enjoy a monopoly. However, the standardization of computer hardware platforms and operating systems, which led to the emergence of the PC technology in the early eighties somehow created a level play ground for all categories of companies and economies to become active in the software development market [16].

2.1.2. Outsourcing Practice in Some Developed Nations of the World

For several decades, the predominant supply chain model for software development was vertically integrated. Each member of a supply chain was considered a part of the same industry. All the ancillary activities that support the supply chain directly or indirectly were included. Steadily, software products became complex, the scale of operations increased and management of entire operations within one corporation became less feasible. This resulted in the increasingly popular use of outsourcing and has resulted in vertical disintegration of corporations and supply chains. As technology and communication improved; as trade restrictions increased; and as the gap in wages between developed and developing countries widened, software outsourcing began to move off-shore. In 2002, for instance, India had 90% of U.S. organizations' Information Technology (IT) off-shore outsourcing business.

China looms as India's biggest competitor, although some consider the two as non-comparable at this time. Other countries considered to be attractive at the off-shore software outsourcing sites include Malaysia, the Czech Republic, Singapore, the Philippines, Brazil, Canada, Chile, Poland, Hungary, Russia, and Vietnam [16].

One noticeable trend, although more of a paradox, is that while the hardware and software development tools are getting cheaper, the nature of software development processes are becoming more expensive as a result of the growing and seemingly insatiable requirements of users, hence the search for means to reduce the time and cost of development, without compromising system functionalities by developers.

According to Papaioannou [28], the search for the so called silver-bullet has led to the emergence of many noble paradigms and approaches to the software development processes, all with the objective of producing software products that are accurate, reliable and cost effective. Some of these paradigms range from functional development, (based on modularization), object-oriented software engineering, agile approaches (Extreme programming etc.), Component-based software engineering, aspect-oriented programming and so on, leaving the developer with the choice of adopting the most suitable approach for his particular situation [23].

The trend of globalization and the Internet has initiated a massive drive toward offshore development (outsourcing) which is the practice of moving software development and other IT work such as project analysis, coding, testing and maintenance in developed countries to software companies in the low-wage areas. One software development approach that makes itself amenable to this kind of situation is component-based software engineering (CBSE).

Component-based software engineering is a new paradigm for software development that is gaining increasing relevance both in the industry and the academia. The relevance stems from the opportunity it offers software developers to model software systems at a level of abstraction higher than the object level [29]. The notion is that software intensive systems can be built by the composition of various reusable parts (components). These components are able to integrate and interact with one another at run time in order to achieve the requirements of the overall system [7]. A software component is a unit of composition with contractually specified interfaces and explicit context dependencies only. A software component can be deployed independently and is subject to composition by a third party. Therefore acquiring a proficiency in the use of modern trends of software engineering like CBSE, will no doubt boost the potentials of any establishment as an offshore outsource service provider.

The trend started in the 21st century with the shifting western call centers to India. But later, companies started to build their entire software development teams. For an interval, India was the only best option to outsource software development. Through oligopoly however, Bangladesh, China, Philippines and Pakistan started offering the same services and created market competition with more options. The practice of offshore software outsourcing has evolved over the years. It started with an aim based on transaction for cost economics, as the reason earlier was to save cost as well as externalization. However, with the passage of time, this grew with resource based view and moving from low value service outsourcing to high value service outsourcing depending upon the need as well as availability of resources.

The market structure of global software industry is dominated by advanced software enterprises in countries like, US, Japan, UK, France, and so on. But major changes are triggered in such monopolized software industry. Today, many countries, including India, Israel, and Ireland, successfully entered the global software market and joined

the ranks of software exporting countries. Encouraged by India's success, many countries among transitional economies and developing nations, are supporting software industry as their strategic industry to accomplish economic development [9]. Many countries in East Asia like Malaysia, the Philippines, and Vietnam are joining the stream. Consequently, market size of offshoring is growing rapidly.

2.1.3. Nature of Outsourcing Practice in Nigerian IT Industry

Nigeria boasts of a huge mass of ICT services providers and can affect nations due to her size, entrepreneurial spirit of innovation, and a large deposit of Software Engineers who are able to satisfy the needs of customers at the lowest possible price. Outsourcing in the software development industry cannot be considered to be less important compared to other sectors such as the financial institution, the oil industry, and so on where various engineering models are also used to make tasks and computations easier and qualitative. Software is at heart of the global knowledge economy and in recognition of the importance of software, Nigerian government in conjunction with Nigerian software practitioners developed the Nigerian Software Development Initiative (NSDI). In Nigeria, System software – operating systems, network software, development tools and packaged applications (such as word processing and spreadsheets) – are 100% imported. This is not too unusual as in other countries, most System software and packaged applications in use are those manufactured by global industry leaders, e.g. Oracle, Microsoft, etc for reasons of support, manufacturer's Research & Development (R&D) investment and compatibility. Open Source Software (OSS) alternatives though deployed and growing locally do not command significant market share.

Against this backdrop, the most obvious opportunities for the local software industry exist in the specialized application development markets – producing software for various sectors and fields such as accounting, legal, banking, financial services, personnel, payroll, information management, games, etc. However, the local software industry faces the challenge of patronage and growth. Local developers are losing out due to ignorance of foreign policies and opportunities. Presently the Institute of Software Practitioners of Nigeria (ISPON) launched a campaign to raise significant funds for establishment of a robust software industry for Nigeria.

According to Khong [19], local content development is a major concern for the IT industry. Even though infrastructure availability has improved very little local content is produced or involved in the increased IT activities. Improved infrastructure has served to increase the consumption of foreign software and other imported IT products and services.

2.2. Benefits of Software Development Outsourcing

Software development Outsourcing offers many benefits, to client organizations in the developed countries, including access to skilled sound human resource; high quality

software development and low cost offshore resource options. Cheaper resource options help client organizations to reduce their baseline costs; this involves the downsizing of more expensive onshore resources to be replaced with cheaper offshore resources [12].

Other benefits of outsourcing include:

Lower Operating Costs: Cost of operation is drastically reduced. For example, you do not need to purchase and maintain necessary equipment for your new employees and training costs can also be saved. This can enable to small- and medium-sized IT companies to compete favourably with the larger IT enterprises.

Time-efficient project accomplishment: A company might not have enough specialists with necessary skills to complete a particular project within the deadlines. Hiring more skilled personnel as staff just to complete the project may be an expensive option by management. In this case, it is better and convenient to use IT outsourcing.

Skills Acquisition: An outsourcing company could provide its partners with specific skills it lacks but which are vital to accomplish separate project sections critical for the business process.

However Offshore Software Development Outsourcing is not a risk-free activity. Research has shown that some companies that tried outsourcing sometimes failed to realize the expected outcomes [5]. Nigeria as a developing country can catch in to this global trend of exporting software development services to industrialised and developed nations of the world to improve their economy and strengthen their IT sector.

2.3. Challenges of Software Outsourcing in Nigeria

Some of the obvious challenges to an effective software development outsourcing and service delivery in Nigeria include but not limited to the following:

- i. It could be complicated and time-consuming to come and meet face-to-face with an outsourcing vendor working from distant locations. Time zone difference may also be a considerable obstacle. However, this may no longer be a major problem with the possibility of videoconferences, Skype calls and other means of telecommunication around the world.
- ii. For a successful implementation of Software Outsourcing, it is absolutely vital that a highly competent and dedicated manager be constantly available in order to communicate with the vendor and control the development process in stages. Most times, this is unavoidably absent.
- iii. **Education and Language Barriers:** Whereas the IT specialists and Software Engineers around the globe may be highly competent, sometimes they may lack the necessary language skills and education for global integration and interaction.
- iv. **Cultural Differences:** It might be challenging sometimes because of troubles in mutual understanding and business ethics differences. Companies need to learn as

much as possible about the vendor's country — culture, business traditions, legislation and choose the one suiting them best. For example, outsourcing to Ukraine might be a good choice while its culture is very close to European especially the Western parts.

2.4. Brief Review of Empirical Literature

Carmel [9] reviewed software outsourcing issues associated with the establishment and management of outsourcing relationships. With more companies outsourcing their software operations, this relationship has started attracting research interests. The increased research interests is also reflected in the work of (Ali-Babar [2]) on outsourcing failures and on how outsourcing relationships can be made successful. Major conclusion from the reviewed literature affirms that success or failure of software outsourcing mainly depends on the management of relationships between client and vendor.

In spite of the research work carried out by Carmel [9] and Ali-Babar [2], there is still need to in-depth study into the management of offshore software outsourcing relationships. Kern [15] suggests that client-vendor relationship is one area in outsourcing that has received the least research attention. They suggested a proper study into the relationships and the characteristics that describe such relationships. There have been numerous calls for more research in this aspect of outsourcing [21]. The problem of lack of research in software outsourcing relationships contrasts sharply with the volume of research in other disciplines which focused heavily on relationship issues. For example, the organisational management, strategy and social science literature includes a great deal of research attention on managing a variety of different relationships [20]. Research in other disciplines has identified trust as the most critical factor for the success of any human relationship. Therefore it is reasonable to assume that trust is also important in software development outsourcing relationships. Nevertheless, few research studies have investigated trust in software outsourcing. An example is Lander [22] and Sabherwal [30]. These studies have recognized its importance and called for more extensive empirical studies to extend current understanding of trust in software outsourcing relationships.

3. Methodology

3.1. Model Specification

To investigate the impact of software development outsourcing to the growth of the IT industry in Nigeria, we employ the multiple regression model:

The regression analysis carried out showed a relationship between the Independent variables (X_i) and the Dependent variable (Y) as follows:

$$Y = a_0 + a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 \dots + a_nx_n + \epsilon_1 \quad (1)$$

Where Y = dependent variable

X_1, X_2, \dots, X_n are independent variables.

a_0 = a constant value of Y when all X values are 0.

a_1, a_2, \dots, a_n are net regression coefficients.

For instance, a_0 measures the change in X_1 while holding the other variables constant.

ϵ_1 = independent and normally distributed random error term with mean zero.

In this study, five (5) major driving factors affecting software development outsourcing in Nigeria were identified. They include: Cost saving/reduction, delivery time, technical skills, software quality, and risk management.

Using the above regression model therefore, we can make the following assignments:

Y = IT growth

X_1 = cost savings/reduction.

X_2 = delivery time

X_3 = technical skills

X_4 = software quality

X_5 = risk management

Data Collection and Description

Primary data was collected using a structured questionnaire. The data was subjected to factor analysis using the IBM Statistical Package for the Social Sciences (SPSS), version 17. Hypotheses testing was carried out using two statistical tools, namely Analysis of Variance (ANOVA) and R-square test of association. Interpretation was given based on the research questions and hypotheses testing. The researcher adopted a non-probability sampling in order to obtain the opinion of his target population. The advantage of using non-probability sampling is that it saves time and cost. The selected clusters in this study include:

1. Internet and other service providers.
2. Internet technology/information technology consultancy firm.
3. Computer centers and cybercafés.
4. Internet technology/information technology training centers.

They were selected because the researcher felt that the clusters were large enough to represent the population and embrace the technical information the researcher was seeking to obtain. The affected population in this study includes IT experts from selected cities across Nigeria including IT executives, IT managers, and End users with the knowledge of ICT.

3.2. Hypothesis Testing

The following hypothesis was formulated and tested at 0.05 confidence level:

H_{01} : The collective drivers of software development outsourcing have no significant effect on growth of IT industry in Nigeria.

H_{A1} : The collective drivers of software development outsourcing have significant effect on growth of IT industry in Nigeria.

In order to test the null hypothesis H_{01} stated above the Analysis of Variance (ANOVA) was used which is based on

the F-Test. On the other hand, the F-Test was used to test the significance level of each outsourcing driver to the growth of IT industry in Nigeria.

4. Empirical Findings and Discussions

4.1. Descriptive Statistics

Table 4.1 shows the descriptive statistics of the IT growth in Nigeria with respect to the five (5) drivers of software outsourcing identified: Cost/savings reduction, Delivery time, Technical skills, Software quality, and Risk management. Notice that IT growth (Y) has a mean value of 27.8100 which also implies that software development outsourcing has a significant impact on the growth and development of the IT industry in Nigeria. However, this growth rate is neither very high nor very low. Also the value of IT growth is highest for standard deviation. The table also shows the mean value and standard deviation of all the factors affecting software outsourcing in Nigeria. From the table, risk management has the highest mean of 14.4400. This implies that of all the drivers of software development outsourcing, most of the respondents support the fact that risk management has a great

impact on the IT growth in Nigeria. Also, the value of IT growth is negatively skewed with fat-tails but the most of the driving factors of software outsourcing are normally distributed.

4.2. Determining the Relationship Between the Independent Variables and the Dependent Variable Using Pearson's Coefficient

Table 4.2 presents the results of the test for relationship between the dependent variable (Y) and the individual independent variables (X_i). From the result, it can be established that there are positive relationships between IT growth (Y) and the various variables considered in our study. The relationship between Risk Management and IT growth (Y) is shown with R=0.393. The relationship between other variables is also shown. It can be observed from the table that the relationship between software quality (X₄) and delivery time (X₂) had the highest link with R=0.486. From the test of hypothesis, the result reveals that there is no significant relationship between cost saving/reduction (X₁) and IT growth (Y), based on the level of confidence.

Table 4.1. Descriptive Statistics.

	Mean	Standard Deviation	Skewness	N
IT growth	27.8100	4.25618	-4.2541 (0.000)	100
Cost/Savings reduction	14.3100	3.99864	0.0508 (0.876)	100
Delivery time	14.1200	3.01940	-0.4753 (0.146)	100
Technical skills	13.5400	2.61858	0.1324 (0.685)	100
Software quality	14.3200	2.62805	0.1675 (0.235)	100
Risk management	14.4400	2.86505	0.0628 (0.345)	100

Source: Researcher's Computation (SPSS version 17.0)

Table 4.2. Link between the Independent Variable and the Dependent variables using Pearson's Coefficient.

		IT Growth	Cost Saving/Reduction	Delivery Time	Technical Skills	Software Quality	Risk Management
Pearson Correlation	IT Growth	1.000	.034	.308	.339	.378	.393
	Cost Saving/Reduction	.034	1.000	.001	-.103	.133	-.015
	Delivery Time	.308	.001	1.000	.139	.486	.455
	Technical Skills	.339	-.103	.139	1.000	.268	.310
	Software Quality	.378	.133	.486	.268	1.000	.428
	Risk Management	.393	-.015	.455	.310	.428	1.000
Sig. (1-tailed)	IT Growth	.	.367	.001	.000	.000	.000
	Cost Saving/Reduction	.367	.	.495	.154	.094	.443
	Delivery Time	.001	.495	.	.084	.000	.000
	Technical Skills	.000	.154	.084	.	.003	.001
	Software Quality	.000	.094	.000	.003	.	.000
	Risk Management	.000	.443	.000	.001	.000	.
N	IT Growth	100	100	100	100	100	100
	Cost Saving/Reduction	100	100	100	100	100	100
	Delivery Time	100	100	100	100	100	100
	Technical Skills	100	100	100	100	100	100
	Software Quality	100	100	100	100	100	100
	Risk Management	100	100	100	100	100	100

Source: Researcher's Computation (SPSS version 17.0)

4.3. Estimation of Relationship Model and Interpretation

Table 4.3. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.504(a)	.254	.214	3.77376

Source: Researcher's Computation (SPSS version 17.0)

The regression result from table 4.3 shows that: $R = 0.504$, and $R^2 = 0.254$

Predictor Variables = 5 (X_1, X_2, X_3, X_4 and X_5), and Dependent Variable = 1 (Y)

The overall predictability of the model is shown in Table 4.3, and it can be seen that R-square value for the model shown is 25.4% ($R^2=0.254$). This shows that the level of impact of software development outsourcing on the growth of IT industry in Nigeria can be predicted from the independent variables (cost saving/reduction, delivery time, technical skills, software quality and risk management). Thus software development outsourcing has 25.4% impact on the growth and development of the IT industry in Nigeria.

5. Conclusion and Recommendations

5.1. Conclusion

This research explored the impact of software development outsourcing on the growth of the IT industry in developing countries. The paper has further established the perception of various experts in the IT sector with regard to software outsourcing and IT growth and development. Results obtained showed that all the driving factors considered contribute to the growth of IT firms in Nigeria and other developing countries of the world in the following order of ranking (importance): Risk management, Software quality, Technical skills, Delivery time, and Cost saving/reduction. However, this research concludes that technical skills as well as software quality are the most critical drivers of software development outsourcing.

5.2. Recommendations

We recommend that IT experts in these countries should be encouraged to develop themselves and acquire technical skills in order to become more marketable in the emerging global trend. Software outsourcing presents exciting opportunities for most developing where IT is fast becoming predominant. If IT firms in developing countries are encouraged to participate in software outsourcing, the industry is bound to growth exponentially, and the sustained growth will translates to increased revenue potential.

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