Developing an Integrated Portal Management System for Artisans and Technicians in Nigeria: A Prototype System Development Approach

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ABSTRACT

Artisans and technicians play critical roles in major economies of the world. Unfortunately, Nigeria as a developing economy has fallen short in tapping into this large group of professionals in her desire to drive infrastructural and economic development through job and wealth creation. Coincidentally too, there is an absence of information on technicians and artisans in Nigeria as they hang around different parts of cities and rural areas in search for job while potential employers look for them. Through a rapid prototyping methodology, this study developed a web based information system for technicians and artisans in Nigeria using Nyanya area in the Federal Capital Territory as a pilot. The interfaces are user-friendly and simple. Built using PHP and MySQL database management system, the portal have supports for technicians and artisans' registration, job poster advertisement, interfaces for searching and applying for available jobs. It equally provide prospective customers access to a database of skilled personnel for specific need based on location, qualification, specialization, relevant experience and other criteria as the case may be.

Keywords: Portal, *Information system, artisans, craftsmen, technician, prototype.*

INTRODUCTION

Technicians and artisans also referred to as handymen or craftsmen have been in existence from time immemorial. They are responsible for the creation or crafting of quality items for either household or industrial use. These professional groups have been identified to have had a sizable contribution to the technological and industrial advancement of countries and make up a global economy averaging $32 billion.

In Nigeria the informal sector which makes up an estimated 30% of the populace is largely made up of technicians and artisans. This professional group is made up of a heterogeneous mix of disciplines which possess skills developed either via informal learning such as apprenticeship or by undergoing formal vocational or technical trainings in various public and private institutions.

The economic slowdown which necessitated a drive by the Nigerian government for infrastructural development and advances in Information technology necessitates the identification and registration of technicians and artisans to aid in the identification of available skillset and skill shortages.

The advances in Information Technology and rapid changes in the work environment has also lead to the appearance of new skillsets which have become critical to economic development leading to a widening gap in skillset supply and demand.

Unfortunately, there is a complete absence of an integrated information system that serves as database for the supply and demand of the artisans and technicians in Nigeria. The search for qualified labour force is usually through the referral system. This approach is time consuming, risky and provides insufficient options for the selection of qualified and competent professionals for specialized tasks.

In the Federal Capital Territory and in most towns in Nigeria, artisans converge on daily basis in certain locations, waste useful hours waiting for prospective employers in different unorganized ways. Identifying available skillsets and implementing skill acquisition and vocational training programs has been close to impossible due to the absence of centralized and detailed information on artisans. Efforts by government agencies are often targeted at the formal sectors of the economy often leaving the informal sector despite their critical nature and contributions to national gross domestic product.

This work developed a web-based technician and artisan's registration and information system. The developed system would serve as a centralized location for electronically accessible information for skilled technicians and artisans, their employers and the government in Nigeria. The system would provide a user-friendly interface for technician and artisan registration, credential verification and also serve as a reliable source of information for the general public on availability of skilled and verified technicians and artisans.

RELATED WORKS

Research by (Palei, 2015) and (Nedozi, Obasanmi, & Ighata, 2014) established the importance of infrastructure to economic development. Although Infrastructure is not the main indicator of economic development, it is one of the tools for regional development, as it affects directly or indirectly, socio-economic activities and creates the necessary conditions for achieving economic growth and development.

Artisans and technicians play a critical role in industry and, therefore, in facilitating infrastructure development and economic growth. As stated in (Artisan Alliance, n.d.) and (The Artisan As An Engine Of Economic Growth, 2015), the artisan economy is the second largest employer of labor after agriculture with an average annual earnings of approximately $32 billion. If it were a country it would have the fourth largest economy in the world, with the fourth-largest workforce. As explained by The Former U.S. Secretary of State John Kerry. While speaking at a forum at the State Department about the impact that artisans have on communities and on the global economy, artisans are widely acknowledged as an engine for poverty reduction and economic development (Foote, 2015).

Artisanal Training in precolonial times involved the transfer of skills through apprenticeship system. New entrants into the systems were accepted based on personal relationships including kinship, friendship and philanthropy, this is still obtainable today (Osasona 2005).

Various departments of the Federal Civil Services by setting up training schools initiated the formal capacity development of skilled workers. Training programs provided by these schools, while been tailored to the needs of the departments were also run by the departments that established them including among others Public Works, Post and Telegraphs Department, and Nigerian Railways. In a bid to make the training programs offered by some of the civil service departments more economical, The Yaba Technical Institute was established in 1948. Thereafter, Yaba College of Technology, Kaduna Polytechnic, Auchi Polytechnic, The Polytechnic, Ibadan among others were established, this was acting upon a recommendation for the expansion and upgrade of the Technical Institutes by The Ashby Commission in 1959.

Worried by the high rate of youth employment, the Presidency in 2006 in a bid to redirect the youths to technical and entrepreneurial skills for self-employment,

introduced through the NBTE, the inclusion of compulsory entrepreneurship education in all the polytechnics and monotechnics. Under this scheme students are made to undergo in addition to core technical courses of study, training in any other skill. This is expected to produce enough high-quality technical skills needed in the country if the students enroll in the skills that are essential for economic and social development in the country. (Esene, 2015)

Other youth empowerment programs Introduced by the government which have been designed as short term technical and vocational skills programs include; carpentry, iron bending, furniture youth training programs established by The National Directorate of Employment, National Poverty Alleviation Programme (NAPEP), National Youth Service Corps (NYSC), Industrial Training Fund (ITF) amongst others. These are programs with the objectives of providing the teeming population of youths with opportunities to acquire marketable and applied skills outside the school system (Gumbari, 2009).

All these programs have unfortunately been plagued with inability to make any significant impact, because these programs have been marred by high levels of corruption and politicization, they have failed consistently to meet the objectives set from inception. Little progress has also been made in the formal technical educational sector. As at 2012, there were only 159 recognized Technical Colleges in the country made up of 19 Federal, 137 State and 3 Private with a total enrolment of 92,216 as against 610,000 in secondary schools. As observed by (Gumbari, 2009), most of these technical colleges which are over twenty-nine years in age are made up of technical laboratories and workshops that are mostly ill-equipped and incapable of providing the requisite traying for the rapidly increasing population. There are 140 polytechnics/monotechnics to date, producing about 32,292 diplomats.

Due to the introduction of non-technical programs in the polytechnics / monotechnics, a high percentage (over 60%) of students who eventually graduate major in the Humanities and the Social Sciences (Gasper, 2011). The has ultimately led to slow industrialization which is caused by the dearth of artisans in the economy arising inability of these institutions to provide the much-needed high-quality technical skills (Okereocha, 2017).

Responding to this dearth of artisans, various state government and private organizations have initiated programs to breach the gap, such as the Lagos state annual training and retraining of artisans which make up more than half of jobs and business opportunities in the State (Bello, 2016), (Essiet, 2017), (The Vanguard, 2018) and the Dangote Group plan to spend about ₦30billion in the next five years in training 500,000 artisans in the construction industry (Gbonegun, 2018).

Different countries have put in place different techniques aimed at identifying and collating information regarding specific skillsets in their climes.

In the United State of America, there exist a sophisticated dataset and statistical infrastructural institutional design of labour market information systems (Sparreboom 1999). With this infrastructure, the government is able to have first-hand information on the number of Americans who are out of job at any given time, their qualifications, specialties, location etc.

In the Netherlands, deliberate policies have been put in place to identify and control the labour market. The system ensures that government institutions present only courses with sufficient opportunity for gainful employment. Courses are tied to workplaces. Through internship programmes, students identify and access prospective workplaces where their career progresses after graduation. In that country, the up-to-date labour related information including qualification structure, guidance for vocational labour force, regional policies are developed by the Netherland's National Centres for Expertise (Cras 2011).

The approach is different in New Zealand as reported by Baker (2011). Information JABU Journal of Science and Technology (2019, Vol 4:4) is accessed from official statistics like census. Consequently, census is carried out every five years to ensure accuracy. Household Labour Force Survey (HLFS) takes place quarterly to act as additional data gathering avenues. The organ of government responsible for compiling official statistics, present the report in tables and chart for use by the Industry Training Organisations is the IndustryTraining Federation in New Zealand. Australia employs multidimensional techniques. These include structured on-line telephone surveys, interactions with companies, focus group discussions, feedback which emanates from registers of industry skills councils, government planning information etc. Information accessed through these techniques is used in initiatives associated with workforce development, determination of skill shortage, provision of country-wide database and serves the need of labour market Paton (2011).

In 2009, India developed a labour market information system. The portal was built by collating information from government agencies and developing a model suitable to integrate all the data. Sector skill councils were required to build a portal that links all stakeholders in order to have an integrated system that cut across different sectors, ministries, states, sector skills among others Chenoy (2011).

In Canada the sector councils are responsible for tracking information on their labour market on a sector by sector basis using different techniques. While some councils adopt macroeconomic models, other make use of committees comprising of government stakeholders as well as the industry. Systems that make use of surveys, interviews for employers of labour and educational institutions are already in place. Some council carries out sector studies and other types of intelligence Cardozo (2011).

In South Africa, the development of frameworks for standardization and cooperation as it concerns the demand and supply of skill labour as well as the development of the development of systems and system interfaces had been put in place Roodt (2012).

From the forgoing, there is an absence of an artisan and technicians information system hence the gap.

MATERIALS AND METHODS

This work adopted the prototyping approach. The approach entails interactions with the intended users of application and the researcher. The users of the application software were involved in the development process of the application by making contributions to the requirements, specification document and prototype presented to their umbrella association leadership in such an iterative manner until the final application emerged. The more times the validation of the application takes place, the more the proof-of-concept becomes the final application. To ensure the information system is accessible to end users and to verify its functionality, a working copy of the information system was hosted temporarily on an online website "http://enigma.com.ng/taris" and feedback collected from test users. The rationale for the selection of the rapid prototype model is its support for early gathering of clients feedback, functionality, avoidance of re-design cost as well as the focus on the end product instead of its evolution,

HTML and PHP were used for the design of the Web Application. Oracle MySQL was selected as the database management system, due to its seamless integration with PHP. A database named "taris" was created and tables for the various entities of the information system were equally created as shown in Table 1.

Table 1: Database Objects Created

Object	Type	Description
admin	Table	Stores details about system administrators
User	Table	Stores records about Technicians and Artisans
company	Table	Stores records about job-posters (companies)
State	Table	Provides a list of States in Nigeria
Lga	Table	Provides a list of Local Government areas in Nigeria
Area	Table	Provides a list of Districts or Area in Nigeria
qualification	Table	Provides a list of Qualifications related to Technicians and Artisans in Nigeria
discipline	Table	Provides a list of disciplines related to Technicians and Artisans in Nigeria
specialty	Table	Provides a list of
		Specialties related to Technicians and Artisans in Nigeria
job_post	Table	Stores records of job posts created by the Job posters.
apply_job_post	Table	Stores records of jobs that have been applied for.
mailbox	Table	Stores mailbox for mails created by Technicians and Artisans
reply_mailbox	Table	Stores mailbox for mails replied to by Job posters.
vjob_post	View	A view created to join records from job_post and company tables

System Design

The Database Entity Relationship Model diagrams are shown in figures 1 and 2.

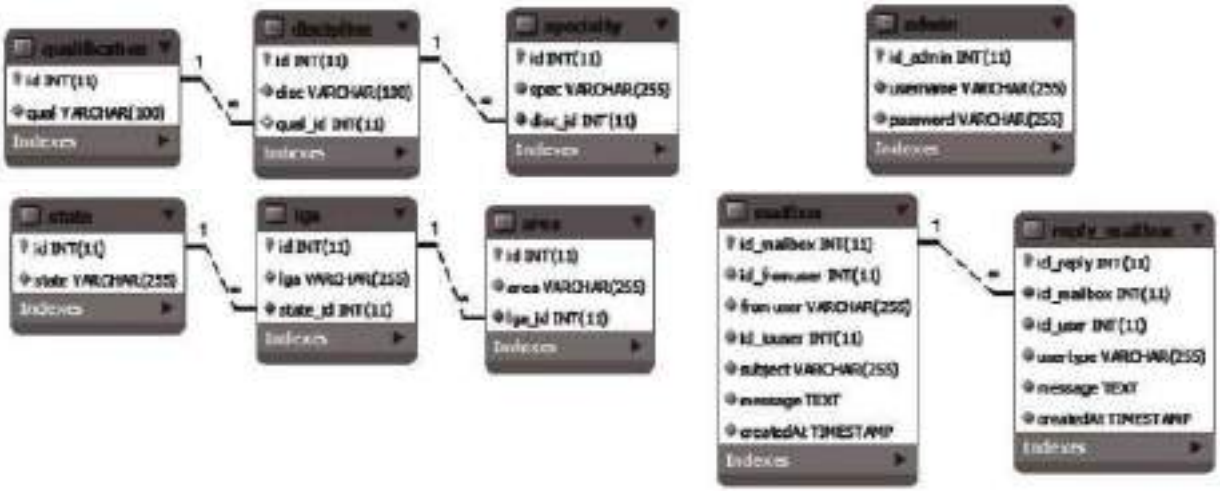

Figure 1: Database Entity Relationship Model diagrams

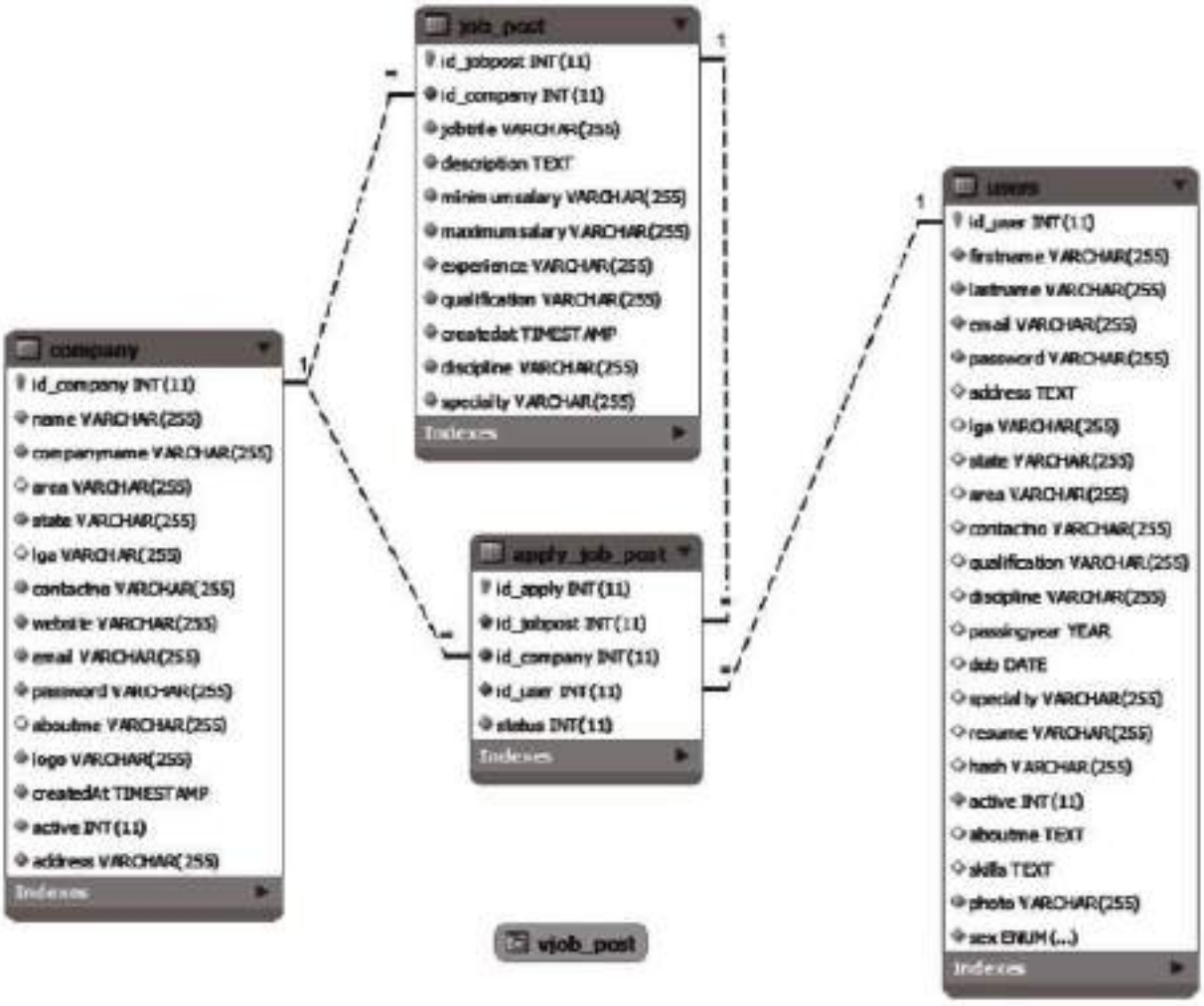

Figure 2: Database Entity Relationship Model diagrams

Modules and Interfaces

Six broad categories of modules were designed for this information system with several submodules. These are listed thus:

i. Authentication Management Module
ii. Registration / Signup Module
iii. Technicians and Artisans Information Module
iv. Job Poster Information Module
v. Administrative Module
vi. Search module

The Technicians and Artisans Information Systems being a web-based information system can either be deployed on premises on owned severs or hosted online on commercial hosting platforms. The System software and hardware requirements would therefore be determined by the platform of choice. Notwithstanding, there are certain minimum requirements for effective and efficient functioning of the system which have been identified below.

The Server Systems would have the following minimum requirements as shown in Table 2 while the client system's requirements are stated in Table 3.

Table 2: Server System Minimum Requirement

Item	Recommended Minimum
Memory	4GB RAM or Higher
Processor	2.4 GHz (32 or 64 bit)
Storage	200GB Storage for Database and Application Files
Network	100Mbps Ethernet or

Table 3: Client System Minimum Requirement

Item	Recommended Minimum
Memory	4GB RAM or Higher for PCs and Laptops 1GB RAM or Higher for Mobile Devices
Processor	2.4 GHz (32 or 64 bit)
Network	High Speed Network Connectivity. Local Area Network for On premises hosting and Internet for Online hosting

TARIS is a web-based Information system which was designed using PHP (PHP: Hypertext Preprocessor). Table 3 provides a summary of the server software requirements for the two main operating systems used for hosting PHP based web applications.

Table 4: Server Software Minimum Requirement

Operating System	Software Requirement
Windows	Internet Information Services (IIS 7.0) with the PHP 5.6 installed using the Web Platform Installer and MySQL OR WAMMP Server Application
Linux	Apache Server running PHP 5.0 or higher with MySQL Support

The only software required by client devices to connect to the System is any compatible web browser that supports HTML5.

RESULTS

Snapshots of the implemented system are presented in figures 3 to figures 11:

Figure 3: Admin: Login Page

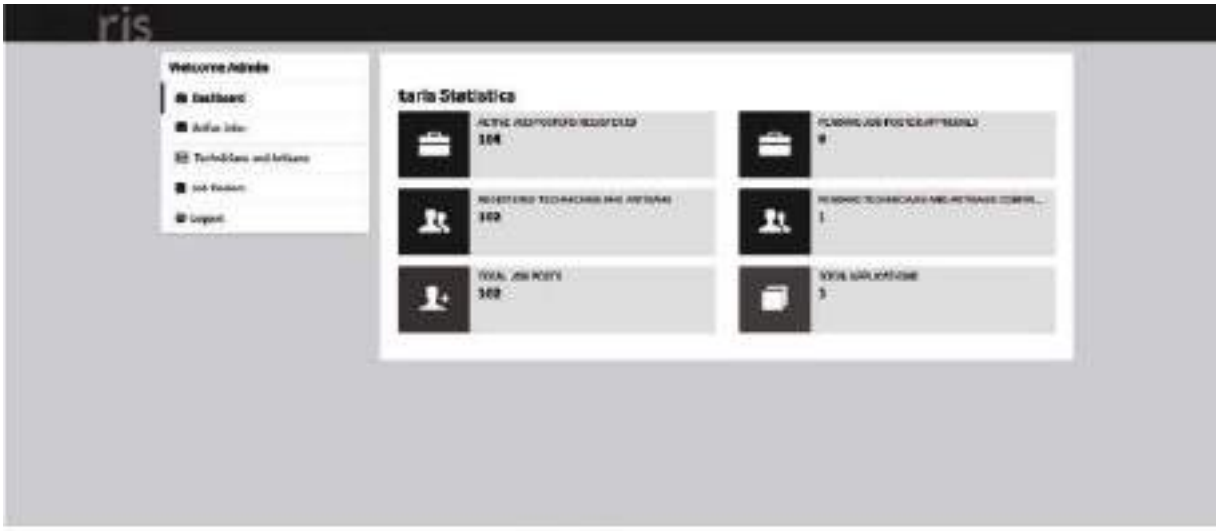

Figure 4: Admin: Dashboard

Figure 5 Admin: Technician & Artisans Database

Figure 6: Technician & Artisan Registration /Signup

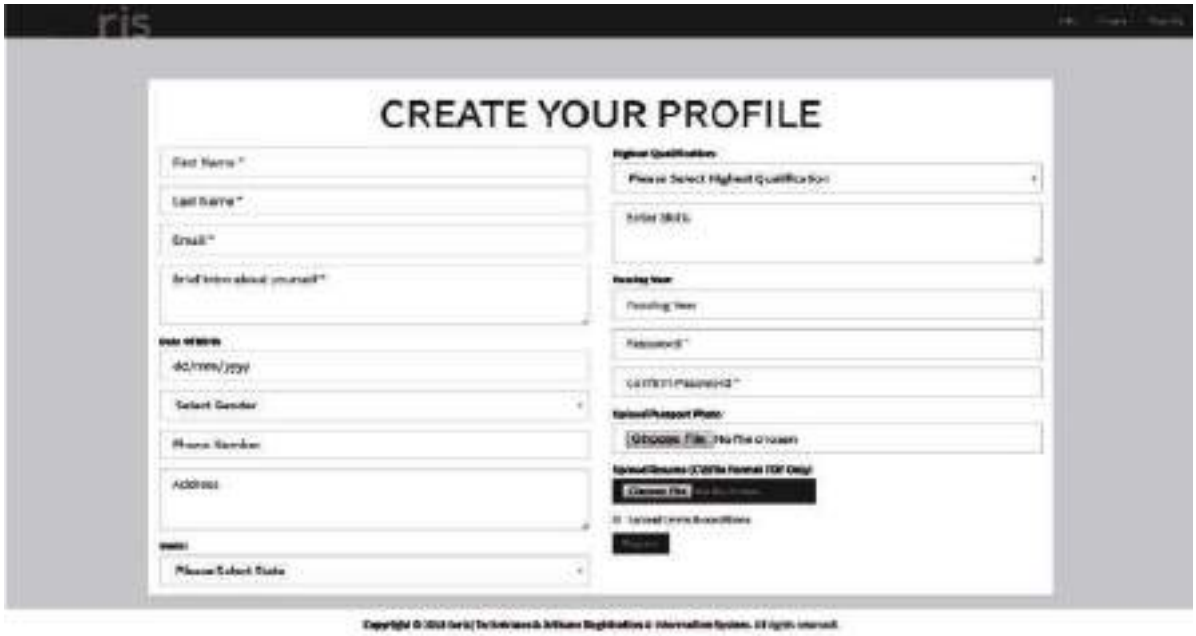

Figure 7: Blank Technician & Artisan Signup Page

Figure 8: Job advertisement

Figure 9: Technicians, Artisans and Job Poster Information Section

Figure 10: View Technician & Artisan Profile

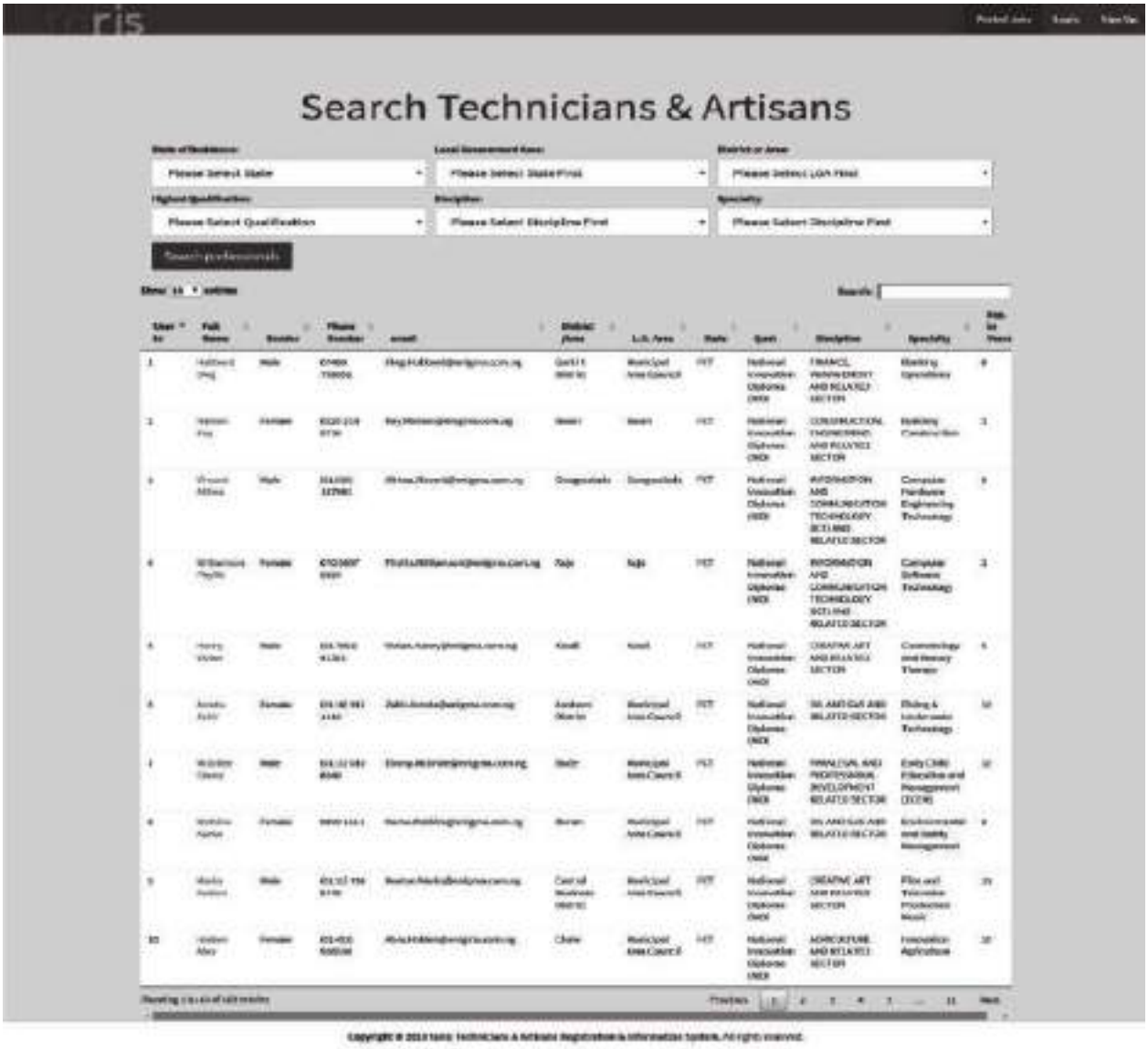

Figure 11: Search Technicians & Artisans Page

DISCUSSIONS

This work identified the role of technician and artisans in infrastructural development and economic growth, and went further to develop an information system for the identification and registration of Technicians and Artisans named TARIS. This system would be useful in aiding the identification of available skillsets in various locations of the country. It would also serve as an authoritative source of information for developing capacity building and training initiative in line with both the Federal Government and various State Governments drive for economic growth through industrialization and youth empowerment.

TARIS would provide the following facilities to professionals (technicians and artisans), the Job Posters', researchers and the government.

Centralization of Data: With the current situation of an almost total lack of information of skilled technicians and artisans in Nigeria,

when fully implemented the system would serve as the "go-to" portal for information on availability, competency and experience of technicians and artisans in Nigeria thereby providing the necessary public and private agencies and the general public with reliable information of technicians and artisans based in different locations of the country. This can also be used by relevant agencies for technical education in determining skillset availability and shortage levels when designing and implementing skills acquisition and vocational or technical training programs.

Identification of Technicians and Artisans based on Location: The system provides a user-friendly interface for Technician and Artisan Registration. It would also serve as a reliable source of identification of available skillset per location by simply assessing the portal, viewing and selecting the need skills at any given time and location. Such database must be regularly populated and updated regularly to ensure accuracy of information.

Improved quality of service: The implementation of technicians and artisan's registration and information system will help improve the quality of service provided by the technicians and artisans. Artisans registered on the system are rated by verified clients for whom they have work and ranked based on their average percentage rating, and number of jobs successfully completed.

Job Board: The System also serves as a job board where job posters and companies can post vacancies and get qualified professionals to fill such vacancies.

ICT Researchers: The existence and usage of such an information system by both customers and the skilled workforce would showcase ICT as playing a pivotal role in the identification and utilization of skilled resources within an economy. Centralized collection and management of skillset offers researchers the opportunity to study trends, analytics and evaluation of interactions among workers and how such interactions has resulted to economic growth and development..

Government: The creation and management of such an information system offers the government the opportunity to understand the professional competencies of artisans in both the formal and informal sectors of the economy. This to a large extent can serve as the framework for relevant policy direction and best ways of harnessing and channeling of such skillset to achieve national growth and development.

CONCLUSION

Technicians and Artisans Information system was designed in response to an almost lack of information on Technicians and Artisans in the country. Although various associations of artisans and technicians have in the past attempted to identify their members, this Information system is a single centralized tool for Technician and Artisan Registration. Its implementation would not only serves the artisans and technicians but also provide the general populace with a means of interfacing with professionals in their various localities.

Future Research

Future research should evaluate the performance of the implemented system with the view to making comparison between results of the designed system vis-à-vis the

existing system. Analysis of the designed system can also be carried out with a view to recommending features that would result to increased usability, performance impacts and higher rates of employments especially in developing economies.

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