CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Software quality depends largely on the process that is used to create it. (Trudel *et al*., 2006). In rennet years, software process improvement (SPI) has been recognized as an effective way for companies to improve the quality of the software they produce and the productivity with which they work (Scott *et al*., 2001). A software process can be defined as an environment of capable interrelated resources managing a sequence of activities using appropriate methods and practices to develop a software product that conforms to customer's requirements (Zeineddine and Mansour, 2005). Software processes play an important role in coordinating different teams in large organizations so that their practices don't lose touch with one another (Dyba, 2003). Ideally, these processes should combine the need for flexibility and creativity, but that balance is hard to achieve (Glass, 1995). There is evidence that the majority of small software organizations are not adopting existing standards as they perceive them as being orientated towards large organizations and studies have shown that small firms' negative perceptions of process model standards are primarily driven by negative views of cost, documentation and bureaucracy (Laporte *et al*., 2008). A vast majority of software producers, have not yet implemented a methodology for software process improvement, are paying high costs of production and systems maintenance, and are therefore being displaced from the global market, not being on the same competitive level as companies that possesses a process improvement method (Herrera *et al*., 2003).

Software processes play an important role in coordinating different teams in large organizations so that their practices don't lose touch with one another (Gyba, 2003). Ideally, these processes should combine the need for flexibility and creativity, but that balance is hard to achieve. Improvement in Small and Medium Enterprises (SMEs) is paramount to the survival and growth of any business to ascertain her desired level of economic growth (Namusonge, 2018). Improvement has changed the way companies conduct their businesses and the ways of satisfying the needs of customers in the contemporary society, this is because Small and Medium Enterprises (SMEs) constitute 99.7% of the enterprises worldwide. Improvement occurs in several functional areas of any small and medium enterprise. These consist of product Improvement, process Improvement, service Improvement and technological Improvement. Due to initiation of diverse forms of Improvement, SMEs helped to bring gradual socio-economic change through employment creation, use of local technology and raw materials, generation of income, promoting local and indigenous entrepreneurship, technological innovation and poverty reduction. evaluation is needed to assess the economic efficiency of SME and entrepreneurship policy actions.

There is evidence that the majority of small software organizations are not adopting existing standards as they perceive them as being orientated towards large organizations and studies have shown that small firms' negative perceptions of process model standards are primarily driven by negative views of cost, documentation and bureaucracy (Laporte *et al*., 2008). The contribution of SMEs to Gross Domestic Product (GDP) to boost economic growth in Nigeria had over the years been below expectation (SMEDAN, 2018). A vast majority of software producers, have not yet implemented a methodology for software process improvement, are paying high costs of production and systems maintenance, and are therefore being displaced from the global market,

not being on the same competitive level as companies that possesses a process improvement method (Herrera, 2003). In the same vein, Jahangir and Mohammed (2014) asserted that as a result of decline in product and technological innovations in Nigeria, low productivity among Small and Medium Enterprises resulted to decline in economic growth due to fall in SMEs contributions to GDP. Several models for software process improvement, such as the Capability Maturity Model Integration (CMMI), the Software Process Improvement and Capability determination (SPICE) and the ISO 9000 norms from the International Standardization Organization. However, these models provide quality patterns that a company should implement to improve its software development process (Herrera, 2003). Regrettably, it has been observed that the successful implementation of such models has not been possible within the context of small and medium-sized software organizations since they are not capable of bearing the cost of implementing these software process improvement programs (Wangenheim et al., 2006; Oktaba et al., 2007) and the proper implementation of software engineering techniques is difficult task for SMEs as they often operate on limited resources and with strict time constraints (Oktaba *et al*., 2007).

Small companies generally need external assistance in planning and implementing process improvement to keep abreast of state-of-the-art software-engineering research and practice (Bae and Panel, 2007). Many small and medium software development organizations have recognized the need to improve their software product and evaluating the software product alone seems insufficient since it is known that its quality is largely dependent on the process that is used to create it (McCaffery *et al*., 2007). Therefore, these organizations are looking for evaluation of their software processes and products. It is further supported by many researchers that small software organizations are characterized by their insufficient human resources, lack of

development and supporting environment, lack of budget and dependency on the large organizations (Valtanen and Ahonen, 2008) and find software process improvement a major challenge (Cater-Steel, 2004). Another main problem with these organizations is that they do not have a process culture and in a process culture people's customs and behaviors are influenced by process-oriented thinking and process management principles (Calvo-Manzano *et al*., 2002). Dyba (2003) indicated that SPI can be used as a competitive advancement strategy for both small and large organizations. Further, Cater-Steel (2010) found in their study that the process improvement program was effective in improving the process capability of many of these small software development firms. Today, the software industry is one of the most rapidly growing sectors and this situation stimulates especially the constant creation of small companies which play an important role in the economy and in the last few years, a great number of organizations have been interested in SPI. A considerable amount of software is produced world-wide by Small and Medium-sized Enterprises ranging from 1 to about 50 employees (Russ and McGregor, 2000). In this study, we proposed a model for software improvement and process management and evaluate such model for its performance. We also presented a brief description about the software process improvement as well as a new sequential model designed for software process improvement for small and medium-sized enterprises.

Inventory management is a major requirement even for the small and medium shop owners. A system which tracks inventory levels, orders and sales in order to perform predictive analysis, obtaining forecasted demand will help to reduce over-stock and out of-stock situations. A good inventory management system must ensure keeping enough stock in the warehouse to ensure the business keep functioning but not enough stock to drain its limited cash reserves. This is a task where all business needs are to be anticipated, most of the calls made are crisis calls, yet where

the people in-charge of the inventory need to find a solution. However, a major requirement for small/medium-sized businesses is Inventory Management since a lot of money and skilled labor has to be invested to do so. E-commerce giants use Machine Learning models to maintain their inventory based on demand for a particular item. Inventory Management can be extended as a service to small/medium sized business process in order to improve their sales and predict the demand of various products. This study will develop a machine learning model for predicting inventory in the context of managing inventory process in SMEs.

1.2 Statement of the Problem

SMEs in Nigeria are often faced with challenges of innovation to address the problems of power shortage, managing inventories, handling requirements, generating Documentation, managing Projects, allocating resources, measuring progress, conducting reviews, providing training, lack of capital, poor management skills, inadequate information, and corruption amongst other causal factors. Poor financial base and inefficiency of the market share of SMEs to enhance product and technological innovations resulted to low productivity which hardly allowed SMEs to compete effectively with both factor and product markets to boost the country's GDP towards achieving the macroeconomic target of economic growth. This study will implement a model to address the issue of inventory management faced by small and medium-sized enterprises in software process and project improvement.

1.3 Objectives of the Study

The aim of the study is to develop and evaluate new methods of software process improvement in inventory management in the context of small and medium sized enterprises. The specific objectives are to:

i) Analyze the existing approaches towards SPI in inventory management which focus on SMEs.

ii) Design a predictive model for software process inventory management in small and medium enterprises.

iii) Evaluate the proposed model performance using knowledge from SQL and PHP.

1.4 Significance of the Study

This study will be beneficial to individual in civil service, students, and government in the following ways:

i) Individual:

Investing is one of the key ways in achieving the financial goals for oneself. As an individual grows through life, there are new financial requirements that come up. It usually starts with buying a house. Even if one funds a house through a loan, there is the requirement of a substantial down payment. By investing through a mix of assets, an individual can build up the corpus required for the down payment.

ii) Industry

Inventory management can help in demand forecast to minimize wastage in an industry.

1.5 Scope of the Study

This work is essentially intended analyze the existing approaches towards software process improvement (SPI) in managing inventories which focus on SMEs. The study will also propose a model for developing and evaluating software process and project improvement practices in managing products inventory in small and medium-sized enterprises.

1.6 Limitations to the Study

The limitations encountered in this study include the following:

Time Factor: There was insufficient time given to carry out this study due to the academic calendar for the program.

Resource Material: There is limited information the study topic since it is a new area of knowledge. Internet Access: Access to stable Internet services was cost intensive

1.7 Definition of Terms

1. Software Process: Software process refers to a set of activities, methods, practices, and transformations that are used to develop and maintain software systems. It encompasses the entire software development lifecycle, including requirements analysis, design, coding, testing, deployment, and maintenance.

2. Project Improvement: Project improvement involves enhancing the effectiveness, efficiency, and quality of software development projects. It focuses on identifying and implementing strategies, techniques, and practices that lead to better project outcomes, such as improved productivity, reduced costs, enhanced customer satisfaction, and higher quality deliverables.

3. Methods: In the context of software process and project improvement, methods refer to specific techniques, approaches, or procedures used to accomplish a particular task or objective. These can include various practices, frameworks, tools, and guidelines employed to improve the software development process and project management.

4. Small and Medium-Sized Enterprises (SMEs): SMEs are businesses that fall within a certain size range, typically characterized by having fewer employees and lower revenue compared to larger corporations. The exact definition of SMEs may vary across countries, but they are

generally considered to be smaller in scale and have different operational characteristics than large enterprises. In the context of software process and project improvement, the focus is on developing and evaluating methods specifically tailored to the needs and constraints of SMEs.

CHAPTER TWO

LITERATURE REVIEW

2.1 Inventory Management

The concept of inventory management includes a vast set of areas to be dealt with. With the rapid expansion of ecommerce industry, the demand for efficient inventory management is the need of the hour. More research effort is required to improvise the existing inventory management techniques. E-commerce giants define an end-to-end machine learning system using probabilistic demand forecasting models that is built on Apache Spark. Such e-commerce giants contain large

datasets. Forecasting usually includes two different methodologies: Time series methodology and Machine learning methods (Joos-Hendrik *et al.,* 2017). A case study of Inventory management focused on identification of factors that influences inventory optimization among SMEs in steel sector through a structured and unstructured questionnaire can aid in effective inventory management. It involves grouping the factors into two sets as internal variables and external variables (Nazar and Sheikh, 2018).

Artificial neural networks (ANN) is an intelligent system that uses layers of neurons. ANNs are very good with fitting problems. A retrospective study on ANN for inventory management is required to improve prediction accuracy (Rohaifa *et al*., 2017). AI proves to be beneficial in handling the customer data and forecasting the purchase behavior of customers AI can be used to provide notification when a company has to re-order stock and assist in creating manufacturing schedule considering the variations in demand including seasonal increases accurately (Yashoda, *et al*, 2018). A decision support system (DSS) is another technique that could be used to assist for effective monitoring of inventory levels and to ensure continuous availability (Mahuya *et al.*, 2017). To perform inventory analysis that consists of multiple attributes under consideration, a hybrid methodology that integrates multi-criteria decision making (MCDM) techniques with different machine learning algorithms are used. The methodology uses ABC analyses for determining classes and Artificial Neural Network (ANN), Bayesian network, and Support Vector Machine (SVM) algorithms to predict different classes for inventory items (Hasan *et al.*, 2016).

Identification of dead inventory can be achieved by predictive modelling. Predictive modelling is a methodology in which a predictive algorithm predicts part obsolescence in advance with reasonable accuracy (Madhu and Ghosh, 2016). ABC analyses is a classification technique that determines the relevant classes for each of the inventory items, thus providing the proper foundation for demand forecast process. ABC analyses generates an optimized inventory stock classification (Darya and Borisov, 2015).

2.1.1 Limitations of Traditional Inventory Management Methods

The processes used historically to plan inventory management vary between statistical methods and manual analyses based on the use of Excel tables in particular. These approaches have various disadvantages and limitations:

i) A time-consuming operation that does not allow for continuous analysis of the company's data. The study of the data is therefore done periodically and not in real time (once a month for example);

ii) the forecasts generated by these methods lack precision, which implies a low level of reliability and risks of overstocking (with the loss of perishable goods, for example) or, on the contrary, understocking, leading to the failure to satisfy customer needs;

iii) The processing of information is tedious and the possibility of taking into account the specificities of each point of sale is not possible. The result is the generation of generic predictions for all your virtual or physical stores. Work teams try to weight this generalized data via multipliers that take into account the characteristics of the store, but this remains imprecise;

iv) These workflows are tedious set of tasks for the operational teams responsible for inventory management.

The size of the data to be taken into account (receipts, prices of articles, promotions, points of sale, marketing repository, business objectives, customer traffic and behavior) becomes unmanageable at a human scale. The multi-dimensional nature of the problem of managing product or raw material reserves is difficult to cover by Excel-based analyses or traditional ERP systems. New operating systems must emerge to fill the gaps in manual or statistical techniques. These new tools must also overcome the chronological barrier of historical data and succeed in adjusting the values of predictions in real time.

2.1.2 The ideal framework for Accurate Inventory and Sales Calculations

The goal behind challenging statistical and manual methodologies is to devise a new framework for generating predictions related to purchasing, inventory management and sales of items and products. The criteria guiding the creation of the new inventory calculation paradigm must take into account different objectives.

The first objective is to limit lost sales (under-stocking), stock-outs (overstocking) and to optimize the resale rate. This implies taking into account logistic constraints linked to suppliers, customer behavior at each point of sale, geographical specificities of the business concerned as well as exogenous data having an impact on the functioning of the company. An efficient prediction method should therefore respond to this imperative by generating predictions that suggest product assortments in line with the needs of the clientele of each outlet.

The second element to consider is the choice of metrics to propose to the sales teams (in physical or digital stores) in order to allow them to anticipate their customers' needs. These metrics would be used as a guide for the promotions to be implemented as well as the orders to be placed according to the needs calculated by the predictive tool.

The third aspect to take into account is to contain human and business bias in the prediction of future orders. Indeed, the predictions related to the supply chain requiring a strong human involvement can conflict with the evolution trends of some stores and try to match the business and commercial objectives by denying the realities of the field. These factors partly explain the sources of overstocking and ultimately the increase in transport and storage costs.

Finally, the last dimension to diagnose is the liberation of sales teams and internal staff from repetitive and tedious tasks in order to orient them towards processes with higher added value.

This aspect of the inventory management automation problem is a consequence of the two objectives described above.

2.2 Machine learning for Inventory Management

Machine learning enables the creation of a set of predictive solutions that automate the complex tasks described above and avoid human bias. By assisting operational teams in these processes, artificial intelligence helps to generate forecasts that facilitate the management of product orders, but also of inventory flow. Indeed, predictive technologies based on data science tools offer the possibility to generate:

i) Promotional scenarios to help customers purchase certain products and maximize their sales to customers in a given store or web or mobile sales area;

ii) Optimal product assortments through the accurate and complete analysis of customer behavior, sales receipts and the seasonal nature of the stores concerned;

iii) anticipation of consumption evolutions in real time and not periodically as in the case of manual or statistical methods;

iv) recommendations to operational teams combining characteristics of points of sale (mobile, web or physical) and all inventory management units (product and item references) over periods ranging from 6 to 9 months.

The network of data taken into account by the machine learning algorithms during their training ensures a global vision (macro scale) of the brand or business while adapting the predictions to the sales areas and SKUs they manage (micro scale). Artificial intelligence is therefore not limited to demand or sales prediction, but also encompasses the sales modalities of the merchant

units (items, products, clothes, etc.). Finally, the duration of the generated predictions can extend over a semester or more, making machine learning not only a predictive tool, but also a tool for anticipating and analyzing trends.

2.2.1 The Benefits of Automating Inventory Management via Machine Learning

The use of artificial intelligence for inventory management automation brings first of all a gain in accuracy by producing predictions related to each store separately. This is possible thanks to the continuous volumes and flows of information that these data science tools can ingest. Indeed, during their learning phase, machine learning algorithms take as input both the references (items, merchandise) specific to each store, but also exogenous data (meteorological, economic, regional, vacation and epidemic calendar data, etc.).

The collection of data that feeds the machine learning models is not only automated, but can be easily extended without altering its management costs (scalability). The granularity of the input data allows for the inclusion of in-store customer behavior, customer purchasing behavior, cannibalization effects between products, and the seasonality of consumption by point of sale.

Finally, the use of an automation solution based on machine learning such as Verteego ensures industrialization, taking into account scalability and interoperability with your company's information systems as well as those linked to your supply chain. The prediction lines created can be used within your BI tools, your dedicated CMS, your analytical dashboards or web interfaces for operational teams.

To conclude, the use of artificial intelligence via machine learning techniques in enterprise inventory management fulfills the objective of reducing residual inventory while ensuring the avoidance of under-stocking (lost sales). The direct consequences of the automation of inventory

management planning include the reduction of transportation costs, storage costs, lost sales and lost products. They also affect human resources by reducing the time spent on tedious and low-value tasks. Finally, the accuracy of predictions generated by these self-learning systems is by store type, department, item and season.

2.3 Software Process Improvement

Existing software engineering and organization development literature acknowledges that there are fundamental operational differences between small and large organizations (Dyba, 2003). Small organizations seem more concerned about practice, while large organizations seem more concerned about formal process (Dyba, 2003). Russ and McGregor (2000) observed that software development process can be just as critical to a small project's success as it is to that of a large one due to the number of external dependencies per team member. They further argued that its goal is to produce high quality and timely results for today's market without imposing a large overhead on a small project.

Although, innovation is a means by which the entrepreneur creates wealth producing recourses or endorses existing resources with enhanced potentials for creating wealth. In order words, innovation is a catalyst to change in software project improvement. It is the combination of marketable and creative and creative ideas of produce desirable result in an organization and the society at large. Innovation is a complex concept because of its multidimensionality. In the same perspective, Dormio (2011) opined that innovation is the generalization, acceptance and implementation of new ideas, processes, products or services. Importantly, innovation is generic and covers a range of issues necessary to provide value to customers and a good return to the business enterprise and the economy.

Similarly, Chesbrough and Gassmann (2016) were of the view that innovation is purposive inflows and outflows of knowledge to accelerate internal innovation and to expand markets for external use of innovations. b) Concept of Small and Medium Enterprises (SMEs) There is no agreement among policy makers and scholars with reference to the condition at which a business firm or enterprise is considered to be small. In reality, there is no generally or even nationwide satisfactory definition of SMEs except that the size of business needs to be defined for a definite reason. Central Bank of Nigeria (CBN) in its Monetary Policy Circular No. 2 (1980) defined SMEs as enterprise whose annual turnover ranges between N25, 000 to N50, 000. However, Central Bank of Nigeria (2018) also defined SMEs in Nigeria based on assets and number of staff employed. The criteria are; an asset base between N5million to N500 million and staff employed between in 11 – 300. Hence, business enterprises that can meet up to these criteria are known as Small and Medium Enterprises (SMEs). The Federal Ministry of Industry, prior to her structural Adjustment Program and International Foreign Exchange Market defined SMEs as enterprises whose investment is not more than N150,000 in plant and machinery. In addition, Small and Medium Enterprises (SMEs) had by and large accepted as medium of achieving economic growth and development in an economy. Vivacious SMEs are considered key in solving numerous problems in developing economies. The problems facing developing nations are poverty, unemployment and inequality. SMEs help in the provision of goods and services, job opportunities, wealth creation, poverty alleviation and utilization of local resources. c) Concept of Economic Growth Economic growth is the quantitative increase in Gross Domestic Product in an economy within a year. Economic growth is the increased in the inflation-adjusted market value of the goods and service produced by an economy over time. It is conventionally measured as the percent rate of increase in Real Gross Domestic Product or real GDP

In software process improvement cycle, the International Monetary Fund (2012) suggested that the rate of economic growth describes the geometric annual rate of growth in GDP between the first and the last year over a period of time. This growth rate is analyzed as the trend in the average level of GDP over the period, which ignores the fluctuation in the GDP around this trend. Economic growth is quantitative increase in real output available to meet the economic needs of any nation or economy. It is also referred to as an over increasing level of all the goods and services made available by the producers to meet the economic needs of the people. Economic growth is persistent rise in real and nominal economic variables over a successive period. The increase in Gross Domestic Product (GDP) Per Capita in an economy is known as economic growth (World, 2014).

Safiriyu and Njogo (2012) examined the impact of small and medium scale enterprises on employment generation in Lagos state, Nigeria. The study employed primary data instruments, questionnaire and interviews techniques of data collection. The results of simple percentages and chi-Square tests conducted revealed that small and medium scale enterprises and sustainable development of Nigerian economy are positively related, just as promotion of SMEs and improvements in employment generation are positively related and significant. The study concluded that availability of finance has been widely viewed as a constraint to the growth of SMEs.

Azende (2011) conducted an evaluation of the performance of small and medium scale Enterprises, Equity Investment Scheme (SMEEIS) in Nigeria using Benue and Nassarawa states as case studies. The study using total credit to SMEs as a percentage of credit for the period 1993 to 2008, the ttest conducted to determine the extent of relationship between bank loans before

and after the introduction of SMEEIS indicated no significant difference between loans disbursed by banks to SMEs.

Akingunola (2011) assessed the specific financing options available to SMEs in Nigeria and their contribution to economicgrowth performance. The study used spearman's correlation coefficient to determine the relationship between SMEs financing and investment level. At 10 percent level of significance, the correlation coefficient value of 0.643 indicated a significant and positive relationship between SMEs financing and economic growth in Nigeria.

Eze and Okpala (2015) presented quantitative impact of Small and medium scale enterprises (SMEs) on Nigeria's economic growth performance econometric technique adopted for the study was multiple regression method based on ordinary least squares technique. The study revealed that SMEs had negative impact on economic growth in Nigeria within the study period. The study concluded that poor government policies, on tariffs and incentives, bribery and corruption, non-existent entrepreneurial development centers and poor state of infrastructure act as impediments to the growth and development of SMEs in Nigeria.

Otugo, Edoko and Ezeanolue (2018) examined the effect of small and medium enterprises on economic growth in Nigeria by modeling the effect of SMEs, government expenditure in promoting SMEs, Employment generation growth rate and level of Corruption, commercial bank credits and lending rate to SMEs on economic growth in Nigeria using an econometric regression model of the Ordinary Least Square (OLS). The study based on the results revealed that small and medium enterprise, government expenditure to small and medium enterprise, employment generations, commercial bank credit to small and medium enterprise and lending rate to small and medium enterprises have a positive impact on economic growth in Nigeria.

Rasak (2012) described Small and Medium Scale Enterprises (SMEs): A panacea for Economic Growth in Nigeria. The study also examined how government and other agencies finance SMEs in Amuwo Odofin Local Government area of Lagos State. The agencies in this study include banks, cooperative societies, and government, among others. Quatitative and qualitative method was used to collect data for the study. Fifty (50) samples of respondents were selected from the Local Government Area. The data gathered was analyzed using descriptive statistics such as frequency distribution, while the qualitative data was subjected to content and descriptive analysis. The study revealed that SMEs is panacea for economic growth in Nigeria.

Ali (2013) analyzed the impact of small and medium enterprise on economic development in Nigeria. The study used descriptive content analysis. The study revealed that a small and medium enterprise helped in enhancing economic development through employment creation and increase in the income level of the people. The study concluded that SMEs is considered an important factor to attain the desired level of economic development.

Mohammad (2014) investigated the effects of process innovation on SMEs Growth and to find the impact of SMEs on economic growth of Pakistan. A secondary data was collected for the period from 1981 to 2013. Main economic variables are included in this research i.e. GDP growth rate, Trademark total, Public expenditure on education, Patent Applications, High Technology Exports, Share of export as percentage of GDP, Inflation rate for the analysis of the objectives. Two linear regression equations were constructed. The study revealed that there is a positive significant effect of process innovation on SMEs growth. Similarly, the strong correlation was estimated between SMEs performance and economic growth of Pakistan.

Scholars like Tversky (2001) had established and developed the behavioral finance theory, since then analysis and researches on the investors' characteristics have begun to attract attention. According to the view of Pompian (2012), studies on behavioral finance can be divided into two types: one is Behavioral Finance Macro, whose research objects are usually institutional investors with more influence; the other one is Behavioral Finance Micro, which mainly studies on some psychological bias and behavioral characteristics of the individual investors. Although the former is the mainstream of research, the latter also gradually attracts some scholars' attention, and many interesting phenomena have been found. For example, after conducting the investigation to 100 investors by using Myers-Briggs personality test list and questionnaire, Longo (2004) found there were striking differences among the individual investors with different personality characteristics in terms of such aspects as preference of investment type, choice o information channel and transaction behavior.

Wen et al. (2014) examined the relation between investors' risk preference and return on stock market, found that investors become risk averse when they gain and risk seeking when they lose and the extent of risk aversion in gains and that of risk-seeking in losses were different. Hira and Loibl (2008) paid special attention to differences of investment behavior caused by the gender, and they found that the gender had an impact on the acquisition channel of investment information, and at the same time it also influenced the risk taking level of different the individual investors.

Barnea et al. (2010) used some twins investors' investment records that is very difficult to obtain to discuss the relations among individual investor's characteristics, market participation habit and capital investment distribution behaviors, finding that one third of investment behavior differences can be explained by individual genetic characteristics. According to the different

attitudes and decision-making behaviors of the individual investors, Clark- Soutar (2005) divided the samples into four clear categories, finding that each category's individual investors has different features in investment preference and target choice. Based on these results, some financial services and educational institutions have gained advices and measures that are more targeted.

McCormick and Maalu (2011) innovations as new products that result from advances in knowledge/technology. 'Incremental' innovations include improvement of process or product designs, with or without up-grading of machinery and/or acquisition of new machinery. The duo concluded that the most common form of innovation for small firms is non-technological innovation which includes marketing innovation, measured by whether or not the firm has implemented a new design or product packaging, significantly changed the way merchandise is displayed, introduced a new channel for selling goods and services, or introduced a new method of pricing products.

Hou et al. (2012), henceforth HDZ, can be improved by adopting different approaches to estimating the model and/or extending the model by adding in additional variables that we argue have the potential to help predict earnings. First, we consider estimation approaches. We initially ask whether the HDZ model performs better when estimated on profit-making firms than when estimated on all firms (profit and loss making firms), the approach adopted by HDZ, in generating one year-ahead earnings forecasts for profit-making firms. In similar fashion, we then ask whether the HDZ model performs better when estimated on loss-making firms only, or on each category of loss making firms that are identified below, relative to when it is estimated on all firms, in generating one year-ahead earnings forecasts for loss-making firms. Our categories of loss making firms are: (i) high research and development (RD) and non-dividend paying

firms; (ii) dividend paying firms; and (iii) other firms. Second, we ask whether accounting items other than those in the HDZ model, that are either documented in the existing earnings forecast literature as having the ability to predict earnings, or in the value relevance literature as having the ability to explain cross-sectional differences in firm market valuations, contain incremental information on future earnings for profit-making firms, loss-making firms, and of the three categories of loss-making firms. Consequently, we build expanded earnings forecasting models for profit-making and loss making firms that include additional accounting fundamentals together with the variables in 26 the HDZ model and examine whether the additional variables help in the prediction of future earnings. Finally, we ask whether our expanded earnings forecasting models, when applied to lossmaking firms, perform better when estimated separately for each of our three categories of loss-making firms than when estimated using all loss-making firms together, and whether it is possible to extend the HDZ model to make more accurate one year-ahead earnings forecasts for profit and loss-making firms using these additional variables. Prior research documents that using individual firm time-series models to produce earnings forecasts features two problems: (i) survivorship bias; and (ii) large data requirements. This has led to the use of analysts' earnings forecasts in studies that require earnings forecasts. Although analysts' forecasts are widely used by researchers and practitioners, studies in the US provide evidence that analysts are overly optimistic in their forecasts. Another issue concerning the use of analysts' forecasts is the availability and coverage of firms .HDZ develop a cross-sectional model using lagged information to make one, two, three, four and five years-ahead earnings forecasts.

Li (2014) construct two alternative cross-sectional earnings forecasting models (what they refer to as their EP and RI models) to the HDZ model, and find that both models outperform the HDZ

model. Given the growing attention to the HDZ model, it is useful to examine how it is estimated. In particular, it is useful to examine whether the model gives more accurate estimates if the estimation of the model takes place on profit-making firms, loss-making firms, and categories of loss-making firms separately.

In particular, we might expect that the HDZ Recent studies by Mohanram (2014) provide evidence that RW model that simply sets the earnings forecast to equal current earnings outperforms the HDZ model in terms of forecast accuracy, bias, and estimates of the ERC in the full sample, a small firms sample, and a sample of firms without analysts' coverage. Further, they report that the forecast errors are larger for firms without analysts' coverage where the requirement for an earnings forecasting model is more important. In addition, recent studies develop alternative earnings forecasting models to the HDZ model and find that their models outperform the HDZ model in terms of forecast bias, accuracy, and estimates of the ERC . These previous earnings forecasting models are not considered comprehensive models, however, as they use different variables than each other and exclude the majority of the financial statement items that are proposed in the value relevance literature. To test our second concern, we examine the predictive power of financial statement items other than those in the HDZ model. Therefore, we extend the HDZ model by including financial statement items that are documented to be useful in the valuation and earnings prediction literature, for either all firms or for loss-making firms only, in the UK and the US. We add measures of a firm's size and a firm's growth, measures of the incidence and frequency of previous profits (losses), the firm's stability and firm conservatism measures, and other measures, into the HDZ model. Based on the arguments above, we expect that at least some of these accounting items will be helpful for explaining one year-ahead earnings for profit-making and loss-making firms. In addition, based on the prior

valuation literature 41 for loss-making firms, we expect that the explanatory power of those accounting items will vary across the various categories of loss-making firms defined above.

SONGBo (2017) from school of mathematics and information sciences north China university, presents a paper on Analysis and Prediction for the Income Elasticity of the Consumer Demand in Chinese Rural Areas. The authors make the inference that pay flexibility of shopper request in the country regions of China is very enormous, which implies that it is somewhat delicate to change in buyer request. So modifying the pay circulation structure and expanding the salary of country occupants can adequately invigorate utilization and lift household request. In any case, most sub-classes of the pay flexibility of purchaser request show a declining pattern in the forthcoming barely any years, so the important divisions ought to modify the financial polices opportune and sensibly as per explicit structure.

Agarwal (2016) from SRM University, presents a paper on analysis and prediction of adult's income. Authors are predicting the income of the population and analyzing the factors which strongly affect the income. The author would be giving suggestions based on the result obtained which degree of qualification can lead to a better income and people of which certain age group are earning more.

Abereijo et al., (2007) looked into the ability and talents of manufacturing SMEs to innovate. They used a purposive sample technique to conduct a survey of SMEs in Ibadan and Lagos. A questionnaire was utilized to collect the primary data, which was then analyzed using descriptive and inferential statistics. They determined that no SMEs had produced significant achievements that were distinctive and science-based. If SMEs in Nigeria are to attain true innovation, they advocate for improved educational backgrounds in science and technology courses beginning at

the elementary level, as well as increased and ongoing investments in R&D operations. According to Hajar (2015), innovation has a positive impact on firm performance in Indonesia. Terziovski also supported up this claim. contends that innovation channels are positively connected with firm success, shows that culture and strategy are major determinants of business performance.

Cielik et al. (2013) utilized a probit model with firm-level datasets. They discovered that the possibility of exporting is directly proportional to the degree of product and process innovation. In 2003, process innovation was more important for export performance than product innovation, while in 2012, product innovation was more important. Finally, innovation capability is linked to new product performance, and overall firm performance .

Schwartz (2015) present a paper to predict individuals income from their facebook profile. Their observation demonstrated that Facebook Likes and Status refreshes not just foresee self-revealed salary with a similar level of precision as standard financial factors, yet they likewise included steady prescient force. The accuracy of their prediction is sufficiently high for low stakes applications, for example, directed advertising where results are normally estimated at the gathering level. Several papers apply cross-sectional quantile regressions to forecasting returns. Advancements in this effort are important because estimating the return probability density function is an ongoing, but elusive goal.55, 56, 57 While we focus on the quantile regression, other papers apply functional data methods to estimate the return density functions with cross-sectional data.

2.4 Evaluating the Success of Small and Medium-Sized Enterprises in Foreign Markets

SMEs in the Czech Republic as well as in the other countries of EU play very important role in the international arena. In the last three decades it led to an increase of the SMEs number relative to large firms. SMEs have become an important market sector of the economy. Nowadays the driving force depends on the business growth, innovation and competitiveness. SMEs are also an important factor in providing job opportunities. In the Czech Republic 61.52% of SMEs are involved in the creation of jobs and 35.17% of the GDP. Economic and social benefits of SMEs are characterized by several factors. These include in particular: mitigating the negative effects of structural change, acting as subcontractors for large firms, creating conditions for the development and introduction of new technology, creating jobs at low capital cost, quickly adapting to the requirements and market fluctuations. They are a source of innovation and technological progress, they employ nearly 60% of active workers, they involve more than half of GDP, they complete peripheral areas of the market that are not attractive for larger businesses, they decentralize business activities and help accelerate the development of regions, towns and villages (Abrjutina, 2019).

Small and medium-sized businesses have many advantages in the market, but they must face number of negative effects. The advantages of SMEs are as follows: the simple organizational structure that brings lower costs for company management and reduce bureaucracy, the setting up of the company capital is usually not as demanding as it is for large enterprises. Then there is flexibility - small and medium-sized businesses can react faster and more sensitively to changes than large corporations (with even greater flexibility and ability to improvise). Another advantage of SMEs is lower demand for energy and raw materials, SMEs also seek for small niche markets easier and adapt better to local markets. They can address the needs of individual customers. One positive aspect is also personal and direct contact with the company owner and

other employees. The possibility of maintaining personal contact with customers is also a privilege. SMEs are considered as vectors of a large number of innovations. SMEs, unlike large multinational companies, do not have the vast resources and cannot afford to carry out extensive analysis and evaluation of foreign market opportunities, but they must spend their resources more effectively. Because of limited resources, which are a typical feature for SMEs, it is necessary to propose such evaluation models, which both provide valuable information for SMEs and are not resource-intensive. One way to facilitate SME business in foreign markets is to identify key success factors of enterprises in foreign markets using international performance evaluation models for SMEs (Kongolo, 2010).

2.4.1 Features of Small-Scale Business

In a report publish in 1994 by the Center for Management Development (CMD) Lagos, it was noted that in order to create a clear picture of what small business is, certain characteristics as sociated with small firms need to be identified and discussed. The report shows the following features of small-scale business: Ownership and Management. To small scale business, the chief executive generally participates actively in the decision-making process and in the day-to-day operation of the firm with little or no adequate specialist support. The chief executive can be known by all employees of the firm. The chief executive is the owner, founder, and manager as well as the controller of the business. Another feature identified according to Kolawole (2015), a small scale business is not a separate legal entity from its individual members i.e. it cannot sue and be sued in its name(except for a private limited company). Action can only be brought against its members individually and they are not liable to any breach committed by the business. The third feature of a small scale business is according to the report is that it is adaptable and flexible unlike the big industries or businesses. A photographer who is a small scale can also be

the sole owner of a restaurant. Unlike the manufacturer of electronics, which is an example of alarge scale business cannot change overnight to become a manufacturer of soft drinks. This is due to the rigidity of the system and the cost involved. Different studies have revealed similar characteristics for SMEs in Nigeria. Aluko (2016) listed the following as the general characteristics of the small and medium sized industries. (i) The Manager handles all aspects of Management.(ii) Suffers from difficulty in obtaining finance,(iii) Limited market products intended to serve local markets.(iv) Maintains no proper accounts of costs and revenues.(v) Lack of competent personnel with sufficient educational background in Borno State, he listed the following characteristics of small and medium industries:(i) Small local market (ii) Most of the companies run on single line of production;(iii) Handicaps in obtaining finance. The inability of small and medium sized industries toobtain finance is one of the general characteristics highlighted in his report.(iv) Lack of participation of employees in the planning horizon; and(v) Management Succession problems. he identified the following as some of the common features of SMEs: that SMEs have difficulties in borrowing capital, have close integration of industries, weak account of business cost and revenue, manager or proprietor handles key activities, their establishment are usually weak, they mostly have poor managerial skills, but have the ability to take faster decision and action as they do not need much consultations with anyone to take decisions. Okpara was more detailed in that he went a step further to explain the weaknesses of most SMEs, like he mentioned most of them have weak establishment, poor record keeping habits and they have difficulty in sourcing funds except through internal source of financing such as owners' fund. The characteristics identified by Aluko's was further buttressed by Bulama and Okpara The characteristics of Small and Medium Scale Industries can then be seen as an enter priserelatively small as to have the owner be in control of all the affairs, this makes him take

faster decisions and actions, he can be known by all the employees and can change line of businessat any time unlike large businesses. But they face the problem of poor accountability, weak record keeping and difficulty in accessing funds. Small- scale Industries cut across the industrial sector, although majority is agro- allied and food processing. There are quite a number in wood products and product furniture, in non- metallic mineral, in plastic wares, inclothing, tailoring etc. Considering the facts that they form a large pool of indigenous enter prise and technical know-how and a breeding ground for entrepreneurial management, the SMEs sector needs to be supported and prepared for the uprising in economic activities in Nigeria.

2.4 2 Importance of Small Scale Business

Many economies, developed and developing have come to realize the value of small business. They are seen to be characterized by dynamism with innovation and efficiency.Their small size also allows for faster decision making process. Small businesses have always played an important role in the economy. Looking at the importance of small business meanstrying to assess its contribution to the economic development of the country. Thecontributions of small scale businesses to the development of the Nigerian economy are immense and have been acknowledged by many. Data from the federal office of statistics in Nigeria affirmed this importance when it reveal that about 97percent of the entire enterprisesin the country are SMEs and they employed an average of 50% of the working population aswell as contributing to 50 percent of the country industrial output. According to Ihua (2009), SMEs in Nigeria are not only catalyst ofeconomic growth and development, but are also the bedrock of the nation. In everyeconomies, small and medium scale enterprises has been seen as a pivotal instrument ofeconomic growth and development either in developed or developing economies. (Ihua;

2009).Empirical Studies have shown that SMEs have greater economic benefits compared to largefirms in terms of job creation, poverty reduction and the general growth of the economy

Economic Implications of SME Development: The Case of Nigeria SMEs account for a large proportion of the total employment growth many countries. In such countries, SMEs produce a significant share of their increases in Gross Domestic Product (GDP), while the contributions of larger enterprises tend to remain stable (ADB 2002). For instance, in the OECD economies, SMEs and micro enterprises account for over 95% of firms, 60-70% of employment, 55% of GDP and generate the lion's share of new employment. In the case of developing economies, the situation is not very different. For instance, in Morocco, 93% of firms are SMEs and account for 38% of production, 33% investment, 30% export and 46% employment. Similarly, in Bangladesh, enterprises of less than 100 employees account for 99% of all firms and 58% employment. Also, in Ecuador, 99% of all private companies have less than 50 employees and account for 55% of employment. In the case of Nigeria, well-managed and healthy SMEs constitute significant sources of employment opportunities and wealth creation. While the citizens benefit in terms of employment and income, Government also benefits by generating revenue in form of taxes. This can be a strong factor to social stability. It is noteworthy that not all SMEs and microenterprises are in the formal sector; some of them occupy the unofficial labour market, which varies in size from an estimated 4-6% in developed countries to over 50% in developing nations. According to the International Finance Corporation (IFC, 2006), there is a positive relationship between a country's overall level of income and the number of SMEs per 1,000 people. The World Bank's Doing Business reports indicate that a healthy SME sector corresponds with a reduced level of informal or "black market" activities. Thus, managing SME sector to reduce the number of informal business is essential in the Nigerian development

project. SMEs are regarded as the bedrock of industrialization. Because a number of them possess extensive knowledge of resources, as well as demand and supply trends, they constitute the chief supplier of input to larger firms. They also serve as the main customers to the larger firms; provide all sorts of products ranging from food, clothing, recreation, entertainment, healthcare, education, and so forth. They help in economic development through industrial disposal and production of primary and intermediate products. They can also supply the material needs of the larger enterprises. In addition, they provide specialized, and many times, personal services. In summary, SMEs constitute important sources of local supply and service provision to larger corporations. Developing countries represent a huge, largely untapped market for large corporations. By working closely with SMEs, large corporations can develop new customer base that may not be accessible to the traditional distribution networks of these corporations. SMEs also represent important sources of innovation. They tend to occupy specialized market "niches" and follow competitive strategies that set them apart from other companies. This might include re-engineering products or services to meet market demands, exploring innovative distribution or sales techniques, or developing new and untapped markets. This often makes them good partners for large corporations. In the financial sector, emerging economies represent a huge potential market for credit, particularly in subSaharan Africa, where according to the United Nations Capital Development Fund (UNCDF), only 4% of Africans have a bank account. Local financial institutions that have successfully served the SME market in developed countries have found it highly profitable, according to United Nations Conference on Trade and Development (UNCTAD, 2001). Large international banking groups are beginning to tap into these markets. For instance, today Barclays Bank is present in 12 African countries, employs 41,000 people – one-third of its total workforce – and has 8 million customers. Africa accounts for 13% of the

group's profits. Barclays has worked to integrate SMEs into its operations. In their efforts to localize value creation, many large companies in the world increasingly rely on local companies as a crucial component of their value chain. Furthermore, SMEs help in the development of local technology and mobilization and utilization of domestic savings

2.5 Towards Building a Formidable Small and Medium Scale Enterprises in Nigeria

For SMEs to thrive, favourable institutional frameworks are required. Unfortunately, their needs are often overlooked by policy-makers and legislators, who tend to target larger corporations. Also, they are usually left out when it comes to tax incentives or business subsidies. They suffer more than big companies from the large burden and cost of bureaucracy, (World Bank, 2006). Only few SMEs possess the necessary financial or human resources to deal with these. Therefore, government can assist SMEs by: Implementing inclusive reforms. Governments need to create the necessary enabling frameworks and relax the burden of regulatory measures. Additionally, they can simplify business registration procedures and paperwork to make them cheaper, simpler and speedier. A World Bank report stated that reform expands the reach of regulation by bringing businesses and employees into the formal sector." The same report also concludes that the greater a country's ease of doing business, the greater the number of jobs created in the formal sector "because the benefits of being formal (such as easier access to credit and better utility services) often outweigh the costs (such as taxes)." Most importantly, efforts must be strengthened to tackle corruption Providing financial and tax incentives: To encourage SMEs to join the formal sector, governments need to provide tax incentives for SMEs and subsidies similar to those available to large corporations or micro-entrepreneurs, as well as make provisions for start-up funds for SMEs. Encouraging friendly regulatory environments: Governments should promote public-private partnerships to attract venture capital funds and

higher levels of investment, and put in place measures to create investor-friendly environments. Big corporations and potential investors need guarantees that their investments and infrastructure are not going to be expropriated. Involving business in identifying necessary reforms: Increasingly, the business voice is being listened to in decisions aimed at effecting change. In several countries, such as Mali and Mozambique, private businesses now participate in identifying the most needed reforms. The culture of bureaucrats telling bureaucrats what's good for business is gradually disappearing. Export potential: SMEs contribute a large share of manufactured exports in most industrialized East Asian economies like China and India, ranging from 31-56%, than less developed African economies of less than 1% in Tanzania and Malawi, for instance. There is therefore the need to focus on policies that will promote the SMEs export potential to boost economic growth and development.

CHAPTER THREE

METHODOLOGY

3.1 Analysis of the Existing System

Ahmad (2021) proposed a Behavioral Investment Theory for small business determining investment strategy of investors. The data was collected from 500 investors in Punjab by using structured questionnaire. Multiple Regression test was performed using SPSS to test the relationship. The parameter used for the prediction investment are economy, politics and regulation which could all affect the individual investment. The application collects information from third-party like social media. Pulling large amounts of data from these social media users avoids bias and establishes reliable sourcing. Using this information as a predictor, the app computes data and effectively predicts the performance of the investment for the next three days.

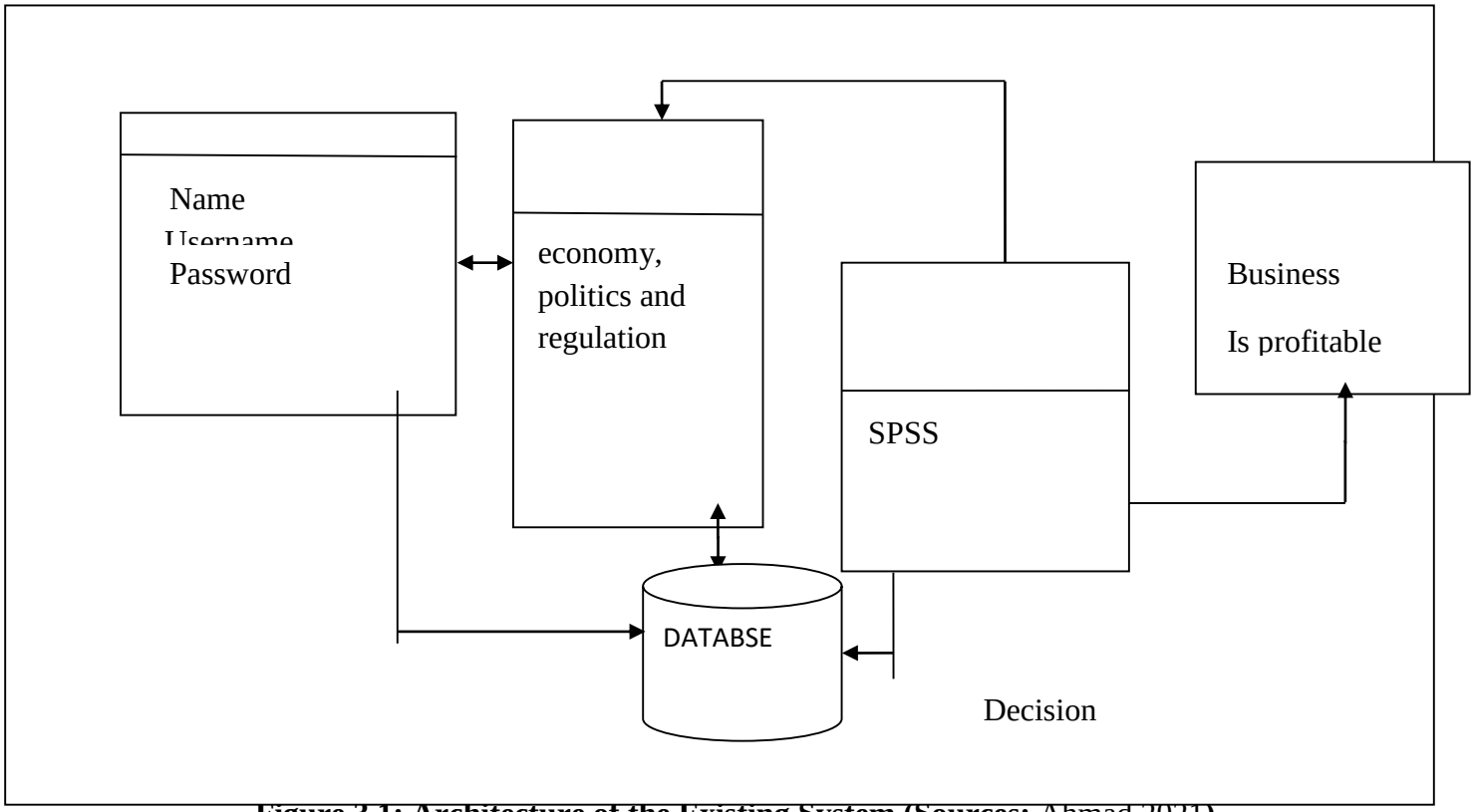


Figure 3.1: Architecture of the Existing System (Sources: Ahmad 2021**)**

3.1.2 Constraints of the Existing System

The existing system is therefore constrained with the following;

i. It is not an expert system

ii. The dataset was too small

iii. The duration for business investment prediction was too short

3.2Analysis of the Proposed System

The proposed system is Developing and Evaluation New Methods of Software Process and Project Improvement in the Context of Small and Medium Sized Enterprises. The system consists of fuzzy logic and user. The user has to register with the system. Enter his monthly income for a particular period of time. In the Fuzzy logic Knowledge Base, Fuzzification, Inference Engine and Defuzzification are the essential components of our model. Relational database Knowledge Base stored the user information and the parameter information like market policy, environment, season pass price and current price. the system generated satisfactory recommendation as when and what to invest based on the user income that has be save and the current investment that can mark with the amount.

3.2.1 Justification of the Proposed System

i. it is an expert system

ii. it stores user information

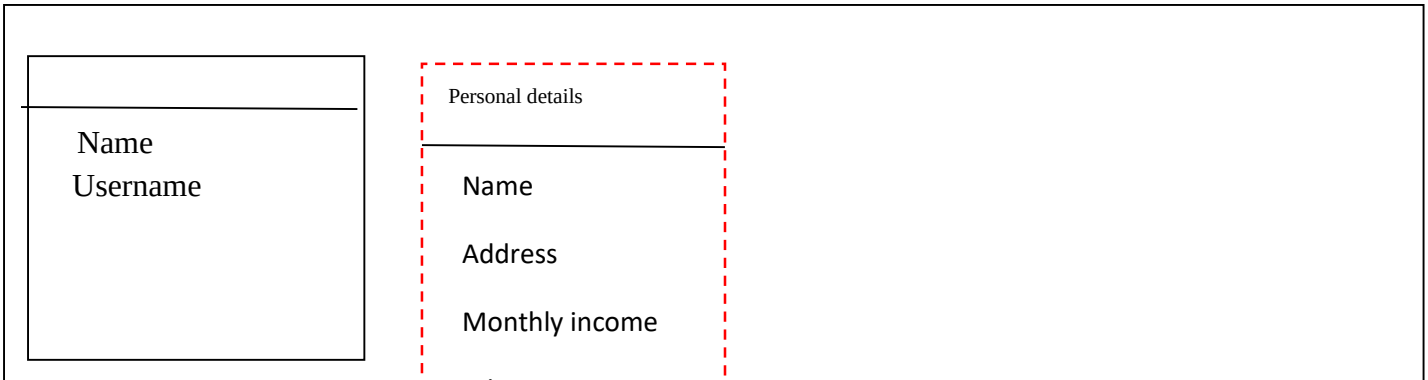
iii. it predicts more than one investment for users

3.3 Method Adapted in the study

The Object-Oriented Development (OOD) method was adopted in the study. The method promises to reduce development time, reduce the time and resources required to maintain existing applications, increase code reuse, and provide a competitive advantage to organizations that use it.

3.4 Architecture of the Proposed System

Once a user logged on, the browser presents the main module of the system to the user. to create an account and login enter the monthly income before the fuzzy system will make it prediction based on the raw data enter by the user. The first step is the conversion of this raw data into processed data. This is done using **Rule Base**, since in the raw data collected there are multiple attributes but only a few of those attributes are useful for the purpose of prediction. So the first step is **Rule Base**, where the key attributes are extracted from the whole list of attributes available in the raw dataset. **Rule Base** starts from an initial state of measured data and builds derived values or features. These features are intended to be informative and non-redundant, facilitating the subsequent learning and generalization steps. followed by a **Fuzzifier** process wherein the data that was obtained after **Inference Engine** is split into two different and distinct segments. **Defuzzifier** make the prediction of the investment to the user based on the amount save in the database. by analyzing its historical data. The architecture of the proposed is shown in figure 3.2



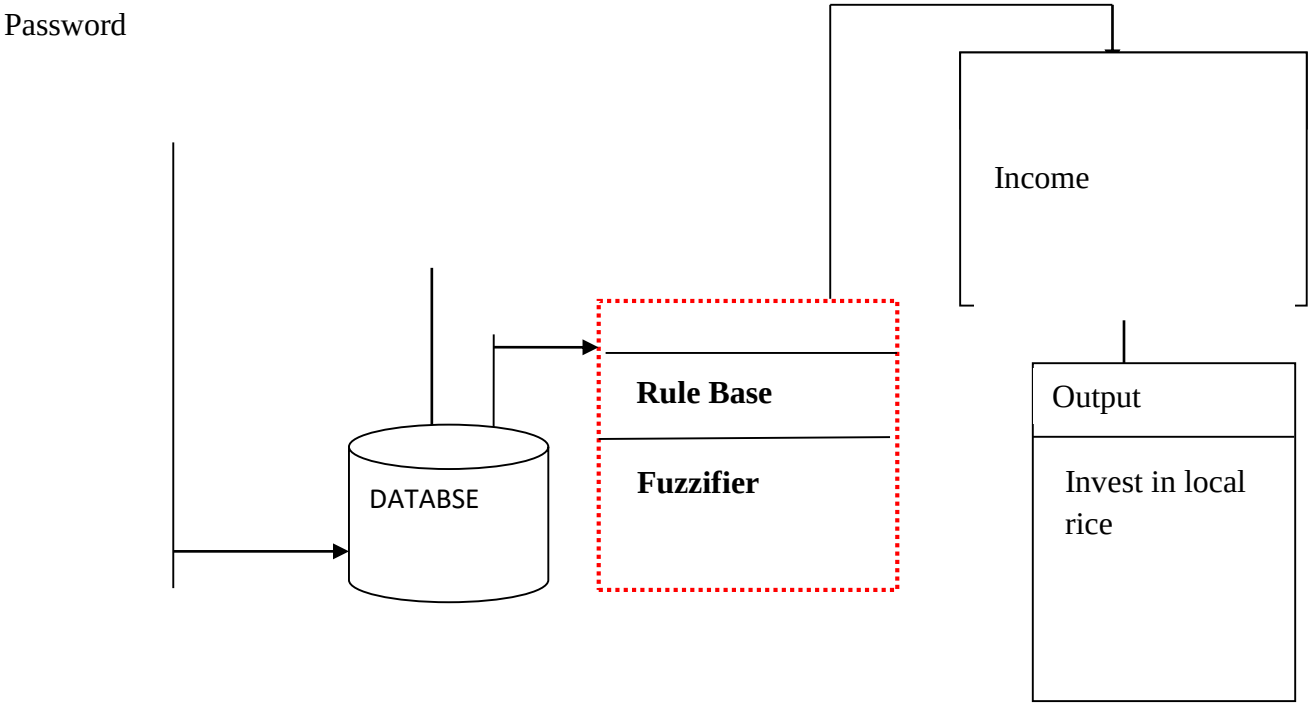
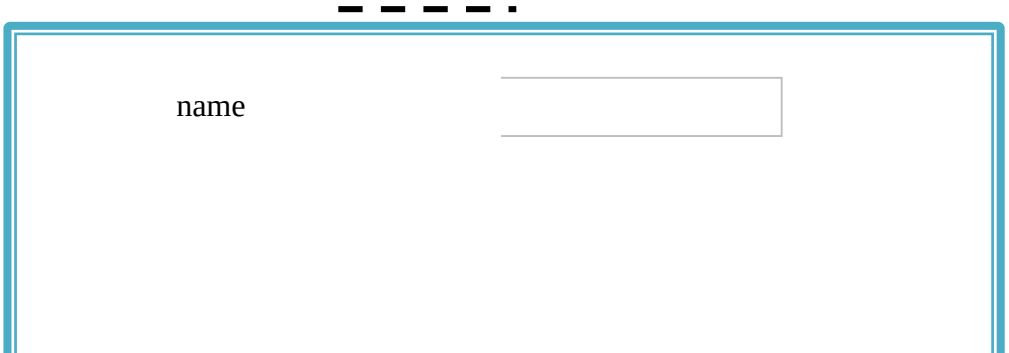


Figure 3.2: Architecture of the Proposed System

3.4.1 High Level Input Model

This is about the interface that the user will use to interact with the program. The user will be able to enter is monthly income. The request form include name, address, monthly salary and Any smart devices like phone, desktop and laptop can be used to capture the information into the system. figure 3.3 Input design of the proposed system



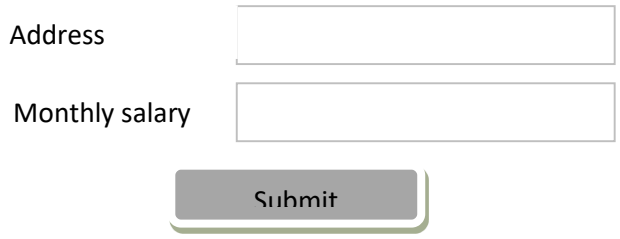
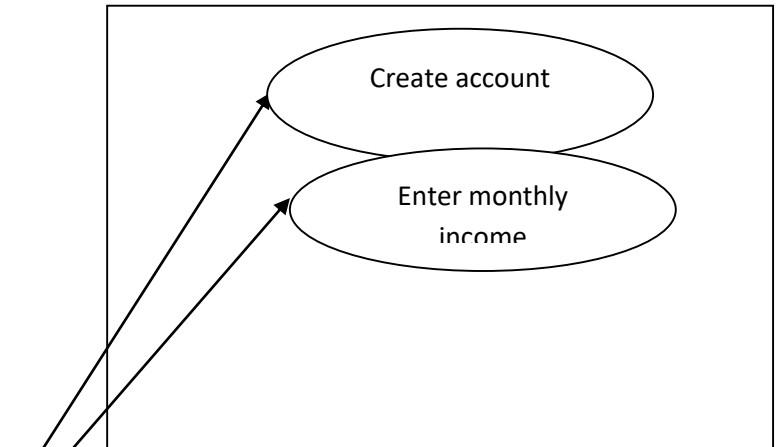


Figure 3.3: Input Design of the System

Since the development of this application is based on web based that means the users must click on submit button after required fields to save it in the database for fuzzy logic to make it prediction.

3.4.4 High level process design

The interoperability Use Cases provide a description of the workflows that need to be addressed and the main exception situations. The USE-CASE diagram shows in figure 3.4 below. The user creates an account, enter the monthly income save it inside the database for the fuzzy logic system to make it prediction based on the amount.



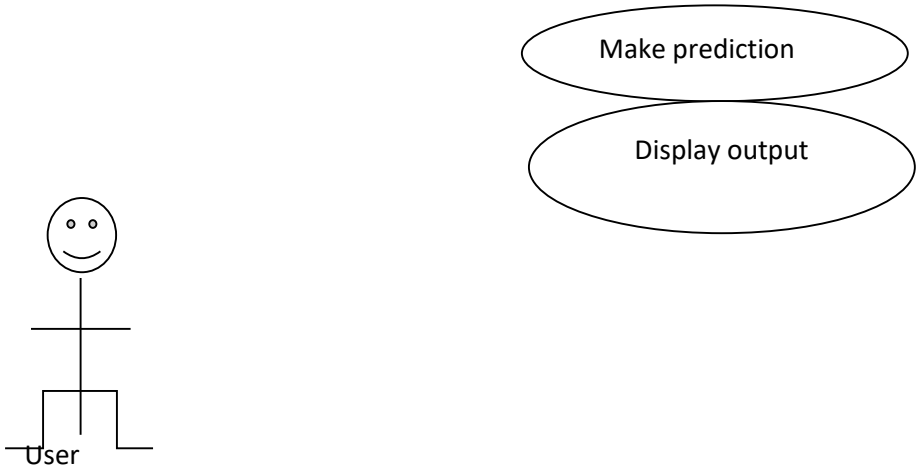
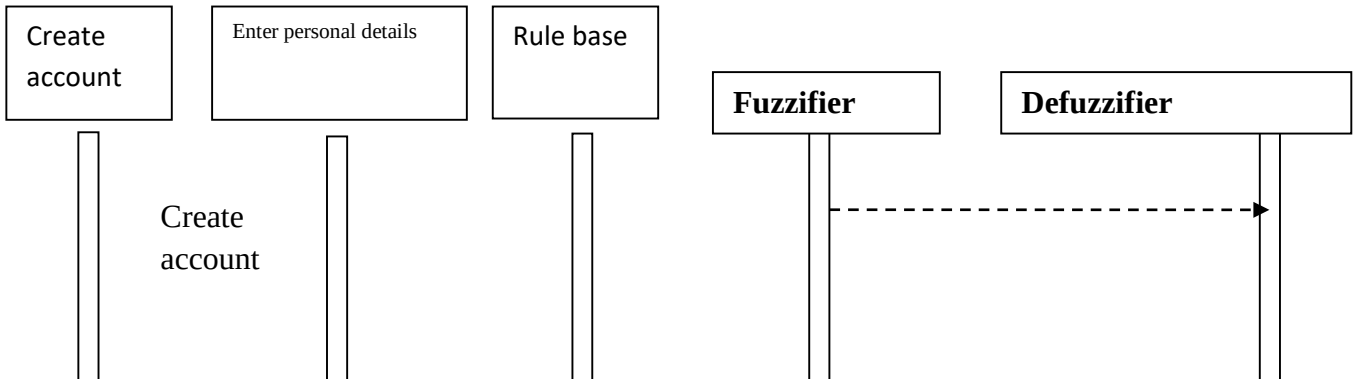


Figure 3.4 USE-CASE diagram of the proposed system

3.4.5 Sequence Diagrams

Sequence diagram show how object interact with each other via messages in the execution of an operation. This workflow starts when a user register enters the monthly salary save it to the database for decision making. The fuzzy logic rule base will check the condition in the **Fuzzifier for Defuzzifier to make it prediction send it to the user for the investment.** A sequence diagram depicts in figure 3.5.



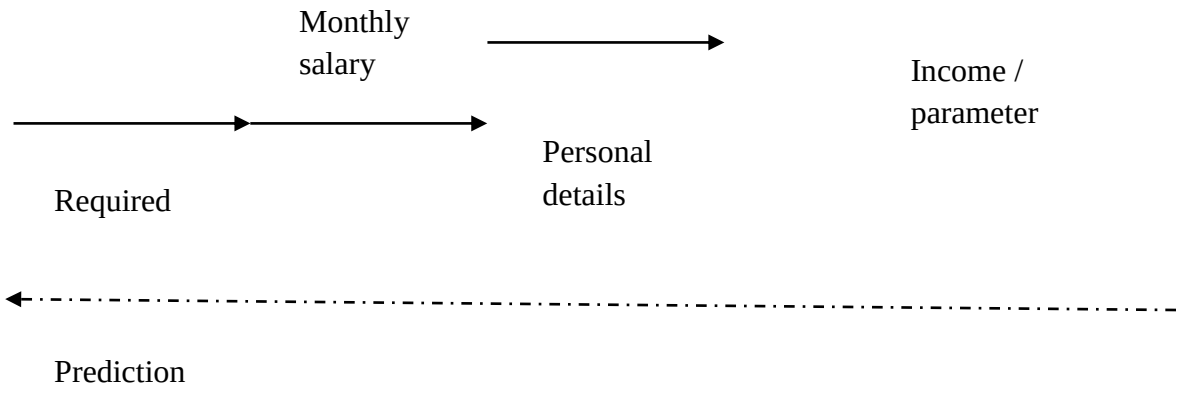
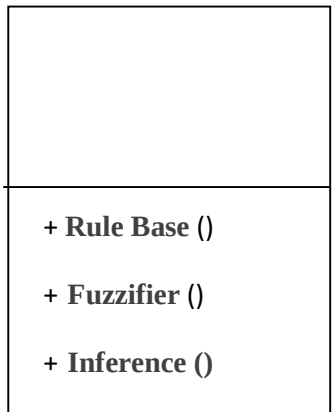


Figure 3.5 Sequence Diagram of the proposed system

3.4.6 Class Diagram

The class diagram of the investment income system is the complete relationship between the components and their attributes predicting investment to individual based on the person current income save. The component are user, personal details, fuzzy logic and output. The fuzzy logic is the trained system to use the personal details information of the user to make prediction Show in figure 3.6 Class diagram of the proposed system.



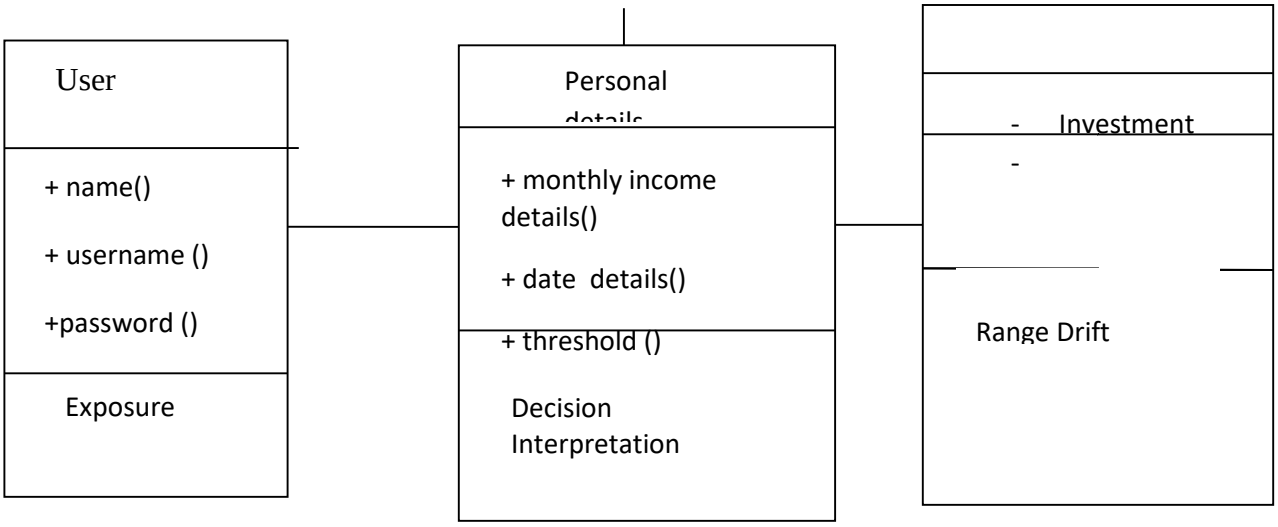
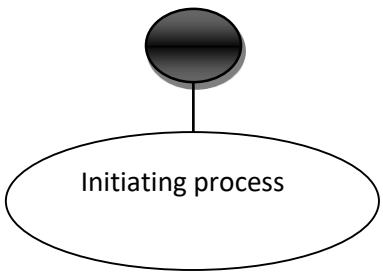


Figure 3.5 Class Diagram of the proposed system

3.4.7 Flowchart Diagram

The system Flowchart Diagram presents a pictorial representation of the entire system show in figure 3.6. The system will display main menu where the user can enter is details including name, monthly income, the system will use the information of the user to make it prediction of investment to the user.



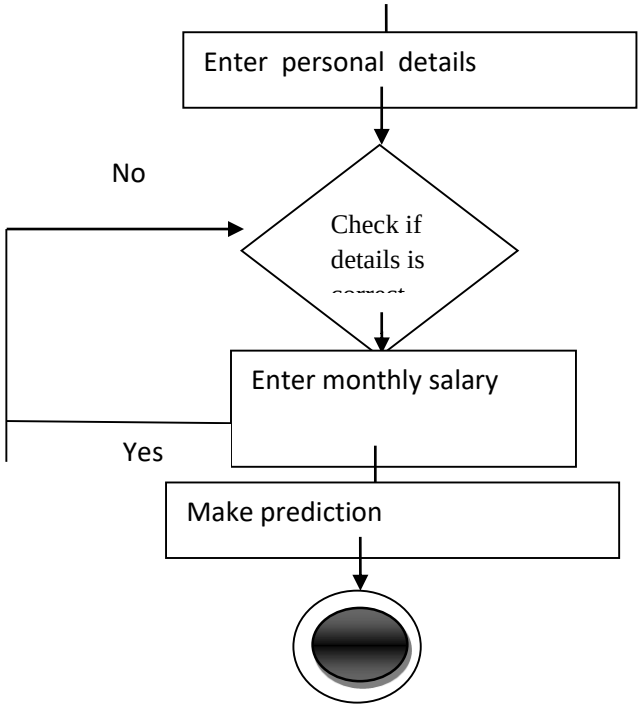
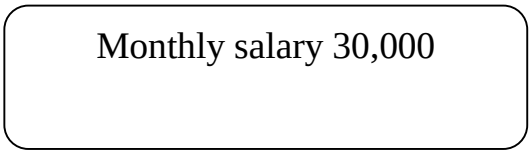


Figure 3.6 Flowchart Diagram of the proposed system

3.5 High Level output put model

The output design shows the process of predicting the result. After the variables had been entered it will be passed through the fuzzy logic model then an output will be given. Figure 3.7 output of the proposed system.



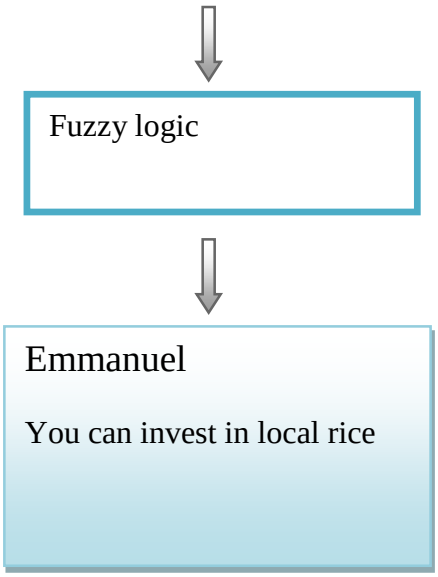
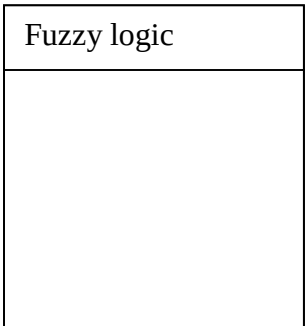


Figure 3.7: Output form of the proposed system

3.6 Database Design of the proposed System

The fuzzy database system database design is a database design use, for managing individual information functions and events. It enables user to register personal details into the database. .The purpose of the database Design is to make a secure and easy way of storing information of the individual details and choose of investment .The process of doing database design generally consists of a number of steps which will be carried out by the database designer. Usually, the designer must:

- Determine the relationships between the different data elements.
- Superimpose a logical structure upon the data on the basis of these relationships



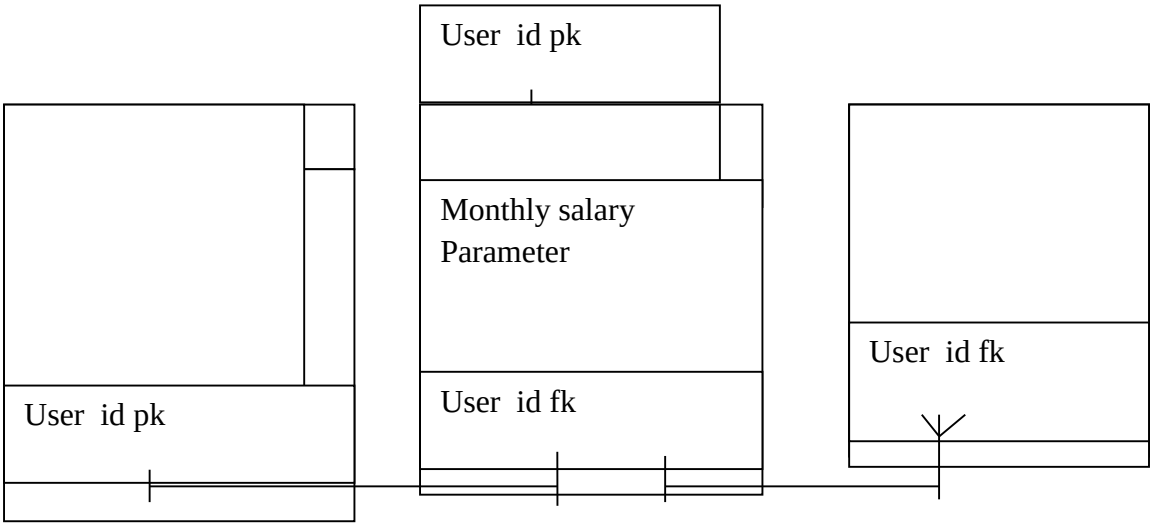


Figure 3.7 Logical Data Model

Table 3.1 Database design

Field Name	**Description**	**Type**	**Length**
User _id (PK)	User ID	Varchar	10
Name	Name	Varchar	50
Age	Age	Int	3
Gender	Gender	Varchar	50
Address	Address	Varchar	50
Salary	Salary	Varchar	50

CHAPTER FOUR

IMPLEMENTATION / DISCUSSION

4.1 Programming Language of Implementation

The system is developed using certain tools and in specific environment. These tools are briefly discussed in this section.

i) Hypertext Pre-processor: is generally employed free open-source software platform independent scripting language that is mostly appropriate for web design with which can be ingrained into HTML, it is employed to control vigorous content, database, session hounding, this desegregated with a number of a known database, including Microsoft Structure Query Server. PHP is a scripting language constructed to fill the space within server Side Includes and Perl, deliberate largely for the web surrounding. PHP performs system functions, handles forms, it has access to restrict users from viewing some pages of your choice, it is easy, flexible, secured, familiar and efficient in use.

ii) MY Structured Query Language is a relational database management system that gives many users access to a figure of databases. MySQL is used in the taking of things or tables arranged into predefined classes or demonstrate tables from which data can be gained or reassembled in several different ways without having to redefine the database tables.

iii) JAVASCRIPT is a query language which permits an individual to implement features that are complex on web pages, it enables a person to create dynamically updating contents, control multimedia, animate images. JavaScript is a client-side programming language that is approximately quick for the final-user, metaphoric configuration to websites, needless of anthology, it is effortless to sort and test, Occasionally-based computer technology, it has subprogram or function proficiency.

4.1.1 Reasons for choice of Programming Language

Hypertext Pre-processor (PHP) has some reasons and unique features which makes it a preferable programming language for this study. It is a generally acclimated all-around orchestrate language which is used to develop dynamic web applications which does not require installation unlike application developed with Java, Kotlin, Dart, C++, C. For instance, PHP runs on the Sever and not on the client's computer which makes my software takes little or no space in the client's device and fast as well. It is platform independent, runs on any operating system.

4.2 System Requirements

For the effective implementation and performance of the new system, the following system configuration in terms of hardware and software are required;

4.2.1 Hardware Requirements

i. The processor speed should be 2.3 GHz and above
ii. Intel Processor Core i3 and above
iii. A memory of 2GB of RAM and above
iv. Hard disk size should be 263GB and below
v. Network interface card (NIC).
vi. MODEM

4.2.2 Software requirements

i. Windows 8 and higher.
ii. Application packages required: XAMPP Apache and MYSQL local sever
iii. Web browser: up to date web browser (Google chrome/Firefox browser).
iv. Bootstrap 4 framework.

v. PHP

vi. MY SQL

4.3 Results and Discussion

Figure 4.1 A login form utilizes the credentials of a user, in order to authenticate their access. It generally consists of the typical username or email and password. But more fields can be added to improve the site's security. In the proposed system email and password is use to login after admin most have register the person.

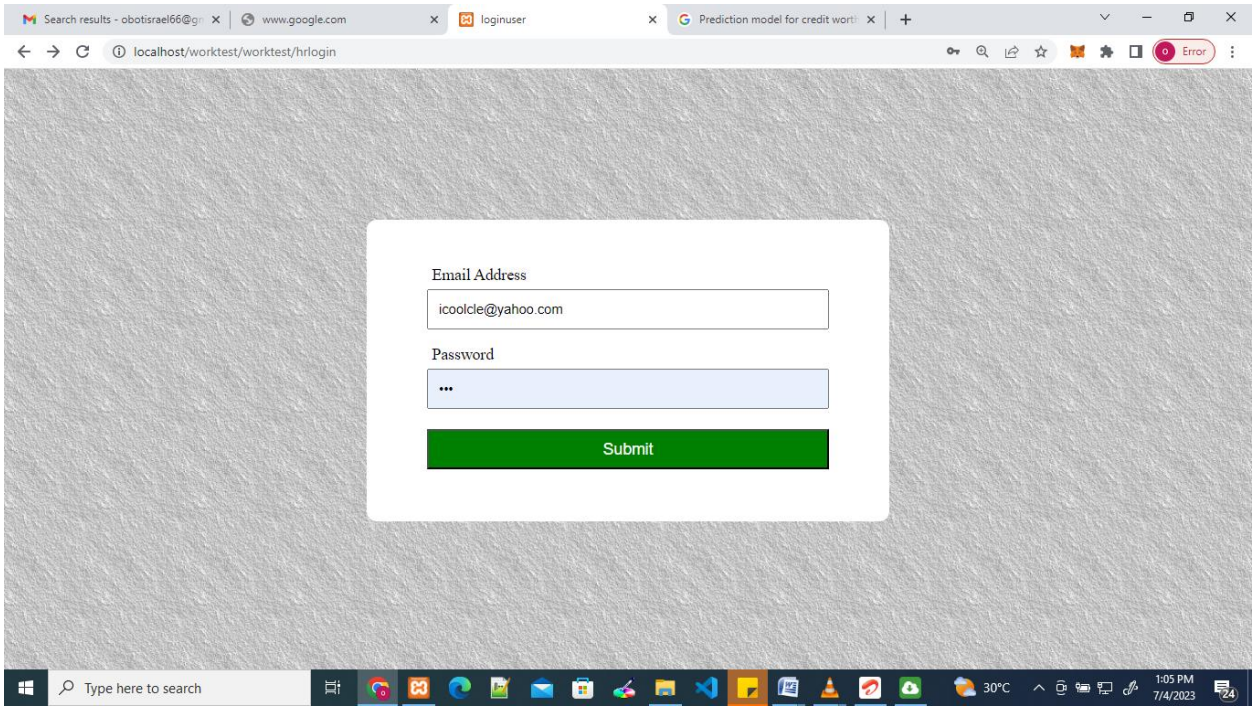


Figure 4.1 Home Page

Figure 4,2 dashboard. In business computer information systems, a dashboard is a type of graphical user interface which often provides at-a-glance views of key performance indicators relevant to a particular objective or business process. The dashboard content information of all the admin function.

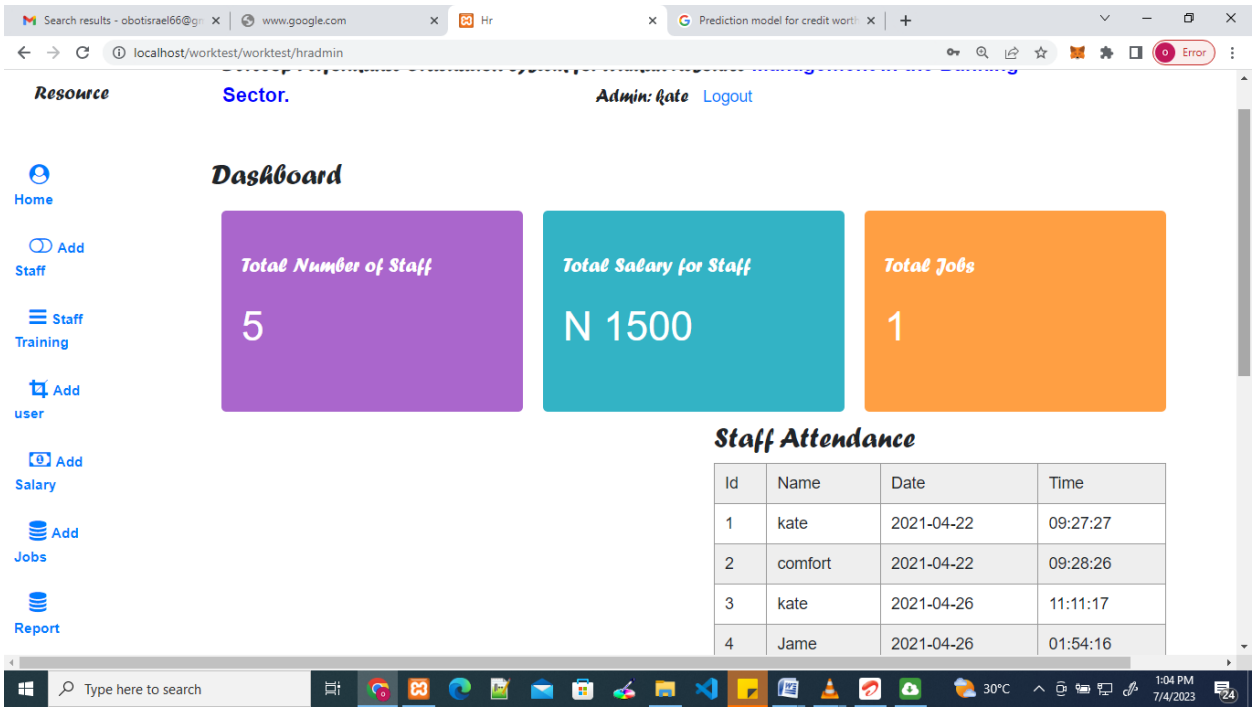


Figure 4.2 dashboard of the proposed system

Figure 4.3 Job task analysis is a tool for creating a detailed breakdown of the specific responsibilities in a role. It is a systematic procedure for researching and identifying the exact duties of a role and the tasks that make up each duty.

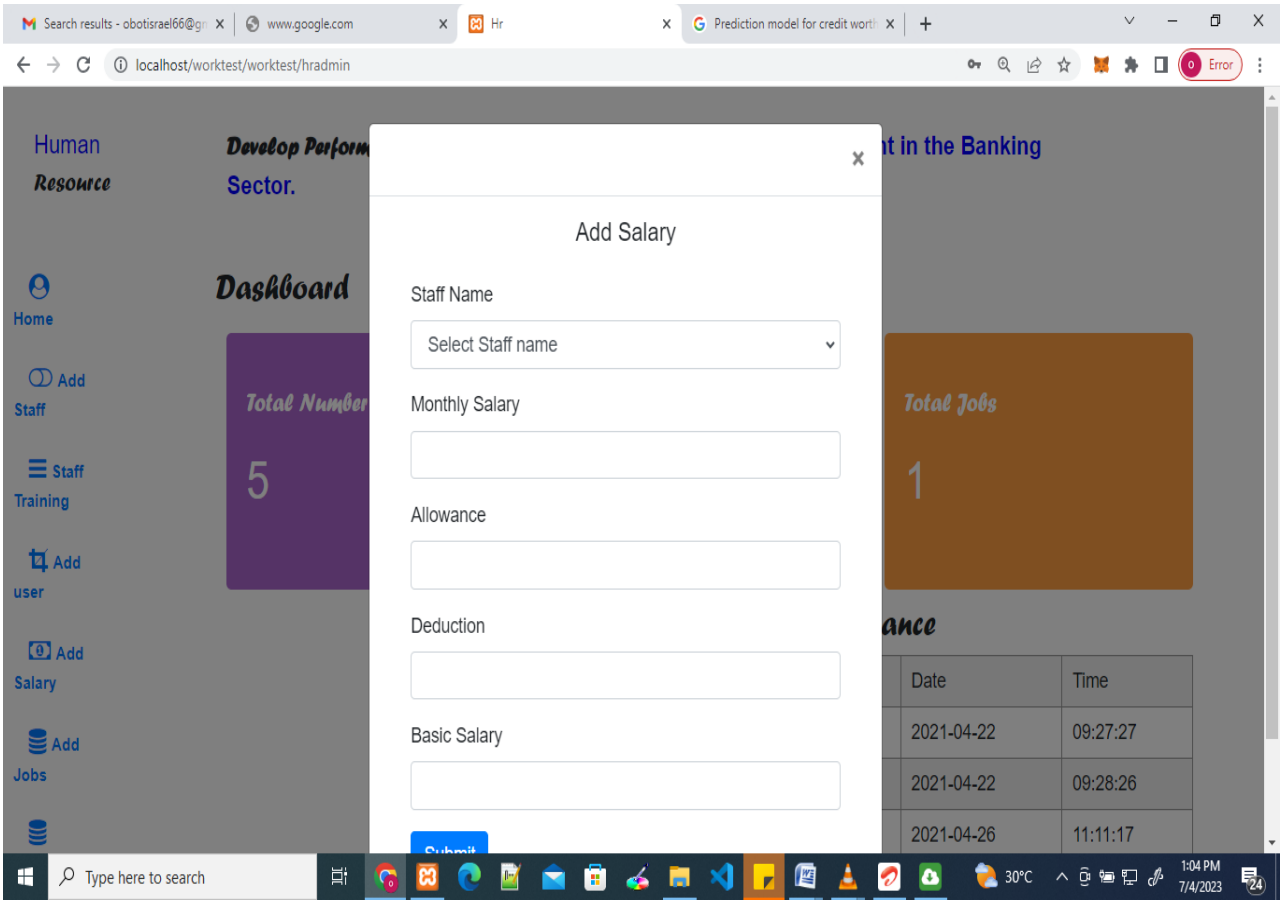


Figure 4.5 Task Page of the Proposed System

CHAPTER FIVE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Summary

It is important to ascertain that the objective of this study was to ascertain information technology and the productivity of SMEs in Nigeria. The relevant data collected for this study were presented, critically analyzed and appropriate interpretation given. In this chapter, certain recommendations made which in the opinion of the researcher will be of benefits in addressing the challenges of information technology and the productivity of micro-business. This study was on information technology and the productivity of micro-business in Nigeria. To achieve the study's aim and objectives, the study analyzed the existing approaches towards SPI in inventory management which focused on SMEs. It also designed a model for software process inventory management in small and medium enterprises. The study also implemented its proposed model using Python programming language and finally evaluated the implemented model performance.

These objectives were raised which included: To ascertain if micro-business increase their productivity and efficiency through the use of IT, to ascertain ways IT enhancing efficiency in the Nigerian micro-business, to ascertain the relationship between information technology and the productivity of micro-business, to ascertain the different areas of micro-business where the use of IT can improve micro-business productivity.

5.2 Conclusion

In conclusion, implementing a data management system is crucial for the success and growth of small and medium-sized enterprises (SMEs). A well-designed data management system enables SMEs to efficiently collect, store, organize, and analyze data, providing valuable insights that drive informed decision-making and strategic planning. With such a system in place, SMEs can

streamline their operations, optimize resource allocation, enhance customer experiences, and identify untapped opportunities for growth. Moreover, a data management system helps SMEs meet regulatory requirements, ensuring data privacy and security while building trust with customers and partners. By centralizing data and enabling real-time access, collaboration among teams and departments improves, promoting a culture of data-driven innovation.

5.3 Recommendations

- Establish a centralized data repository to ensure easy access, data consistency, and enhanced collaboration among different teams and departments.
- Set up automated data backups and implement robust data monitoring practices to prevent data loss, unauthorized access, or system failures.
- Utilize data analytics tools to extract meaningful insights from the collected data. Create customizable reports and dashboards that facilitate quick decision-making and performance tracking.
- If implementing a data management system seems daunting, consider seeking guidance from data management experts or consultants who can help tailor solutions to your SME's specific requirements.

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APPENDIX A

SOURCE CODES

```
<style>

 #en{

  margin-left: 23px;

 }
```

```
.datea{
  width:320px;
  height:40px;
}
.desi{
  width:100%;
        display: flex;
  margin-left:100px;
}
.let{
   background-color:#aa66cc;
   width:300px;
   height:200px;
   border-radius: 5px;
   margin:10px;
 }
.midle{
```

```
  background-color:#33b3c5;
   width:300px;
   height:200px;
   border-radius: 5px;
   margin:10px;

}
.righ{
  background-color:#ff9f43;
   width:300px;
   height:200px;
   border-radius: 5px;
   margin:10px;

}
.tsn{
  color:white;
```

```
  font-size:20px;
  margin-left:20px;
  margin-top:40px;

}
.nk{
  color:white;
  font-size:40px;
  margin-left:20px;
}
.slider2{
  display:flex;

  margin-left:100px;
  padding-top:-50px;
}
.slider3{
```

```
  display:flex;
  margin-left:100px;
  padding:10px;

}
.slider4{
  margin-left:100px;
  padding:10px;
  width:700px

}
.thismonth{
  width:250px;
}
.thisweek{
  width:250px;
}
```

```
.yesterday{
  width:250px;
}
.today{
  width:250px;
}
#curve_chart{
  width:500px;
   height:400px;


}
.stfa{
  width:400px;
  margin-right:30px;
}
table {
  border-collapse: collapse;
```

```
}

td, th {
  border: 1px solid #999;
  padding: 0.5rem;
  text-align: left;
}

table
{
  border-collapse:collapse;
  width:450px;
}
td
{
  padding: 10px;
}
```

```
th
{
  padding: 20px;
}
tbody tr:nth-child(odd) {
    background: #eee;
  }
  .re{
  font-size:16px;
  font-family:arial;
  color:blue;
  }
  .stu{
    color:red;
    text-align:center;
    font-size:20px;
```

```
}
.btnx{
  display:flex;
  background-color:green;
  color:white;
}

h1{
  margin-left:100px;
  padding:10px;
}
.app{
  width:950px;
}
.b2{
  text-align:center;
  margin:10px;
```

```
  }


</style>


<!DOCTYPE html>
<html lang="en">
<head>
<title>Hr</title>
<link  href="{{ url('public/css/bootstrap.css') }}" rel="stylesheet">
  <link href="{{ url('public/css/hradmin.css') }}" rel="stylesheet" />



  <link href="{{ url('public/font-awesome/css/font-awesome.css') }}"  rel="stylesheet"/>
<meta charset="utf-8">
</head>
<script src="{{ url('public/js/loader.js') }}"></script>
<script src="{{ url('public/js/jscharting.js') }}"></script>
```

```
<script type="text/javascript">
  google.charts.load('current', {'packages':['corechart']});
  google.charts.setOnLoadCallback(drawChart);

  function drawChart() {
    var data = google.visualization.arrayToDataTable([
      ['Year', 'Sales', 'Expenses'],
      ['2018',  1000,      400],
      ['2019',  1170,      460],
      ['2020',  660,       1120],
      ['2021',  1030,      540]
    ]);

    var options = {
      title: 'Company Yealy Performance',
      curveType: 'function',
      legend: { position: 'bottom' }
```

```
        };


        var chart = new google.visualization.LineChart(document.getElementById('curve_chart'));



        chart.draw(data, options);
      }
    </script>
<body>
     <div class="conta">
            <div class="left">
                <header>
                    <p><font color="blue">Human</font> Resource</p>
                 </header>
                <ul>
                    <li><a href="{{ url('hradmin')}}"><span class="fa fa-user-circle"
id="home"></span>Home</a></li>


                    @if(Auth::user()->role == 'admin')
```

Add Staff

@endif

@if(Auth::user()->role == 'admin')

Staff Training

@endif

@if(Auth::user()->role == 'admin')

Add user

@endif

@if(Auth::user()->role == 'admin')

Add Salary

```
                @endif


                 @if(AUTH::user()->role == 'staff')

                <li><a href="" data-toggle="modal" data-target="#exampleModalCenter6"><span
class="fa fa-database" id="home"></span>Apply for Leave</a></li>

                 @endif


                 @if(Auth::user()->role == 'admin')

                <li><a href="" data-toggle="modal" data-target="#exampleModalCenter10">


               <span class="fa fa-database" id="home"></span>Add Jobs</a></li>

                 @endif


                @if(Auth::user()->role == 'admin')

                 <li><a href="" data-toggle="modal" data-target="#exampleModalCenter">


               <span class="fa fa-database" id="home"></span>Report</a></li>

                 @endif
```

@if(Auth::user()->role == 'staff')

Compliant

@endif

@if(Auth::user()->role == 'staff')

<li class="payment">Attendance

@endif

@if(Auth::user()->role == 'admin')

<li class="payment">Check

@endif

```
                    <hr>
                    <li class="about"><a href=""><span class="fa fa-gears" id="home"></span>About</a></li>
                </ul>
            </div>

            <div class="right">
                <section id="in">
                    <span class="ad">Develop Performance Evaluation System for Human Resource

<font color="blue"> Management in the Banking Sector.</font></span>

                    <span class="adm" name="user_email" value="{{ Auth::user()->email}}">Admin: {{ Auth::user()->name }} </span>

                    <span><a href ="{{url('hrlogin')}}">Logout</a></span>
                </section>
```

```
<section id="mabody">
      <h3>Dashboard</h3>
 </section>

 @if(Auth::user()->role == 'staff')
            <div class="let">
                 <p class="tsn">Monthly Salary</p>

             </div>

              @endif

    @if(Auth::user()->role == 'admin')
     <section class="desi">
          <div class="let">
```

```
        <p class="tsn">Total Number of Staff</p>
          <span class="nk">{{$count}}</span>
        </div>

        <div class="midle">
          <p class="tsn">Total Salary for Staff</p>
          <span class="nk">N 1500</span>
        </div>

        <div class="righ">
           <p class="tsn">Total Jobs</p>
             <span class="nk">{{$jobcount}}</span>
        </div>
    </section>

    <section class="slider2">
           <div id="curve_chart">
```

```
        </div>


    <div class="stfa">
    <h3>Staff Attendance</h3>
        <table>


        <tr>
            <td>Id</td>
            <td>Name</td>
            <td>Date</td>
            <td>Time</td>


          </tr>
@foreach ($area as $row)
 <td>{{ $row->id}}</td>
 <td>{{ $row->name}}</td>
```

```
 <td>{{ $row->date}}</td>

 <td>{{ $row->time}}</td>

</tr>

@endforeach

            </table>

        </div>



   </section>


  @endif


  @if(Auth::user()->role == 'admin')

   <section class="slider4">


        <div class="stfa">

        <h3>Leave Application</h3>
```

```
<table class="app">

<tr>
    <td>Id</td>
    <td>Name</td>
    <td> Starting Date</td>
    <td>Ending Date</td>
    <td class="stu">Status</td>
</tr>
@foreach ($areaList as $leaves)
<td>{{ $leaves->id}}</td>
<td>{{ $leaves->name}}</td>
<td>{{ $leaves->startdate}}</td>
<td>{{ $leaves->enddate}}</td>
  <td class="b2">
  <button type="submit" class="btn btn-primary"> Approve</button>
```

```
        <button type="submit" class="btn btn-danger"> Reject</button>

        </td>



</tr>

@endforeach

            </table>

        </div>




  </section>



  @endif

  @if(Auth::user()->role == 'admin')

  <h1>Expenditure</h1>

  <section class="slider3">



      <div class="thismonth">
```

```
    <h3>This Month<h3>
      <span>N 41,234<span>
</div>
<div class="thisweek">
<h3>This Week<h3>
      <span>N 10,180<span>
</div>
<div class="yesterday">
<h3>Yesterday<h3>
      <span>N 1,180<span>
</div>
<div class="today">
<h3>Today<h3>
      <span>N 780<span>
</div>
```

```
                </section>

                @endif

            </div>




</div>

        <!--

          <div class="char1">

                <div id="curve_chart">



                </div>

                  <div class="cure_chart2">

                   <div class="numberofstaff">

                        <h4>Total number of Staff</h4>

                       <span class ="tn">{{$count}}</span>

                   </div>

                   <div class="numberofstaff">
```

```
                        <h4>Total number of  Staff on leave</h4>

                    </div>

                </div>

                </div>

                   -->

<!--

            <div id="char2">

              <div id="donutchart">

               </div>
```

```
<div id="te">
  <h2>Staff Salary Record</h2>
   <table border = 1>
       <tr>
           <td>ID</td>
           <td>Surname</td>
           <td>Salary</td>
           <td>Department</td>
      </tr>
       @foreach ($areaList as $row)

       <td>{{ $row->id }}</td>
       <td>{{ $row->surname }}</td>
       <td>{{ $row->salary }}</td>
       <td>{{ $row->department}}</td>
      </tr>
       @endforeach
```

```
                </table>
            </div>
        </div>
                -->

<!-- register -->
<div class="modal fade" id="exampleModalCenter1" tabindex="-1" role="dialog" aria-hidden="true">
<div class="modal-dialog modal-dialog-centered" role="document"> <div class="modal-content">
<div class="modal-header text-center">
<button type="button" class="close" data-dismiss="modal" aria-label="Close">
<span aria-hidden="true">&times;</span> </button> </div> <div class="modal-body">
<div class="login px-4 mx-auto mw-100"> <h5 class="text-center mb-4">Add Staff</h5>
<form action="{{ url('hradmin') }}" method="post" id="addform">
        {{ csrf_field() }}
        @if(session()->has('success'))
```

{{ session()->get('success') }}

@endif

 <label>Surname</label> <input type="text" class="form-control" name="surname" placeholder="" required="">

 <label>Othername</label> <input type="text" class="form-control" name="othername" placeholder="" required="">

 <label>Phone number</label> <input type="number" class="form-control" name="phone" placeholder="" required="">

 <label>Address</label> <input type="text" class="form-control" name="address" placeholder="" required="">

 <label>Department</label> <input type="text" class="form-control" name="department" placeholder="" required="">

<!-- <label>Salary</label> <input type="number" class="form-control" name="salary" placeholder="" required=""> -->

 <label>Email</label> <input type="email" class="form-control" name="email" placeholder="" required="">

```
<button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter1">Register</button>

</form>

<!--

<form action="#" method="post">

<div class="form-group"> <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required=""> </div>

<div class="form-group"> <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required=""> </div>

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

<p class="text-center pb-4"> <a href="#">By clicking Register, I agree to your terms</a> </p>

</form>

-->

</div>

</div>
```

```
</div>

</div>

</div>

<!--//register-->

<!-- Staff Traning -->

<div class="modal fade" id="exampleModalCenter2" tabindex="-1" role="dialog" aria-hidden="true">

<div class="modal-dialog modal-dialog-centered" role="document"> <div class="modal-content">

<div class="modal-header text-center">

<button type="button" class="close" data-dismiss="modal" aria-label="Close">

<span aria-hidden="true">&times;</span> </button> </div> <div class="modal-body">

<div class="login px-4 mx-auto mw-100"> <h5 class="text-center mb-4">Staff Training</h5>

<form action="{{ url('tra') }}" method="post" id="strain">

{{ csrf_field() }}
```

```
                        <div class="form-row">


<div class="form-group col-md-6">
    <label for="exampleFormControlSelect1">Staff Name</label>
      <select class="form-control" id="exampleFormControlSelect1" name="staffname">
        <option  value="">Select Staff name</option>


                                @foreach($areaListx as $item)
                               <option value="{{ $item->email }}">{{$item->surname}}</option>
                               @endforeach
                             </select>


</div>
```

```
    <div class="form-group col-md-6">
      <label for="inputPassword4">Start date</label>
      <input type="date" class="form-control" id="inputPassword4" placeholder="date" name="statedate">
    </div>
  </div>

  <div class="form-outline">
  <label class="form-label" for="textAreaExample">Training Discription</label>
  <textarea class="form-control" id="textAreaExample" rows="4" name="discription"></textarea>
</div>

      <div class="form-group"> <label>State</label>
      <input type="text" class="form-control" name="state" placeholder=""> </div>
```

```
<button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter2">Submit</button>

</form>

<!--

<form action="#" method="post">

<div class="form-group"> <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required=""> </div>

<div class="form-group"> <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required=""> </div>

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

<p class="text-center pb-4"> <a href="#">By clicking Register, I agree to your terms</a> </p>

</form>

-->

</div>

</div>
```

```
</div>

</div>

</div>


<!-- add user -->

<div class="modal fade" id="exampleModalCenter3" tabindex="-1" role="dialog" aria-hidden="true">

<div class="modal-dialog modal-dialog-centered" role="document"> <div class="modal-content">

<div class="modal-header text-center">

<button type="button" class="close" data-dismiss="modal" aria-label="Close">

<span aria-hidden="true">&times;</span> </button> </div> <div class="modal-body">

<div class="login px-4 mx-auto mw-100"> <h5 class="text-center mb-4">Add User</h5>

<form action="{{ url('addus') }}" method="post" id="addfor">

        {{ csrf_field() }}

    <div class="form-group"> <label>Username</label> <input type="text" class="form-control" name="name" placeholder="" required=""> </div>
```

```
<div class="form-group"> <label>Email</label> <input type="email" class="form-control" name="email" placeholder="" required=""> </div>

<div class="form-group"> <label>password</label> <input type="password" class="form-control" name="password" placeholder="" required=""> </div>

<div class="form-group">

<label for="exampleFormControlSelect1">Role</label>

<select class="form-control" id="exampleFormControlSelect1" name="role">

<option></option>

<option value="admin">Admin</option>

<option value="staff">Staff</option>

</select>

</div>

<button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter3">Add User</button>

</form>

<!--

<form action="#" method="post">
```

 <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required="">

 <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required="">

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

 By clicking Register, I agree to your terms

</form>

-->

<!--//register-->

```
 <!-- compliant -->
<div class="modal fade" id="exampleModalCenter4" tabindex="-1" role="dialog" aria-hidden="true">
 <div class="modal-dialog modal-dialog-centered" role="document"> <div class="modal-content">
 <div class="modal-header text-center">
 <button type="button" class="close" data-dismiss="modal" aria-label="Close">
 <span aria-hidden="true">&times;</span> </button> </div> <div class="modal-body">
 <div class="login px-4 mx-auto mw-100"> <h5 class="text-center mb-4">Staff Complaint Form</h5>
 <form action="{{ url('compl') }}" method="post" id="complaint">
            {{ csrf_field() }}
     <div class="form-group">
      <label>Title</label> <input type="text" class="form-control" name="title" placeholder="" required="">
      </div>
     <div class="form-group">
```

```
 <label for="comment">Message:</label>

 <textarea class="form-control" rows="5" id="comment" name="message"></textarea>

</div>

 <button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter4">Add User</button>

</form>

 <!--

 <form action="#" method="post">

 <div class="form-group"> <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required=""> </div>

 <div class="form-group"> <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required=""> </div>

 <button type="submit" class="btn btn-primary submit mb-4">Register</button>

 <p class="text-center pb-4"> <a href="#">By clicking Register, I agree to your terms</a> </p>

 </form>
```

```
-->
 </div>
 </div>
 </div>
 </div>
 </div>
 <!--complaint-->

<!-- Attand -->
<div class="modal fade" id="exampleModalCenter5" tabindex="-1" role="dialog" aria-hidden="true">
 <div class="modal-dialog modal-dialog-centered" role="document"> <div class="modal-content">
 <div class="modal-header text-center">
 <button type="button" class="close" data-dismiss="modal" aria-label="Close">
```

× </button>

 <h5 class="text-center mb-4">Attandance</h5>

<form action="{{ url('attn') }}" method="post" id="attend">

{{ csrf_field() }}

<label>Staff name</label>

<input type="text" class="form-control" name="name" placeholder="" required="">

<button type="submit" id="en" class="btn btn-primary submit mb-4" id="exampleModalCenter5">Add User</button>

</form>

<!--

<form action="#" method="post">

 <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required="">

 <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required="">

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

 By clicking Register, I agree to your terms

</form>

-->

<!--//register-->

```
<!-- leave -->

<div class="modal fade" id="exampleModalCenter6" tabindex="-1" role="dialog" aria-hidden="true">

 <div class="modal-dialog modal-dialog-centered" role="document"> <div class="modal-content">

 <div class="modal-header text-center">

 <button type="button" class="close" data-dismiss="modal" aria-label="Close">

 <span aria-hidden="true">&times;</span> </button> </div> <div class="modal-body">

 <div class="login px-4 mx-auto mw-100"> <h5 class="text-center mb-4">Apply for Leave</h5>

 <form action="{{ url('leav') }}" method="post" id="leavmgt">

            {{ csrf_field() }}

        <div class="form-group">

            <label>Staff Name</label>
```

```
            <input     type="text"     class="form-control"          value="{{     Auth::user()->email}}"
name="name" placeholder="" required="">



          </div>
  <div class="form-group">
    <label for="exampleFormControlSelect1">Leave Type</label>
    <select class="form-control" id="exampleFormControlSelect1" name="type">
      <option></option>
      <option value="casual leave">Casual leave</option>
      <option value="maternity leave">Maternity leave</option>
      <option value="sick leave">Sick leave</option>
    </select>
  </div>



  <div class="form-group">
    <label for="exampleFormControlSelect1">Start Date</label>
    <div>
       <input type="date" name="startdate" class="datea">
```

```
  </div>
 </div>
 <div class="form-group">
  <label for="exampleFormControlSelect1">End Date</label>  <div>
    <input type="date" name="enddate" class="datea">
  </div>
 </div>
    <button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter6">Submit</button>
</form>
 <!--
 <form action="#" method="post">
 <div class="form-group"> <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required=""> </div>
```

 <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required="">

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

 By clicking Register, I agree to your terms

</form>

-->

<!-- Add Salary -->

```
<button type="button" class="close" data-dismiss="modal" aria-label="Close">

<span aria-hidden="true">&times;</span> </button> </div> <div class="modal-body">

<div class="login px-4 mx-auto mw-100"> <h5 class="text-center mb-4">Add Salary</h5>

<form action="{{ url('salb') }}" method="post" id="addsary">

            {{ csrf_field() }}



 <div class="form-group">

   <label for="exampleFormControlSelect1">Staff Name</label>

   <select class="form-control" id="exampleFormControlSelect1" class="sta" name="email">

                                <option  value="">Select Staff name</option>

                                    @foreach($areaListx as $item)

                                   <option value="{{ $item->email }}">{{$item->surname}}</option>

                                   @endforeach

                                </select>

                             </div>
```

 <label>Monthly Salary</label> <input type="number" class="form-control" name="monthlysalary" placeholder="" required="" id="monthlysalary">

 <label>Allowance</label> <input type="number" class="form-control" name="allowance" placeholder="" id="allowance">

 <label>Deduction</label> <input type="number" class="form-control" name="deduction" placeholder="" id="deduction">

 <label>Basic Salary</label> <input type="number" class="form-control" name="basicsalary" placeholder="" id="basicsalary">

<button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter7" onclick="price()">Submit</button>

</form>

<!--

<form action="#" method="post">

 <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label class="mb-2">Password</label> <input

```
type="password" class="form-control" name="password" id="password1" placeholder="" required=""> </div>

 <div class="form-group"> <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required=""> </div>

 <button type="submit" class="btn btn-primary submit mb-4">Register</button>

 <p class="text-center pb-4"> <a href="#">By clicking Register, I agree to your terms</a> </p>

 </form>

-->

 </div>

 </div>

 </div>

 </div>

 </div>

 <!-- add Job-->
```

<button type="button" class="close" data-dismiss="modal" aria-label="Close">

× </button>

 <h5 class="text-center mb-4">Add Job</h5>

<form action="{{ url('addjo') }}" method="post" id="addjobz">

{{ csrf_field() }}

 <label>Company name</label> <input type="text" class="form-control" name="companyname" placeholder="" required="">

 <label>Job Title</label> <input type="text" class="form-control" name="jobtitle" placeholder="" required="">

<label class="form-label" for="textAreaExample">Job Discription</label>

<textarea class="form-control" id="textAreaExample" rows="4" name="discription"></textarea>

 <label>Location</label>

<input type="text" class="form-control" name="location" placeholder="">

 <label>Start Date</label> <input type="date" class="form-control" name="sdate" placeholder="" required="">

<button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter10">Add User</button>

</form>

<!--

<form action="#" method="post">

 <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required="">   <label class="mb-2">Password</label> <input

type="password" class="form-control" name="password" id="password1" placeholder="" required="">

 <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required="">

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

 By clicking Register, I agree to your terms

</form>

-->

<!--//register-->

<!-- check-->

<button type="button" class="close" data-dismiss="modal" aria-label="Close">

× </button>

 <h5 class="text-center mb-4">Add Job</h5>

<form action="{{ url('cc') }}" method="post" id="checks">

{{ csrf_field() }}

 <label>Company name</label> <input type="text" class="form-control" name="companyname" placeholder="" required="">

<button type="submit" class="btn btn-primary submit mb-4" id="exampleModalCenter15">Add User</button>

</form>

```
<!--

<form action="#" method="post">

<div class="form-group"> <label>First Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label>Last Name</label> <input type="text" class="form-control" name="text" placeholder="" required=""> </div> <div class="form-group"> <label class="mb-2">Password</label> <input type="password" class="form-control" name="password" id="password1" placeholder="" required=""> </div>

<div class="form-group"> <label>Confirm Password</label> <input type="password" class="form-control" name="password" id="password2" placeholder="" required=""> </div>

<button type="submit" class="btn btn-primary submit mb-4">Register</button>

<p class="text-center pb-4"> <a href="#">By clicking Register, I agree to your terms</a> </p>

</form>

-->

</div>

</div>

</div>

</div>

</div>
```

```
 <!--//register-->



    <script src="{{ url('public/js/jquery-2.2.3.min.js') }}"></script>

    <script src="{{ url('public/js/bootstrap.js') }}"></script>

</body>

</html>

<script type="text/javascript">

  $(document).ready(function (){

      $('#addform').on('submit', function(e){

        e.preventDefault();



        $.ajax({

            type: "POST",

           // url: "/studentadd",

            url:"@php echo route('hradmin'); @endphp",

            data: $('#addform').serialize(),

            success: function(response){
```

```
            console.log(response)
            $('exampleModalCenter1').modal('hide')
            alert("Data Saved");
          },
          error:function(error){
            console.log(error)
            alert("Data Not Saved");
          }
      });
    });
});


$(document).ready(function (){
    $('#strain').on('submit', function(e){
      e.preventDefault();

      $.ajax({
```

```
 type: "POST",
// url: "/studentadd",
 url:"@php echo url('tra'); @endphp",
 data: $('#strain').serialize(),
 success: function(response){
   console.log(response)
   $('exampleModalCenter2').modal('hide')
   alert("Data Saved");
 },
 error:function(error){
   console.log(error)
   alert("Data Not Saved");
 },
 userExistError:function(userExistError){
   console.log(userExistError)
   alert("Date already exists");
 }
```

```
        });
    });
});
$(document).ready(function (){
    $('#addfor').on('submit', function(e){
        e.preventDefault();
        $.ajax({
            type: "POST",
           // url: "/studentadd",
            url:"@php echo url('addus'); @endphp",
            data: $('#addfor').serialize(),
            success: function(response){
              console.log(response)
              $('exampleModalCenter1').modal('hide')
              alert("Data Saved");
            },
            error:function(error){
```

```
            console.log(error)
            alert("Data Not Saved");
          }
        });
    });
});

$(document).ready(function (){
    $('#attend').on('submit', function(e){
        e.preventDefault();

        $.ajax({
            type: "POST",
           // url: "/studentadd",
            url:"@php echo url('attn'); @endphp",
            data: $('#attend').serialize(),
            success: function(response){
```

```
            console.log(response)
            $('exampleModalCenter3').modal('hide')
            alert("Data Saved");
          },
          error:function(error){
            console.log(error)
            alert("Data Not Saved");
          }
      });
    });
});


$(document).ready(function (){
    $('#complaint').on('submit', function(e){
      e.preventDefault();

      $.ajax({
```

```
            type: "POST",
           // url: "/studentadd",
            url:"@php echo url('compl'); @endphp",
            data: $('#complaint').serialize(),
            success: function(response){
              console.log(response)
              $('exampleModalCenter4').modal('hide')
              alert("Data Saved");
            },
            error:function(error){
              console.log(error)
              alert("Data Not Saved");
            }
        });
    });
});
```

```
$(document).ready(function (){
    $('#addsary').on('submit', function(e){
      e.preventDefault();
      $.ajax({
          type: "POST",
         // url: "/studentadd",
          url:"@php echo url('salb'); @endphp",
          data: $('#addsary').serialize(),
          success: function(response){
            console.log(response)
            $('exampleModalCenter7').modal('hide')
            alert("Data Saved");
          },
          error:function(error){
            console.log(error)
            alert("Data Not Saved");
          }
```

```
        });
    });
});
$(document).ready(function (){
    $('#leavmgt').on('submit', function(e){
        e.preventDefault();
        $.ajax({
            type: "POST",
           // url: "/studentadd",
            url:"@php echo url('leav'); @endphp",
            data: $('#leavmgt').serialize(),
            success: function(response){
              console.log(response)
              $('exampleModalCenter7').modal('hide')
              alert("Data Saved");
            },
            error:function(error){
```

```
            console.log(error)
            alert("Data Not Saved");
          }
        });
    });
});


$(document).ready(function (){
    $('#addjobz').on('submit', function(e){
        e.preventDefault();

        $.ajax({
            type: "POST",
           // url: "/studentadd",
            url:"@php echo url('addjo'); @endphp",
            data: $('#addjobz').serialize(),
            success: function(response){
```

```
            console.log(response)
            $('exampleModalCenter10').modal('hide')
            alert("Data Saved");
          },
          error:function(error){
            console.log(error)
            alert("Data Not Saved");
          }
        });
    });
});
$(document).ready(function (){
    $('#checks').on('submit', function(e){
      e.preventDefault();
      $.ajax({
          type: "POST",
         // url: "/studentadd",
```

```
            url:"@php echo url('cc'); @endphp",
            data: $('#checks').serialize(),
            success: function(response){
              console.log(response)
              $('exampleModalCenter15').modal('hide')
              alert("Data Saved");
            },
            error:function(error){
              console.log(error)
              alert("Data Not Saved");
            }
        });
    });
});
$('.sta').on('change', function() {
                console.log($(this).val())
        $('#addsalary').append(`<input name="na" value="${$(this).val()}" type="hidden" />`)
```

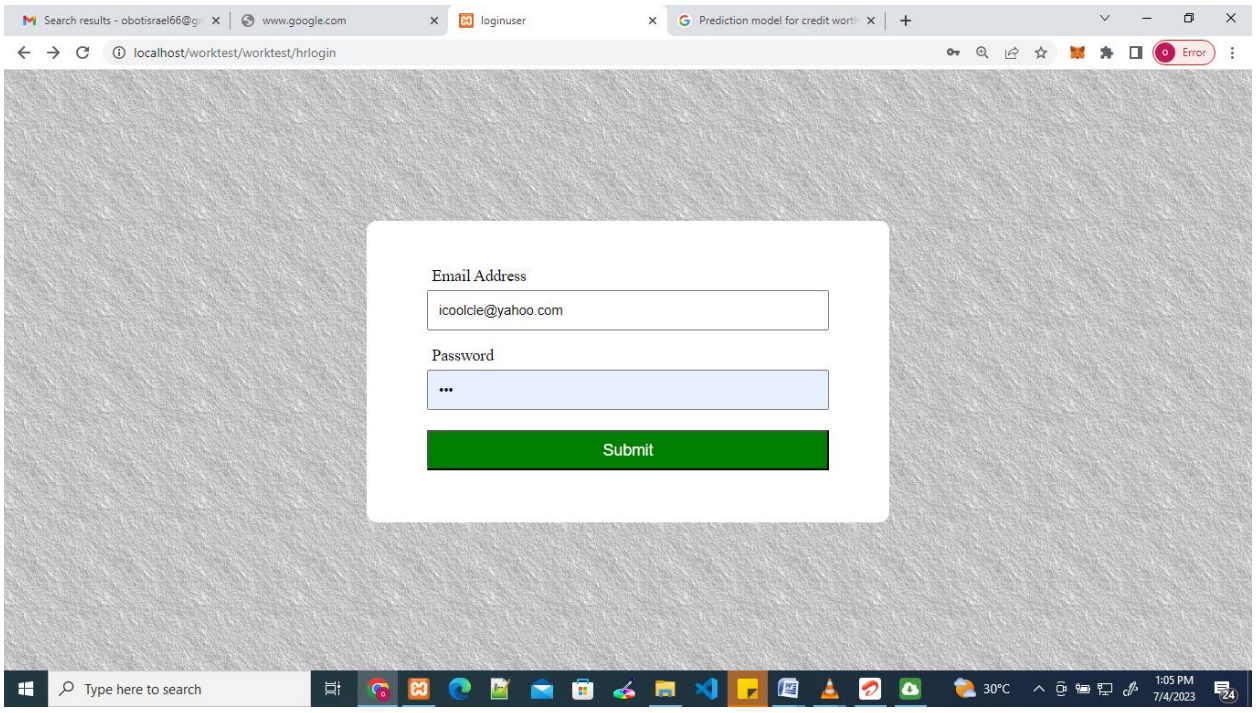
```
                                    })



function price(monthlysalary,allowance,deduction){

    var capt = parseInt(document.getElementById("monthlysalary").value);


    var quty = parseInt(document.getElementById("allowance").value);


     var proft = parseInt(document.getElementById("deduction").value);



       var ansD = document.getElementById("basicsalary");

       ansD.value = capt+quty-proft;
```

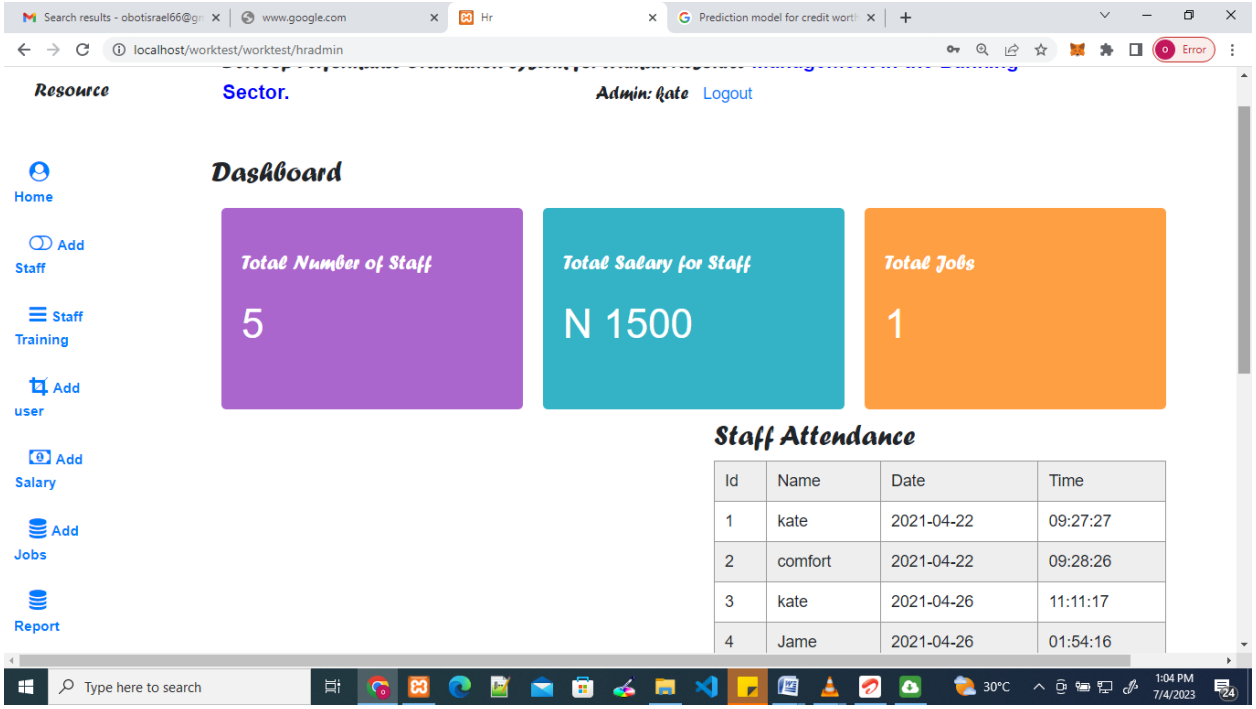
```
    }


    $('#addsalary').on('submit', function() {
      return false
    })
</script>


<script type="text/javascript" src="https://www.gstatic.com/charts/loader.js"></script>
  <script type="text/javascript">
    google.charts.load("current", {packages:["corechart"]});
    google.charts.setOnLoadCallback(drawChart);
    function drawChart() {
      var data = google.visualization.arrayToDataTable([
        ['Task', 'Hours per Day'],
        ['Accountant',     70],
```

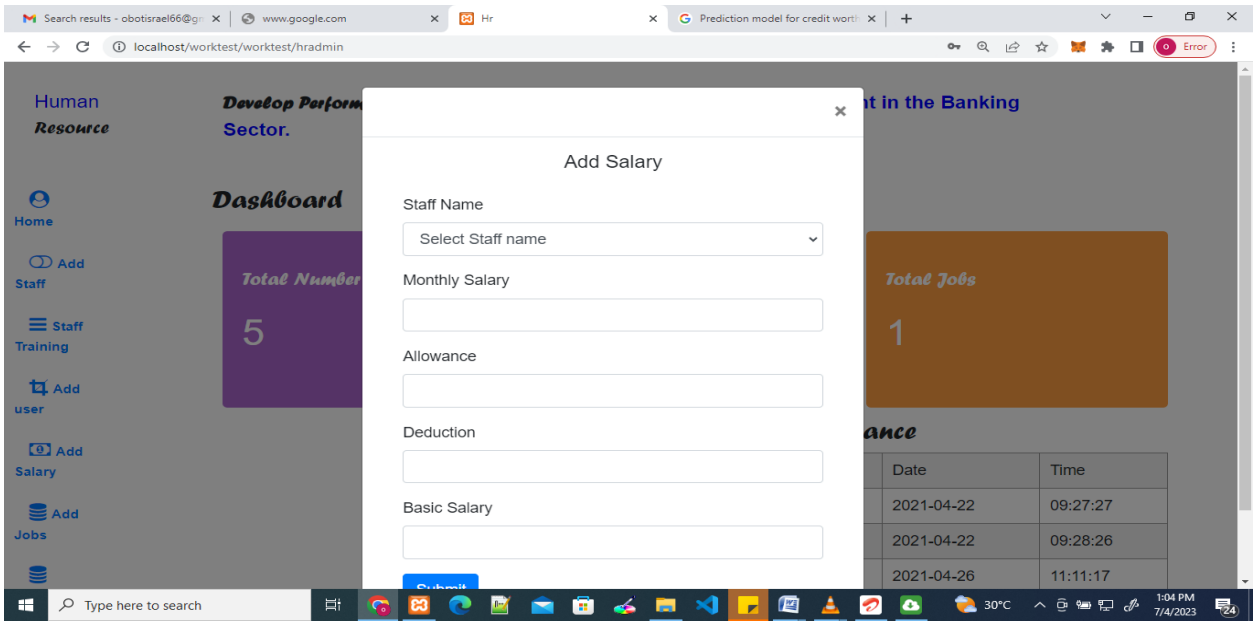
```
      ['Secretary',      60],
      ['Engineer',  46],
      ['Marketing', 20],
      ['ICT',    30]
    ]);

    var options = {
      title: 'Staff Performance',
      pieHole: 0.4,
    };

    var chart = new google.visualization.PieChart(document.getElementById('edonutchart'));
    chart.draw(data, options);
  };
</script>
```

APPENDIX B

SAMPLE OUTPUT SCREEN


Search results - obotisrael66@g
www.google.com
loginuser
Prediction model for credit worth
localhost/worktest/worktest/hrlogin
Error
Email Address
icoolcle@yahoo.com
Password
Submit
Type here to search
30°C
1:05 PM
7/4/2023


Search results - obotisrael66@g
www.google.com
Hr
Prediction model for credit worth
localhost/worktest/worktest/hradmin
Error
Resource
Sector.
Admin: kate
Logout
Home
Add Staff
Staff Training
Add user
Add Salary
Add Jobs
Report
Dashboard
Total Number of Staff
5
Total Salary for Staff
N 1500
Total Jobs
1
Staff Attendance
Id
Name
Date
Time
1
kate
2021-04-22
09:27:27
2
comfort
2021-04-22
09:28:26
3
kate
2021-04-26
11:11:17
4
Jame
2021-04-26
01:54:16
Type here to search
30°C
1:04 PM
7/4/2023


Search results - obotisrael66@g
www.google.com
Hr
Prediction model for credit worth
localhost/worktest/worktest/hradmin
Error
Human
Resource
Develop Perform
Sector.
t in the Banking
Dashboard
Home
Add
Staff
Staff
Training
Add
user
Add
Salary
Add
Jobs
Total Number
5
Total Jobs
1
Add Salary
Staff Name
Select Staff name
Monthly Salary
Allowance
Deduction
Basic Salary
Submit
ance
Date
Time
2021-04-22
09:27:27
2021-04-22
09:28:26
2021-04-26
11:11:17
Type here to search
30°C
1:04 PM
7/4/2023