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Application of Artificial Neural Network with Various Algorithms Tools in Numerous Sectors – A Review

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Abstract

This study reports collective information of the Artificial Neural Network-(ANN) model implemented to improve the management and provide suggestions to the government and corporates. The ANN tool is an awesome architect model that helps collect a high volume of information from independent such as civilians, input parameters in manufacturing, etc to dependent such as government, corporates, machinery, etc. The ANN model has various architect tools that help to regulate and monitor the demand for government and the public through the weighted link, like brain neurons. It's an optimized computation study to predict less uncertainty than experimental values. This literature study reports diverse methods of algorithms available in ANN models and briefly disseminated the procedure specifically to collect a high volume of inputs transferred to hidden neurons and passed to output terminal neurons with accurate solutions to the enhancement of government decision making. Besides, the ANN is a perfect substitute tool for experimental and numerical analysis procedures to reduce high expenses for collecting data in high volume. This literature report briefly disseminates different methods of ANN tools implemented in various applications with significant conclusions, considering many techniques for collecting data and suggestions provided for future research work.

Key words*: ANN models, Smart government, Financial sector, IT Management.*

Financial health prediction by ANN

F. Mokhatab Rafiei et al. (1) designed and predicted a healthy stock exchange for 180 financial companies by employing an ANN model. Further, Genetic Algorithm (GA) and Multiple Discriminant Analysis (MDA) models has taken for further investigation. In this investigation, researchers illustrate company details and schematic layout of Neural network their assumption number in Fig.1 and Table.1. In the Tehran stock exchange, nearly 461 companies are taking part in the stock market. Among them, 180 stocks are manufacturing high financial potential companies. In their study, they took these 180 stock details to predict the low risk of bankruptcy failure. The ANN tool– "Feed-forward" with the "Levenberg-Marquardt" learning process has implemented for the analysis. They reached the maximum accuracy level of 97.84%. from the investigation. Authors further evaluated the detailed correlation of individual models to identify the best tool to attain high precious results

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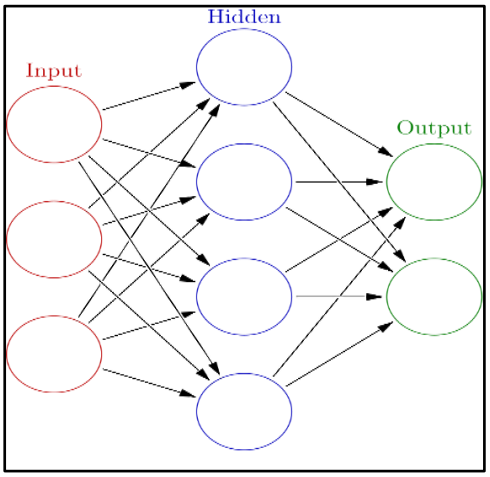

Fig.1.Interconnect Group of Node

Ratio	Number
Working capital/total assets	X1
Operating income/total assets	X2
Market value/total assets	X3
Sales/total assets	X4
Owners' equity/total assets	X5
Net income/total assets	X6
current ratio	X7
Quick ratio	X8
Gross profit/sales	X9
Sales/inventory	X10
Sales/fixed assets	X11
Net income/sales	X12
Sales/total liabilities	X13
Net income/owners' equity	X14
Account receivables/average daily sales	X15
Operating income/interest expenses	X16
Cost of goods sold/inventory	X17

Table.1. Company detailed and their number

The researchers reveal a high accuracy rate of 98.6% has achieved in the ANN model from the data trained in the computer and 96.3% of holdout samples have compared with GA and it attained 92.5% and 91.5% from the training and 80.6% and 79.9% has attained from the MDA models. From this study, the ANN tool can implement in financial management to predict the risk factors of the company taking part in the stock exchange for bankruptcy.

Forecasting Currency Exchange Rates using ANN tool

Joarder Kamrwzaman and Ruhul a Sarker (2) presented a forecasting report on foreign currency exchange (US Dollar) and their investment details. Three different ANN tools such as a) Standard Back Propagation (SBP), b) Scaled Conjugate Gradient (SCG), and c) Back Propagation–Bayesian Regularization (BPR) has taken for the analysis to predict the currency exchange accuracy level by considering five technical indicators in two different time intervals. The significant outcome value has been compared with the traditional Auto-Regressive Integrated Moving Average (ARIMA) model. The study result reveals that predicted values are closer to the forecast values in all ANN tools. However, Back Propagation–Bayesian predicted values have attained closer proximity to market experimental exchange values. It shows ANN tool help to forecast the current flow rate, and minimum deviation has been identified between every two different time intervals.

Case Study on Referendum in E-Governance using ANN

Manzur Ashraf et al. (3) did a case study on the independence referendum in Quebec and the public knowledge management system using E-governance. A significant aim of the report is to build a Knowledge Management (KM) cycle, such as knowledge sharing, enhancing, and preserving to support the law of knowledge dynamics by using ANN tools. Information collected from the public community management system has been done to

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government and communication between governments as shown in flow chart as presented in Fig.2. It illustrates that e-government support may reduce the gap in knowledge of referendums between rural and urban peoples. The study reveals Information Management System (IMS) - based E-governance has been implemented in a cyclic base process to interconnect the various region's people as a knowledge Management System (KMS). Besides, this tool helps the public to communicate with the government in the mode of e-governance comfortably and provides a wide range of knowledge information on both sides.

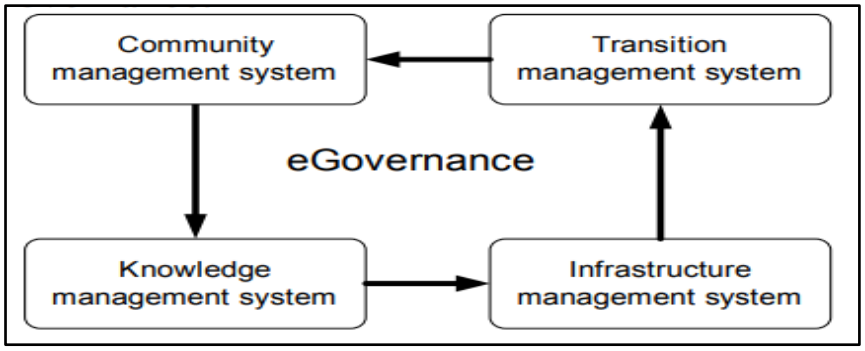

Fig. 2. Various Communication Management Between Expertise and Public

Exchange Rate Prediction using ANN

Manaswinee Madhumita Panda et al. (4) conducted a detailed literature survey in a novel area of foreign money exchange. Implementing the ANN model in the protected period of money exchange is a new concept, and few researchers focused on forecasting the closing stock price details during the evening time. Similarly, Functional Link Artificial Neural Network (FLANN), Hidden Markov Model (HMM), Auto Regression (AR), and Support Vector Regression (SVR) models have simultaneously used in this money exchange market for prediction the stock movement from the long period of 2000 to 2019. However, familiar tools such as Multilayer Perception (MLP), and Radial Basis Function (RBF) have significantly opted to make an alarm in a time series to forecast the most precise decision. The author elaborated on the contribution of deep learning tools and their subdivisions taken part in the forecasting process. They are a) Deep Convolutional neural network (DCNN), b) Auto Encoder (AE), c) Deep Belief Networks (DBN), d) Deep Residual Networks (DRN), e) Recurrent Neural networks (RNN), f) Recursive Neural Tensor Network (RNTN). It also presented clearly that the Bayesina Network model has mostly been used in the stock market to predict the closing stock price, and they used the Fuzzy inferences system for interval values. The research declared they implemented many ANN models in the foreign stock exchange market to predict the accurate market movement in the daytime and forecast the opening and closing price of the market.

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Evidence from country level IT sector returns and Productivity

Sanjeev Dewan and Kenneth L. Kraemer (5) presented a study report on the movement of global IT investment and noteworthy returns from the IT industry. The detailed IT investment of the inside country survey has been extended and compared with the neighbouring country. Besides, the work focused to collect detailed information on the investment returns of IT business and their enhancement. Additionally, a comparison has been conducted between IT and non-IT sector investment and their return too by using the ANN model. The researcher declared evidently that IT capital and their return has attained a positive sign in a developed country and, compared with non-IT, a little down has been recorded. Besides the condition of developing countries, the scenario is inverse. We presented a detailed representation in Fig. 3. Detailed inputs such as a) Computer Hardware, b) Data Communication, c) Software, and d) Services play a major input role in GDP and their process has been evaluated by weightage methods in the ANN model. Their significant outcome reveals traditional capital input and labour were positive signs production and finally declared many data has needed to account to predict more accurate values.

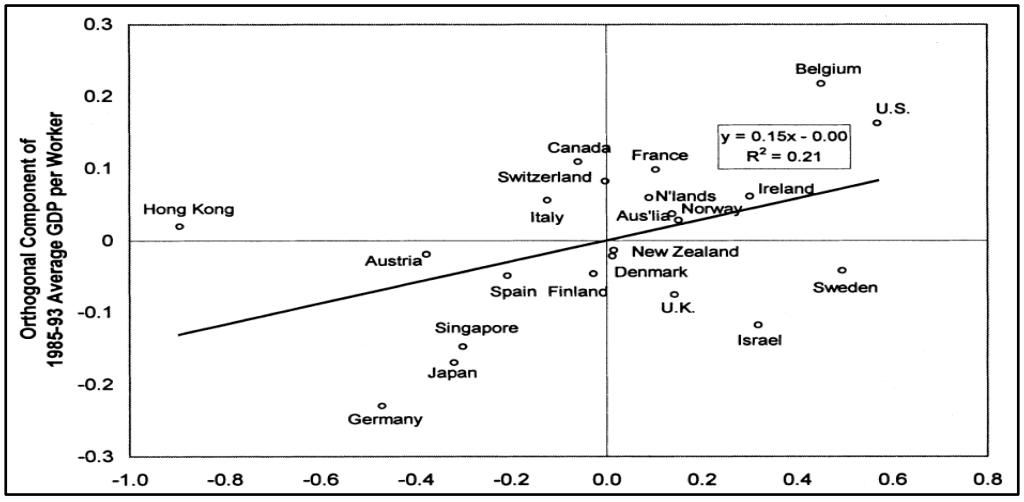

Fig. 3. Orthogonal Component of IT capital per worker.

Consumer Behaviour in Travel and Tourism

Zheng Xiang et al. (6) presented a literature survey report about the recent trend in travel and tourism in America and the comfortability usage of the internet for searching geographical information. A detailed report illustrates the planning of capital investment in tourism and the expectation of the current generation, practical difficulty with Online Travel Agencies (OTA), and their interferences. The significant contribution of a traveller using the internet has been accessed by four methods: a) well adapted and saturated planning, b) contrasts and commonalities generation, c) supports from social media, electronic gadgets, and d)

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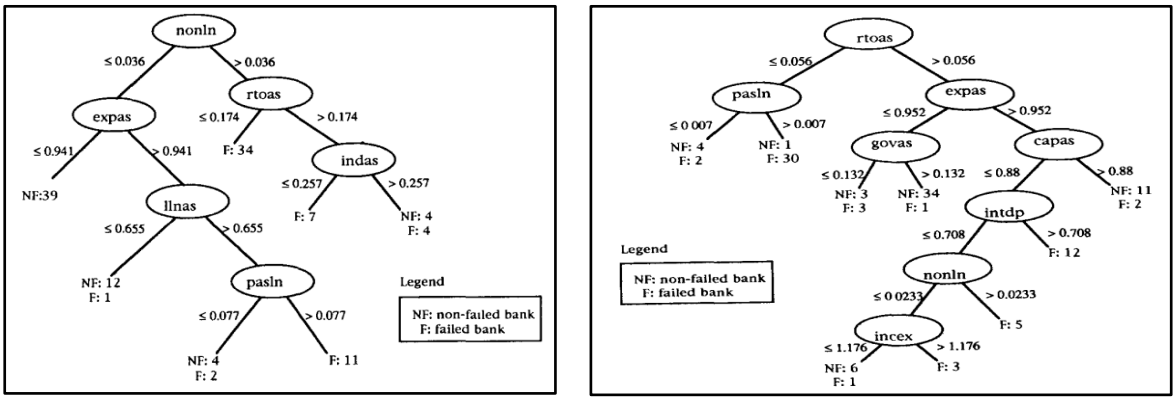
practical searching experiences. We consider these parameters as a primary input in the ANN model for the evaluation of consumer behaviour in travel and tourism. The significant result reveals that usage of the internet present generation bifurcating in three segments a) spending cost–they are comparing prices in booking tickets, rooms, special entry tickets, etc, b) location identification- to avoid spending more time for long travel and plan according to see more place in less time, c) safety–looking trustable tourism agency for safe journey. All these parameters are considered as input for the ANN tool to predict consumer behaviour.

Bank Failure Predictions

Kar Yan Tam Melody Y. Kiang (7) conducted research to predict bank failure discrimination using the ANN model. Default data has trained in computers and their analytical performances, such as logistic regression, k Nearest Neighbour (kNN), and Decision Tree (ID3) tools were used to predict the bank failure by using the ANN model. Detailed information as illustrated in Fig. 4. In the investigation bankruptcy cases detailed information taken from Federal Deposit Insurance Corporation (FDIC). The input data, such as a) asset age, b) number of branches, c) charter status, and d) age from nearly 118 bank details considered for the analysis. The criteria Capital, Asset, Management, Equity, Liquidity (CAMEL) have implemented in USA banks to maintain quality management. Researchers have recorded seven different trial error readings for individual cases and details have been presented elaborately. The report reveals novel methods they have implemented ANN model in the bank for prediction of bankruptcy and this management helps to operate in both online and offline applications. Besides, they compared the outcome with an empirical approach and reveal its most significance in bank usage.



a) **b)**

Fig. 4. a & b Classification of a) One & b) Two year - Tree plan

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Network Management using ANN

G. Prem Kumar and P. Venkataram (8) conducted a survey about the significance of Communication Network Management (CNM). Researchers observed a significant advancement has been achieved in network communication sector owing to multiple times services enhancement between people, government, and corporations in their specific requirements. On another side, there is a lack of skilled managers and effective skilled employees in this booming industry where it is needed to solve this issue raised from the customer end. To overcome and sort out these issues, implementing automation in network communication is mandatory, and it's a promising technique to reduce the no of incomplete cases arising from end user, filter and identify significant issues that are only needed to solve by the skilled person directly. Management model - Open System Interconnection (OSI) has taken for the analysis and network management such as a) fault management, b) configuration management, c) performances management, d) security management, and e) accounting management were involved in this analysis to structure a frame of this OSI model. They illustrate structure details in Fig. 5. The report declared that strong network communication between administrator and the customer is a Network Management–Black Board Architecture Management (NM- BBA) model articulated to solve the issues raised in the network management and their details illustrate in Fig. 6.

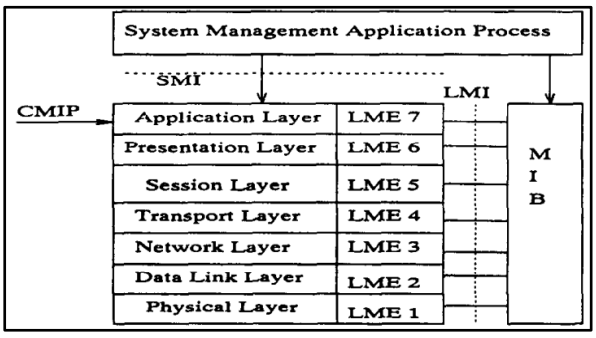

Fig .5. Structure of OSI layer management

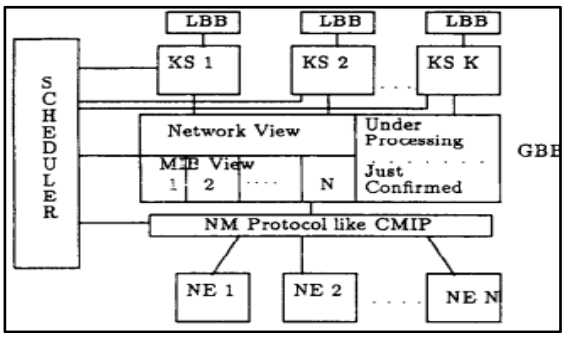

Fig. 6. Network Management –Black Board Architecture Management.

Waste management for Compact Environment

Kan Hua Yu et al. (9) proposed a new model - Artificial Intelligence - Hybridized Intelligent Framework (AIHIF) to control and recycle waste disposal from the public. It has observed (based on Geographic Information System -GIS) consuming more products by people reveals disposing wastage to the environment rapidly increases. It's a huge challenge faced by the government to control this Solid Waste (SW) and management policy has needed to implement a new technique called (4R) Reduce, Recycle, Reuse, and Recover to protect the environment. This AIHIF tool helps to monitor the wastage in short distances using machine

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learning theory. Bulk waste collecting area as observed and recorded in the system. Based on experts' suggestion, necessary to implementing a specific centralized waste management system to recycle this waste. Additionally, longitudinal analysis helps to assess and identify the weakness of implementing waste management in practices. It also suggests that proper structure to collect waste, required funding from the government agency, and individual responsibilities from stakeholders are a key role in waste management. This review declared that AIHIF helps to monitor the waste in the regional wise and identify the waste for recycling and reuse in short time with less human resources.

E-commerce and financial industries

Hari Kumar Pallathadka et al. (10) presented an application of Machine Learning and deep Learning tool of AI for the advancement of E-Commerce Management and Finance sector. Both government and industry are following this tool for their goods and supply chain mechanism for effective performances. This study discussed the process followed in ML and DL in their business. Researchers categorised them into seven significant methods, such as 1. Most trustable and familiar website– "chatbots" used in e-commerce and finance (machine learning technique) acts like a human to predict the customer requirements. 2. "Image search" - customers no need to enter a keyword of the product, directly collect the information by using Images, 3. "Handling customer data'–done by a predicted analysis - here it assured to sell new products as a trail version to customer to make more profit to the management. 4. "Recommendation system"–helps to study the customer's past purchase history and predict present expectation for quick selling products, 5. "Inventory management"–these algorithms find the correlation for the present product with a future product where help the management purchase that specific product earlier to avoid lack of stock in the shop. 6. "CRM"–this tool helps the customer to purchase the best product they need based on their past purchase list and forecast which product is most needed for their daily life. It helps consumer save more time than other tools and 7. "Credit scoring"–this tool help banker/ finance to predict a person's credit capacity and their eligible limit for purchase finances. This detailed survey reports of AI plays a significant role in E-Commerce as a compact design for selling products with lesser time and makes a high benefit for the customer and for corporate, predicts future product demand required for customers and especially forecasts the financial capacity of civilian.

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Learning management system in Nigeria

Mohammed Nasiru Yakubu et al. (11) have conducted research in Learning Management Systems (LMS) using the ANN tool - Structural Equation Model (SEM) among students studying at four different African universities. Around 1,116 students have taken part to expect the enhanced learning method and providing instructions inside and outside the classroom. Survey reports contain merged information on the communal impact of the institute, infrastructure availability, governance system, adaptability of the system, and students' intention toward LMS. Besides researchers discussed the significance of e-learning and the impact of implementing different teaching methods. Fig .7. is illustrated by two different models and their detailed structure framework of the LMS method.

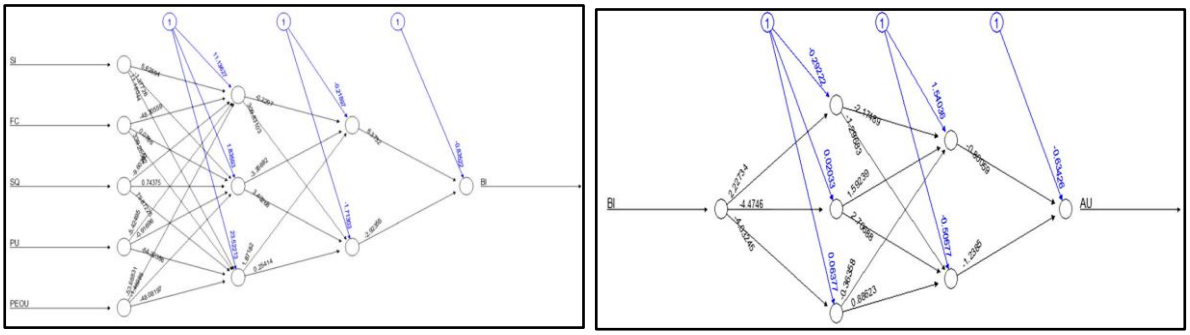

Fig. 7. ANN and SEM Models for LMS.

The survey result reveals, that implementing the ANN model of university administration, software development for higher education, etc. has declared in a significant improvement found among student behavior and improved quality of teaching methods in the Nigeria universities.

Governances in smart transport at Bogota Columbia

Ricardo Alirio Gonzalez et al. (12) conducted an analytical report on regulating traffic signals to avoid heavy traffic jams during peak hours and suggesting to implementing the LED luminaire to insist on incandescent bulbs in traffic lights of major locations of Bogota city in Colombia for energy consumption to the government. An artificial solution for the transportation issue, a Supervised Neural Networks (SNN) simulating application provided for internal control and optimizing traffic conditions in Bogota as a smart city. Besides, a study compared the sustainable strategies and features of intelligent cities such as Tokyo, New York, Paris, Spain, etc worldwide to reduce wasting time on traffic signals, control traffic accidents, and proving a quality lifestyle to the people.

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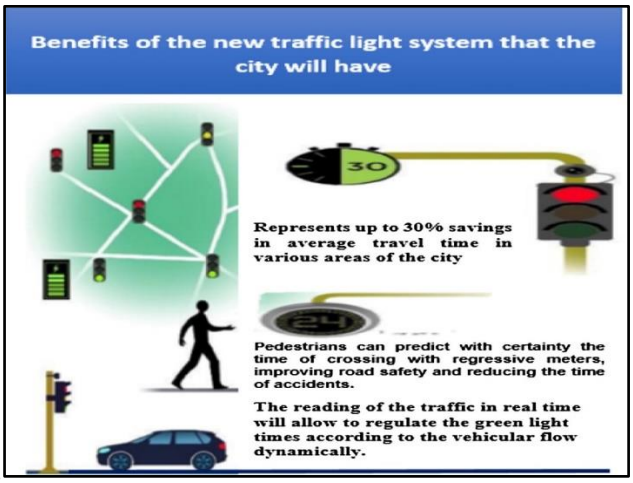

Fig. 8. Smart Traffic Light System

Group discussion completed the analytical study directly with the public through interviews & descriptive methods. The information has combined, such as collaborative, and knowledge-based and they analyzed content using filtering algorithms and presented the solution. Detailed benefits of traffic lights as shown in Fig. 8. The research reveals the Columbia government implemented this SNN model with collective information and found a significant outcome from the proposed architecture model

Quality in Object Oriented System Using ANN

Yajnaseni Dash and Sanjay Kumar Dubey (13) did a brief survey on quality prediction metrics in Object-Oriented systems. Existing prediction tools such as fuzzy inference systems, adaptive neuro-fuzzy inference systems, and artificial neural network systems are available and have a practice in implementation in the Information Technology (IT) sector to forecaster the quality of software available for applications. In this IT Sector, software claims and usage have gradually increased day by day in many applications. However, the security system of that data in the software and error-free report generation is a huge, challenging portion of the IT division. Control the process and monitoring the data mining is significant processing. Moreover, a forecast report is mandatory for each company to balance the demand required in the future. To address these issues various tools are available in the market to optimize and are easy to implement in the firm. Furthermore, these ANN models produced significant results from each algorithm. From the detailed literature survey, research declared that the ANN model yield accurate result and minimum error reading in the ANN tool.

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Estimating Participation in Election

Seyyed Reza Khaze et al. (14) presented a proven matrix for predicting maximum participation in the general election planned to conducted in the Republic of Iran. They implemented the most promising methods ANN tool to expect and investigate the traditional election methods plan to follow in Iran. Multilayer feed-forward and backpropagation algorithms has used in this analysis. For the investigation, input data such as a) age, b) degree, c) jobs, d) political orientation, e) opinion of people about government services, f) general policy, and g) participation in the election. h) election official and I) opinion about candidates has taken part in the study. They showed detailed collision matrix participation in Fig. 9. The research reveals that the ANN model expects the people's participation in the future election maximizes 91% accuracy than the earlier election and it proves they attained accurate levels from this ANN model

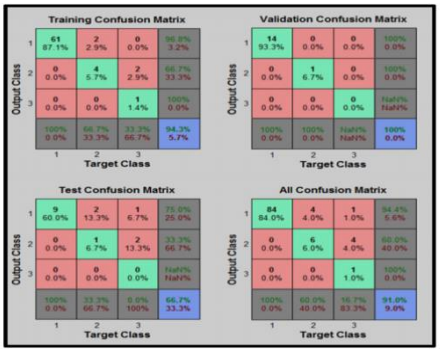

Fig.9. Collision Matrix Participation

Internal Audit Function

Sylvie Héroux; Anne Fortin (15) presented various holistic methods of Internal Audit Function (IAF) in IT Governance. The study elaborates the significant role of IAF transformation from traditional methods to high strategic methods by implementing the ANN tool. Earlier stage report illustrates input such as governance structure, relation capabilities, an elaborate process in IAF has not completely considered for the investigation and needed more survey to build the gap between IT personnel & training certification, IT audit and experiences, etc. Besides, this IT structure helps the board of directors influence directly implementing IAF in IT governance. They classified the relation between IAF characteristics and involvement into three methods: a) resources, b) competencies, and c) interaction between the board of committees. They presented a detailed framework of IAF as shown in Fig.10. Diversified survey reports such as 130 IAF senior officers from the public (21%), and private (15%) sectors have taken part. The research report reveals the influences of IAF impact on strategical analysis

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help the board of member to regulate the process and primarily monitor and control the finance and risk management in IT sector governances.

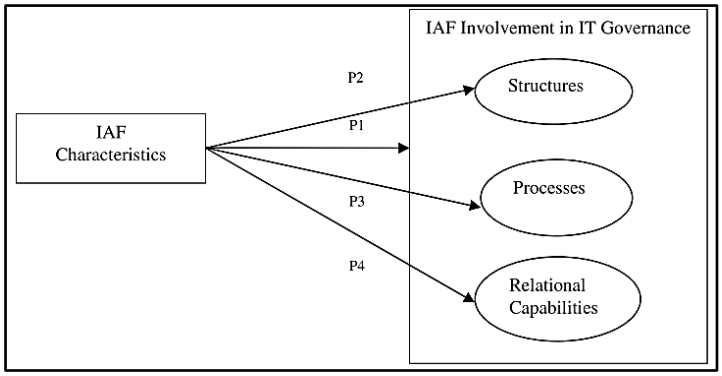

Fig.10. Structure of IAF Characterization.

E-Governance Information Security in India

Deven C. Pandya1 and Narendra J. Patel (16) highlight the significance of the E-governance information security system in India. The authors address visibly both sides 1. The technical sector of government and corporates compared security information with 2. Non-technical sector. Basic details have trained in the system and their Information Security (InfoSec) risk was introduced. Researcher categories of the major contribution of government and public information such as financial, insurance, and proof of asset details are a) InfoSec in E-governance in E-commerce, b) implementation and risk in E-governance projects, c) No technical factors, d) absences of the comprehensive model, e) effective solution in InfoSec, f) significant of ANN tools. The report reveals proper model must implement to control and monitor the InfoSec in e-commerce in different methods. Besides, non-technical details contribute equal weightage to maintaining InfoSec and have needed to develop a new model to assess risk management in the InfoSec system. Additionally, a lot of scopes are available in India to monitor and regulate this e-commerce by e-governance using ANN, genetic algorithm, fuzzy system, and Bayesian network tools in the InfoSec system.

Improving service quality, accountability, and transparency of local government

Hafiez Sofyani et al. (17) conducted a questionnaire survey among Local Government Organization (LGO) in Surabaya, Bojonegoro Regency, Binjai City, Bandung City, etc. in Indonesia about improving quality of service, accountability, and transparency through IT Governances (ITG). Nearly 141 people responded to 200 questionnaires, and it was analyzed by using the Partial Least Square–Structural Equation Modelling (PLS-SEM) method.

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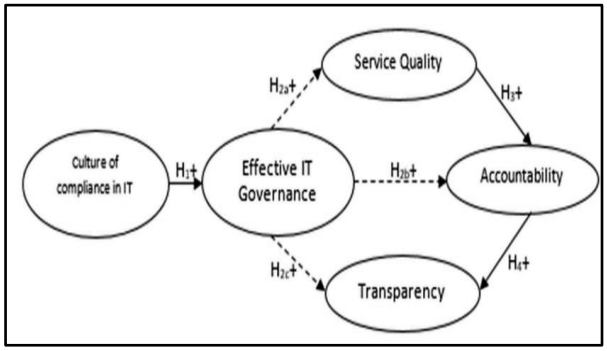

Fig. 11. Flow Structure of ITG compliances

The study focused on analyzing the culture of compliance, and effective ITG intervention between IT with service quality and IT with accountability and transparency. Detailed flow diagram as shown in Fig. 11. In this analysis, hypotheses, reliability, and validity variants have been considered for the comparison. The result reveals that effective ITG has been achieved by implementing e-governance, which helps to develop the local government of Indonesia. Besides, detailed analysis reports such as fast, good quality service practices (in the form of accountability and transparency) result saucerful of implementing ITG by higher official level and build good mindset between the peoples.

Strategies and Tactics for Information Technology Governance

Ryan R. Peterson (18) presented the current scenario of competency market level in electronic network business and governances followed in the system. The ANN is a significant tool to control decision-making by top-level management and distribute IT concerns directly to stakeholders. This research work briefed about the current scenario of IT governance with existences and discussed the future challenges in the IT portfolio. There are three platforms, such as a) Application, b) Development, and c) Operations in IT have implemented this ANN tool for their advancement. The key aim of the research provides a clear understanding of the wide-ranging effects of IT governance in practices.

Crafting IT Governance

A real case study of IT governances of Johnson & Johnson was analysed by Ryan Peterson (19). His work presented 1. problems, 2. methods involved in IT governance with their design, strategic values, etc. The researcher starts his work by stated IT governance is a fundamental guideline needed to follow in a corporation, but different views of stakeholders and their demands as satisfied by conducting deep analysis using various ANN tools, and the significant result may chance to control and monitor the performances effectively. Moreover, the Chief Information Officer (CIO) is a responsible and accountable person in IT governance and plays a role between business and IT executives. In recent days, they transferred

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information into the computer as data to investigate and identify the optimum techniques to reveal the best performances. A detailed assessment process model is shown in Fig. 12. The study considered the capability of structure, process, and relation of IT governances. The result is declared, that IT governments have a collaboration form, and it can't control. Besides, it focused to coordinate formal and informal decision making between business and stakeholders.

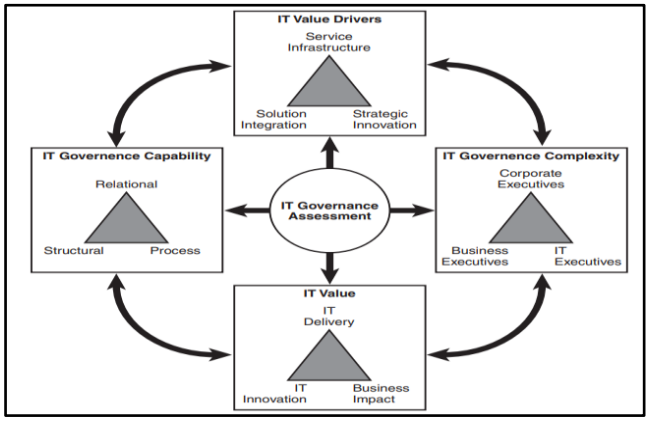

Fig. 12. IT Governances Assessment Process Model – ITGAP

Critical Success Factors for ITG

Zyad Alreemy et al. (20) creates a novel success factor for IT governance from a brief study of IT governance's application and various processes involved in the organization. The study considered existing analyzed methods with different categorized and created a success factor for ITG. The framework of the CSF has illustrated a detailed schematic layout as shown in Fig. 13. Besides the study presented earlier management tools such as risk, project, and performance management of IT governances as implemented. Additionally, Control Objectives for Information and Related Technology (COBIT) familiar audit framework in ITG is implemented to fulfill the need of stakeholders with holistic methods and it's a strong tool for organizational structure. This CSF will be analyzed by the following methods such as a) Stakeholder involvement, b) Financial support, c) Staffing management, d) Management support, e) Organizational effort, f) Strategic alignment between IT and g) Business, h) Structure, and i) Preparation and more. A detailed questionnaire was shown in Fig.14. framed to interact directly with the private sector in Saudi. The result reveals a clear understanding of ITG in the private sector compared with others to understand and disseminate the significant success factors of the ITG framework.

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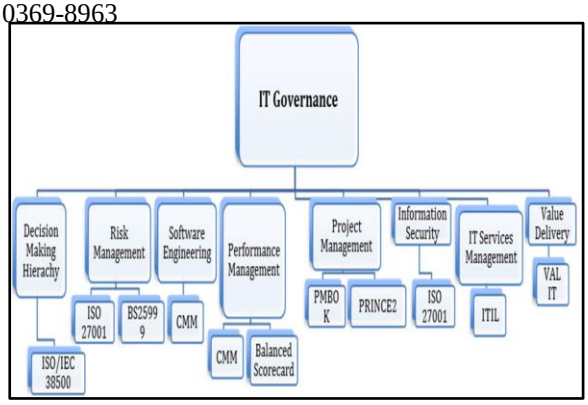

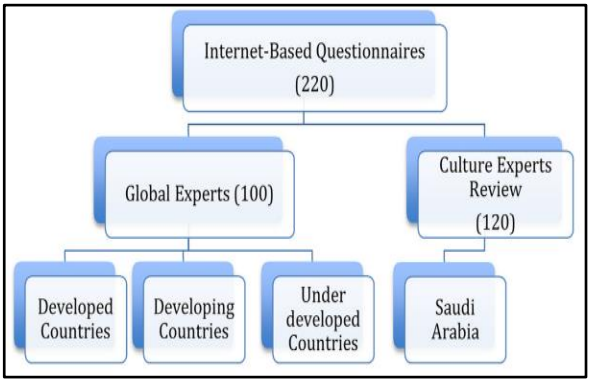

Fig.13. Frame Work of IT Governance **Fig.14. Questionaries Methods**

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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