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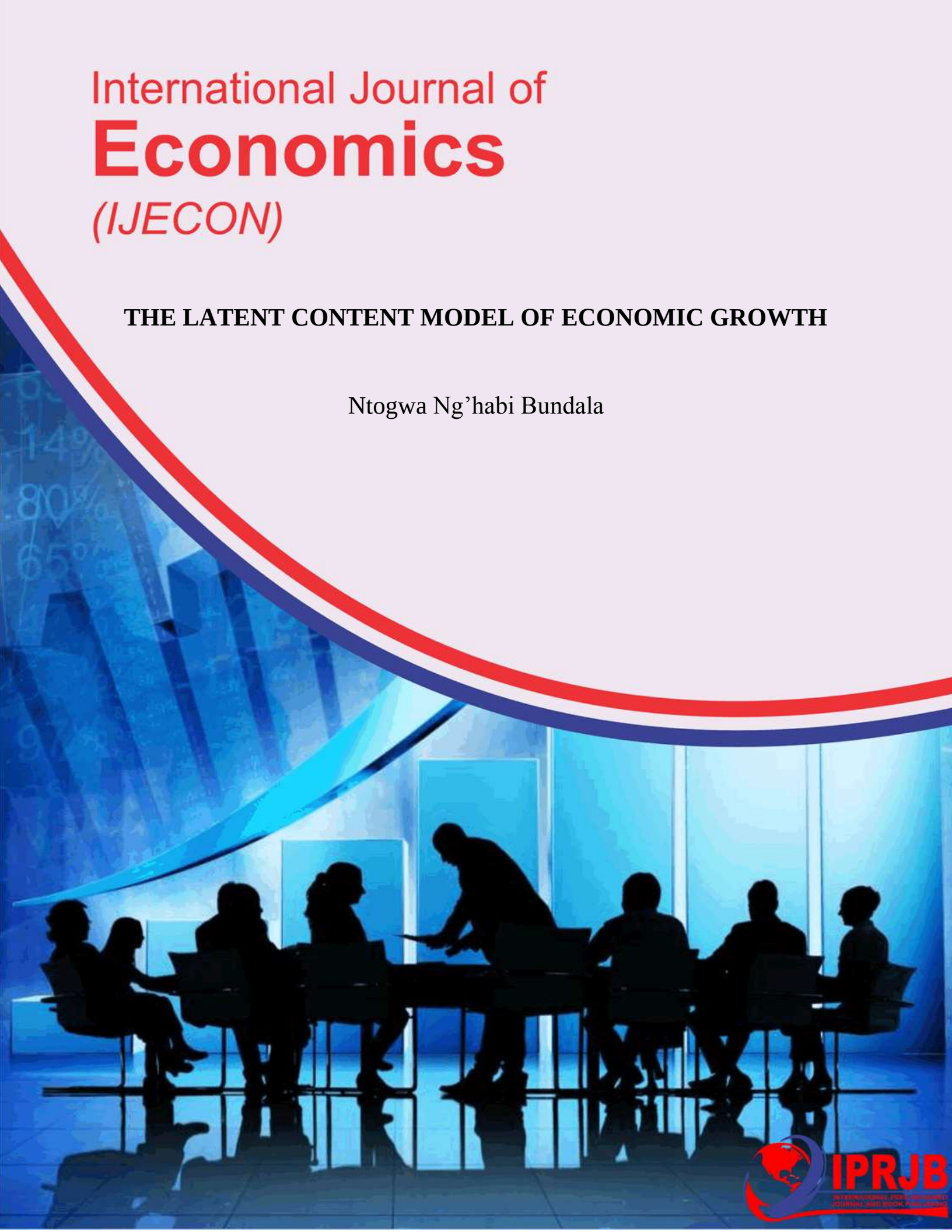

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THE LATENT CONTENT MODEL OF ECONOMIC GROWTH

Ntogwa Ng'habi Bundala
PhD (Economics) –Student: The Open University of Tanzania, Faculty of Arts and Social Sciences, Department of Economics
United Republic of Tanzania
Mob: +255(0)73360418/+255(0)782 33 87 70
E-mail: bundalantogwa@gmail.com

Abstract

Purpose: This paper aimed to establish a latent content (LC) model of economic growth that integrates both economic and non-economic variables.

***Methodology*:** The study used a cross-sectional survey research design. The checklist questionnaires were used to collect primary data. The sample size of the study was 2011 individuals, randomly sampled from Mwanza and Kagera regions in Tanzania. Cronbach'Alpha and principal component analysis (PCA) were used to test reliability and validity of questionnaires respectively. The study used both linear and non-linear modelling data analytics methods to examine assumptions of the LC model of economic growth. Clearly, the study used automatic linear modelling, stochastic structural-factor frontier analysis, and structural equation modelling to test the linearity assumption of the LC model. Moreover, the probit model and neural network analysis were used to examine the non- linearity assumption of the LC model.

Findings: The study evidenced that the LC model was significantly determined by capital, psychological well-being (PWB), and labour. However, the labour was found significant negatively impacts economic growth. The subjective well-being (SWB) indicators were found insignificantly impacting the economic growth, however they have indirect impacts. Furthermore, the study confirmed that non-economic variables had less probabilistic power than economic variables. The paper concluded that an optimal economic growth (GDP) was direct related to capital, psychological wellbeing and inversely proportional to labour. However, the effectiveness of capital and labour were due to mediation effects of subjective well-being and psychological well-being respectively.

Unique contribution to theory, practice and policy: The LC model of economic growth introduces a modern theory of economic growth, that its adoption will affect the traditional economic theories, practices and policy settings. The model was found empirically valid, hence, the paper recommended the adoption of the LC model in pre-and post micro and macro-economic policy and strategy designs/planning. The adoption of the model will increase the probability of an individual of getting a high economic growth (output) as well as the strengthening of psychosocial resources. However, this study suggested further study by using longitudinal data to attest the LC model as the current study only limited on the cross-sectional data.

Keywords: *Latent Content Model, Psychological Well-being, Economic Growth, Subjective Well-being, Happiness Model*

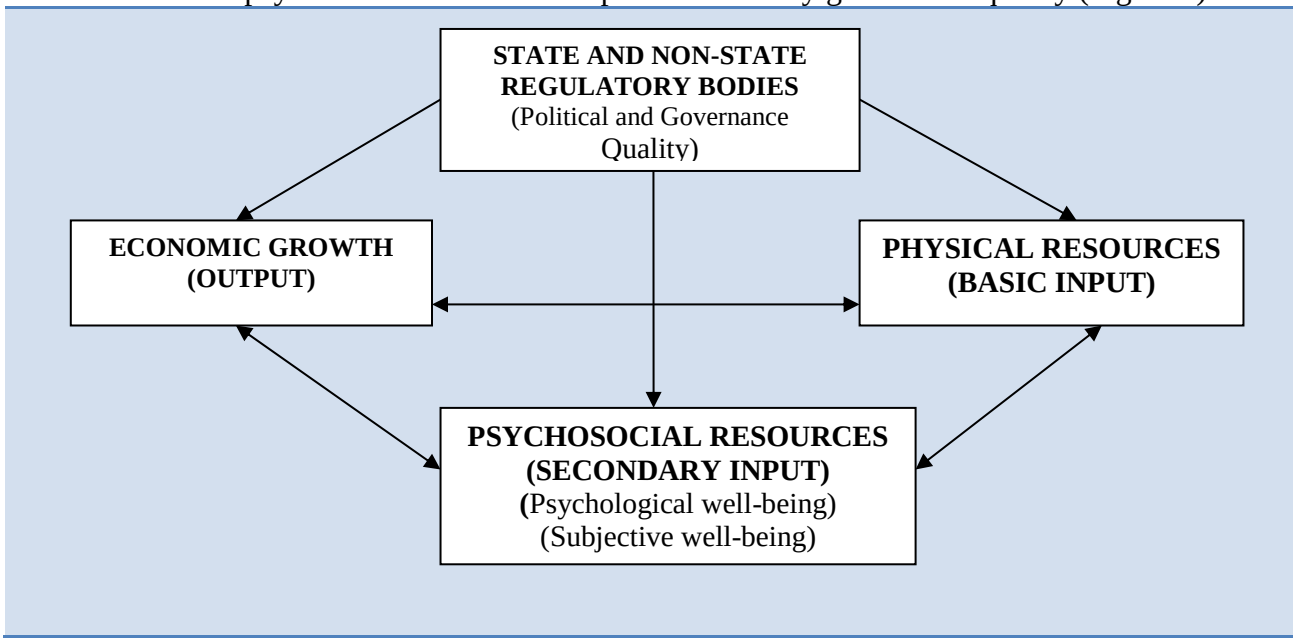
1.0 BACKGROUND OF THE STUDY

Traditional economic growth models that are fully incorporate only economic variables have been challenged by many scholars that are ineffective to foster economic growth. Most of scholars advocate inclusion of both economic and non-economic variables in the economic models (Fehder, Porter and Stern, 2018; Diener and Seligman, 2004). More specific, Diener and Seligman (2004), Okulicz-Kozaryn and Rubia (2018) and Veenhoven (2019) emphasised that the improvement of social capital, democracy, work conditions, environmental pollution, marital status, social security and urbanisation will improve economic growth. Even it is till debated on how non-economic variables particularly subjective well-being (SWB) do impact economic growth, literature weighted more on the positive impacts (Roka, 2020; Semeijn, van der Heijden and Debeuckelaer, 2020; Meyer and Hamilton, 2020; Stevenson and Wolfers, 2008; Diener and Seligman, 2004).The recent study by Li and Shi (2019) criticised various theories that relate non-economic variables and economic growth in specificity of Easterlin paradox effect (Easterlin, 1973, 2017). Specifically, Li and Shi (2019) criticised relative income and absolute income theories that SWB does not only depends on level of income but also on other non-economic factors/variables. In addition to that, Veenhoven(1991) criticised Easterlin paradox, absolute and relative income theories on the ground that, SWB depends on satisfactory of human needs, which actually not fully comes from relative level of income, this criticism supported by most of scholars (Oskrochi, Bani-Mustafa and Oskrochi, 2018; Clapham, Foye and Christian, 2017; Kersemaekers, Rupprecht, Wittmann,Tamdjidi,...Kohls,2018; Markussen, Fibaek,Tarp and Tuan, 2018; Li and Shi, 2019; Li, 2016).However, these theories are supported by some scholars such as Tay, Zyphur and Batz (2018); Liu, Xiong and Yang (2012), Bian and Xiao (2014) and Bian , Zhang, Yang, Guo and Lei (2015).

Another theory that has been challenged is the adaptation theory which propounded by Brickman and Campell (1971) and championed by Knight (2012), and Tsutsui and Ohtake (2012). This theory explains that mental state (psychological well being) of an individual adjusts itself when external stimulation changes so as to adapt to the new environment (Li and Shi, 2019; Kersemaekers *et al*. 2018). Thus, maintain subjective emotion at relative stable level. Specifically, adaptation theory emphasises on two psychological concepts, hedonic treadmill (aspiration of the individual) and set-points (fixed innate psychological factors). The hedonic concept stipulates that an individual that at the early stage motivated as income increases, at the later stage will be accustomed to the increase of income, then at this stage a degree of SWB decreases due to high income effects (Li and Shi, 2019; Luhmann and Intelisano, 2018). On the other hand, the set-point approach, explains that an individual has innate factors which include genes, personality and disposition that determine the individual's fixed baseline of happiness (Li and Shi, 2019; Luhmannand Intelisano, 2018). The baseline of happiness fluctuates due to the external environment and life changes (Yi, 2020; Lindqvist, Östling and Cesarini, 2020). When the emotion system adjusts itself to the new circumstance SWB will return to the baseline. Therefore, happiness or sadness is temporary emotional responses (Luhmannand Intelisano, 2018; Cummins, 2011). Moreover, some scholars attempted to explain various theories, for instance, the theory of satisfaction point that applies the concept of a marginal utility (Li and Shi, 2019). This theory explains when the marginal utility of income becomes zero an individual reaches the happiness satiation point and then income has no effect on individual's SWB (Proto

and Rustichini, 2013; Liang and Shen, 2016). This theory supports the theory of aspiration (Hedonic treadmill theory) as both explain the impact of the final level of utility of an individual. Moreover, the omitted variable theory that suggests that income growth can lead to the increase in SWB, while other factors that influence the level of income such as long work hours and poorer health outcomes would lower the utility of income growth (Srivastava and Agarwal, 2020; Heintzelman, 2018; Clark,Yi and Huang, 2019; Malhotra, 2020; Li and Shi, 2019).

In general it is evidenced that, only economic variables are not sufficient to mould an optimal economic growth model (Li and Shi, 2019; Kara and Petrescu, 2018; Huggins, Thompson and Obschonka, 2018; Braganza, Chen, Canhoto, and Sap, 2020; Markussen et al. 2018; Di Maria, Peronic and Sarracino, 2017; Marhaenia and Purnamawati, 2021; Yi, 2020; Fehder *et al.* 2018). Moreover, adequately concrete theoretical and empirical evidences confirm that non-economic variables are positively impact economic growth (Roka, 2020; Semeijn, *et al.* 2020; Meyer and Hamilton, 2020; Stevenson and Wolfers, 2013; Asadullah, Xiao and Yeoh, 2016; Loon, Otaye-Ebede and Stewart, 2019; Bhuiyan and Ivlevs, 2019; Charles, Wu and Wu, 2019; Wiklund, Nikolaev,Shir, Foo and Bradley, 2020). In addition to that, this study revealed that there were multiple fragmented theories that it becomes hardly to be interpreted in a single policy action plan by decision makers. This is because of absence of a simplified economic model that incorporates both economic and non-economic variables (Li and Shi (2019). Notably, previous theories/models fail to link the impact relationship between micro and macro –levels of economy. And, they define SWB as the happiness or happiness as SWB, which is a vague and limited/narrowed definition of either SWB or happiness. Therefore, from these theoretical and empirical supports, this paper aimed to establish a latent content (LC) model of economic growth that integrates both economic variables (manifested variables) and non-economic variables (Latent variables).Hence, this study assumes that economic growth does not fully depend on economic variables (physical resources) but also are mediated/ depends on non-economic variables such as psychosocial resources and political stability/governance quality (Figure 1).



Source: Author (2020)

Figure 1: The Latent Content (LC) Model of Economic Growth

Figure 1 shows LC model of economic growth. The model is built on various theories that relate economic growth and either economic variables or/and non-economic variables. The model has two impact-directional (paths of effects) that are direct and indirect paths. The direct path starts from an accumulation of physical materials /resources (capital, labour and technology) to improve economic growth (GDP per capita). The direct path assumes that the accumulation of physical materials/resources is directly related to economic growth. The direct model ignores the mediation effects of non-economic variables which are psychosocial resources and the state and non-state regulatory bodies, this direct model is less supported (Ryff, 2018; De Neve, Jeffrey and Sachs, 2020; De Neve, Ward, De Keulenaer,...Norton, 2018; Diener and Seligman, 2004). On the other hand, the indirect path starts from the accumulation of physical materials/resources via psychosocial factors and regulatory bodies (state and non-state based organisations) to improve economic growth. In this path physical resources (basic production inputs) are controlled/mediated by non-economic factors that increase the effectiveness of basic production inputs (i.e., fosters a rapid and high economic growth). This path is highly supported by many scholars that is more effective than the direct model (Roka, 2020; Semeijn, *et al.* 2020; Meyer and Hamilton, 2020; Li and Shi, 2019; Tay, Zyphur and Batz, 2018; Clapham, Foyeand Christian, 2017; Kara and Petrescu, 2018; Marhaenia and Purnamawati, 2021).

From this model, psychosocial resources are influences by national wealth and individual income (De Neve *et al*. 2018; Roka, 2020; Semeijn, *et al*. 2020; Meyer and Hamilton, 2020). There is a bidirectional influence between physical resources, i.e., primary production inputs (PPIs) and psychosocial resource, i.e., secondary production inputs (SPI) which includes soft resources such as entrepreneurial skills, subjective and psychological well-being, etc. Moreover, the model assumes a bidirectional effect between economic growth and psychosocial resources. That is, simultaneously economic growth and psychosocial resources feed reciprocally (Schwartz and Sortheix, 2018). Economic growth improves the well-being of an individual, and at the same time economic growth improves SWB of an individual. On the other side, state and non-state regulatory bodies which measure the quality of politics and governance effectiveness in a country influences economic growth, psychological resources and accumulation of physical resources (Diener and Seligman, 2004; Okulicz-Kozaryn *et al.* 2018; Nikolaev, Boudreaux and Wood, 2020; Arampatzi, Burger, Stavropoulos, and van Oort, 2019). For example ,imposition of unfair tax that leads to unfair (high) price of commodities, limiting freedom and democracy are highly influence the entire variables of LC model. The LC model of economic growth influenced by two factors, which broadly are economic factors (physical resources, e.g. capital, labour, technology), and non-economic factors which are psychosocial resources and state and non-state regulator bodies. The state and non-state concerns on rules and regulations that determine the quality of politics and governance effectiveness, which includes the security, crime rate, working conditions, degree of democracy, freedom, etc.(Okulicz-Kozaryn *et al*. 2018; Suh and Choi, 2018; Yi, 2020; Twenge, Martin and Campbell, 2018; Srivastava and Agarwal, 2020; Malhotra, 2020).

The physical resources (basic inputs) are influenced by the level of economic growth, psychosocial resources, and state and non-state regulatory bodies, such as police, judiciary,

conditioned-services providers such as academic institutions, hospitals, NGOs, etc., and psychosocial resources (psychological well-being and subjective well-being). From this model psychosocial resources not only influenced by physical resources but also by economic growth and state and non-state regulatory bodies. However, psychosocial resources have only two directions of impact; they impact on physical resources and economic growth.

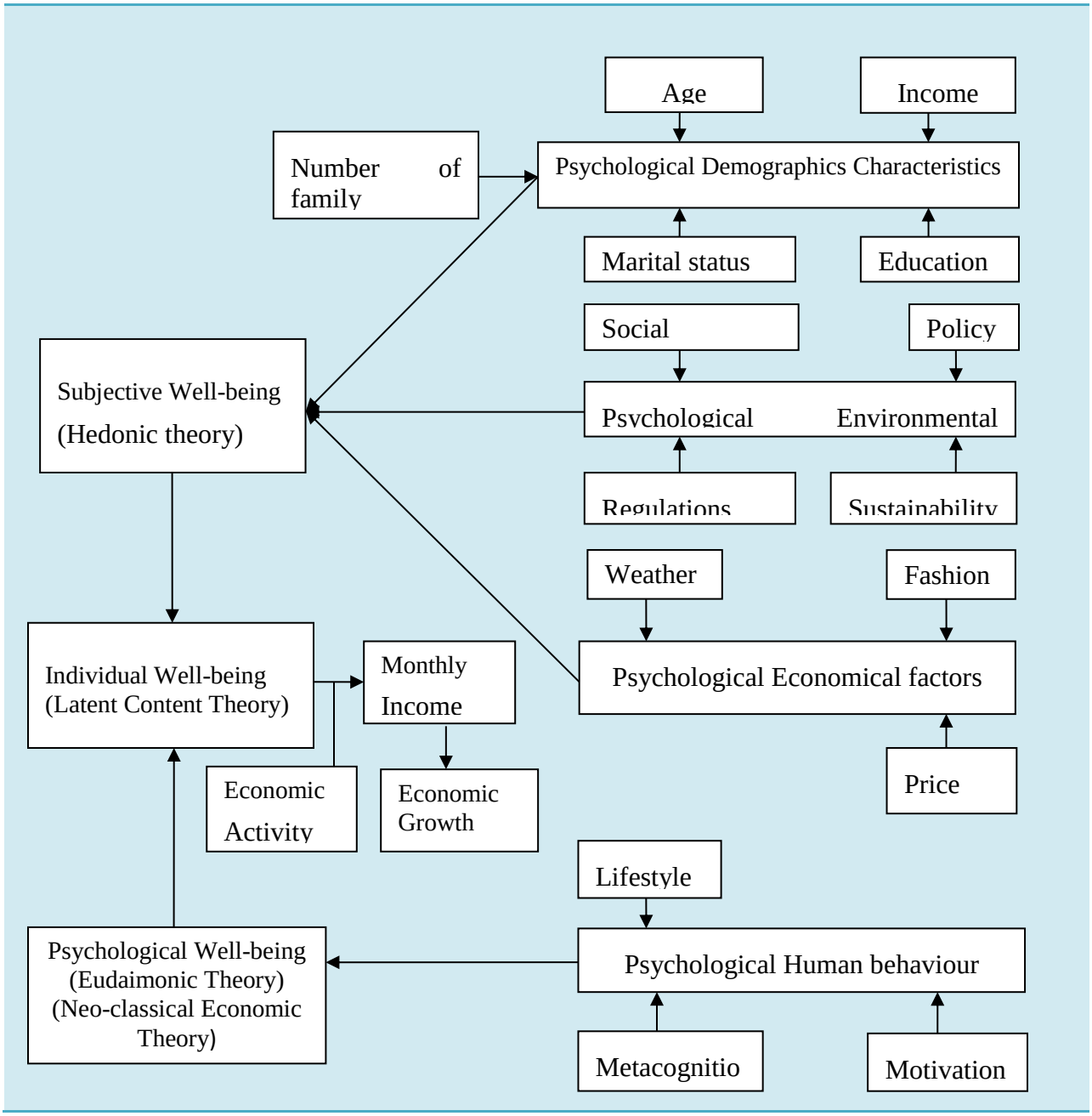
1.1 Research Problem

Despite the fact there are adequate and concrete empirical evidences that traditional economic models that are fully incorporate only economic variables are ineffective to foster economic growth (Fehder *et al*. 2018; Diener and Seligman, 2004; MacCulloch, 2008); there is no economic growth model that has been established to reflect this empirical reality. Moreover, the evidence is clear as the most of scholars agree that the incorporation of economic and non-economic variables in economic growth models foster the economic growth (Zhang and Zhang, 2019; Vukolov and Orlova, 2020; Okulicz-Kozaryn *et al*. 2018). Puzzlingly, there is no full attempt of building an economic growth model that integrates both economic and non economic factors. In addition to that, most of scholars are working on a narrowed definition of the subjective well-being and psychological well-being; hence they reach diametrical conclusions which create a policy dilemma for economists and decision makers. This policy dilemma due to lacking of an optimal model of economic growth and diametrical conclusions of the most scholars in the literature hurts the economic growth, i.e., results to low or suboptimal economic performance/growth. In relying to this fact, this study aimed to establish an empirical economic model that it leads and guides the economists and decision makers on making proper economic choices/decisions. The model provides a clearance for the historical policy dilemma fuelled by the literature (Easterlin, 1973; 2017; Stevenson and Wolfer, 2008; 2013). Hence, the LC model of economic growth resolved this historical problem of economic decision/planning.

1.2 Theorising LC Model of Economic Growth

The LC model of economic growth has its own rooted-theories that are merged from various economic and non-economic theories. Clearly, the LC model is merged from relative and absolute income theory, adaptation and set-point theories, neo-classical economic theory, hedonic well-being (subjective well-being) and eudaimonic theory of well-being (psychological well-being). According to the LC model, happiness is defined as an outcome/product of fundamental psychological factors (FPFs) which composes psychological well-being (PWB) and subjective well-being (SWB). The indicators of PWB are psychological human behaviours. And, the indicators of SWB are psychological demographic factors, psychological environmental factors, and psychological economic factors. Provided that FPFs are positively related to economic growth, then maximisation of FPFs increase the happiness of an individual, which results to an optimal level of economic growth. These psychological factors may have both a direct or indirect catalytic effects on happiness or economic growth. Remembering, the state and non-state regulatory bodies in this study were reflected on the indicators of SWB. Specifically, the regulations and policies of environmental issue those influences the SWB of an individual. This study suggested other researchers may use broad range of state and non-state regulatory bodies' variables.

The etymology of the LC model of economic growth is based on the invisible information that has visible impact on economic growth. The word "latent means invisible" and content means information or value. This model emphasises on psychological capability of economic agents to engulf both internal and external economic forces in a dimension of demographic characteristics, human behaviour, environment and economic factors (i.e., FPFs). Thus, the economic growth is determined by internal strength /motive of an economic producer (an individual). It is quite different from other economic systems/models which emphasise on physical resources (hard capital) as the only inputs in economic production system. Contrarily, this model assumes the mindsets/ psychological resource (soft capital) is a primary gear (input) to enabling the efficiency of basic inputs of production in any production system, hence latent first! This is why this study calls the model, "the latent content (LC) model" of economic growth. Note, this model not ignores non-latent variables, but emphasises more on latent variables as the key or operational machinery of any economic production system. Clearly, this model of economic growth incorporates both hard capital (tangible resources) and soft/latent resources.



Source: Author (2020)

Figure 2: Empirical Algorithm of Structural Modelling of the LC Model of Economic Growth

Figure 2 shows an algorithm of the LC model of economic growth. The algorithm shows how the model is built on fundamental psychological factors. Principally, factors were extracted from various theories including the neo-classic economic theory, eudaimonic and hedonic theories and others. Clearly, the empirical algorithm of the LC model was established to indicate both formative and reflective indicators of the outer and inner structural the LC model.

In a specific way the figure 2 profiles that PWB is sub-dimensioned to lifestyle, motivation and metacognition psychological strength. On the other hand, SWB are sub-dimensioned to psychological demographic characteristics that measured by an individual psychological impression/judgement on a level of age, income, education, marital status, and number of family members; psychological environmental factors that measured by psychological impression of an individual on environmental sustainability, social awareness, policies and regulation, and psychological economic factors which measured by psychological impression on commodity price, fashion of a product and weather. Hence, the individual well-being (happiness) is a total of subjective and psychological well-being.

2.0 ECONOMETRIC SPECIFICATION OF THE LC MODEL

From the general theoretical background the study established an algebraic expression of the LC model, that is, the economic growth is direct related to the factors of production (physical materials, i.e., capital, labour and technology). Hence, constant factors are fundamental psychological factors (FPFs). That is,

GDP = PSY (L, K, T)

GDP = [PSY (L), PSY (K), PSY (T)]

Where, PSY = Psychological influence on a factor of production.

PSY (L), PSY (K), PSY (T) is psychological controlled /mediated factors of production (labour, capital and technology).

Clearly, PSY (L) means that labour quality or productivity efficiency of a labour is subjected to FPFs. The economic decisions of an individual are subjected to his/her psychological resources. Thus, probability of getting a high or low economic output is determined by a level of psychological resources (latent content). The PSY (K) means a psychological impression or control of a producer on capital decision/budgeting (capital resourcing). In this case an individual can avoid the risky source of capital (risk aversely) or can take the risky source of capital (risk taker). This is a secondary stage in the LC model planning. Moreover, PSY (T), in a tertiary stage of the LC model planning, psychological impression or control of a producer on technological uses is evaluated. An individual makes a decision on what technology to use or in other words an individual makes a choice on the adaption of the available and affordable technology. In most cases, most of the risk taker producers have not technophobia syndrome; they conquer any suitable available technology at anytime and able to use the technology for ventures that maximises their income. In general, PSY (L) signifies the psychological well-being (judging capacity/ability) of an individual; PSY (K) and PSY (T) are subjective well-being of producers (judging outcomes), which actual determine the level of happiness of individuals on a particularly economic engagement.

In this economic model the production system is optimally determined by the individual psychological outcomes (happiness). Hence, productivity of an individual is determined by effort, motivation and innovativeness. The effort, motivation and innovativeness are only personal outcomes; they are not devoted by impersonal economic agents such as firms and regulatory bodies. In other words, impersonal economic agents in any economic system cannot

offer these three "productivity drivers", i.e., effort, motive and innovativeness. For example a firm is an impersonal entity that cannot increase the effort, skill or motivation without changing psychological state (mindset) of employees/workers. Therefore, the more technically efficient firms or regulatory bodies depend on these personal productivity drivers (PPD) offered by motivated and skilled workers in a production system. From this fact, the study suggests that an individual is a principle economic agent (PEA) that influences or controls all other economic agents in the economic production system. Hence, psychological states of an individual are needy concern to be evaluated. Uniquely, the LC model explains how the technical efficient or inefficient economic agents (individual, firm and regulatory body) behave or structured. In other words the model explains how firms or regulatory bodies can devote their efforts, motive and innovativeness to economic growth.

3.0 EMPIRICAL JUSTIFICATION OF LC MODEL

3.1 Materials and Methods

For the purpose of credibility and empirical validity of the LC model, empirical clearance of the model was done by using empirical data from Tanzania. The empirical justification of the model is necessary as it is highlighting the methodological approaches and empirical fitness of the model. The objective was to examine the linear and non-linear assumptions of the LC model of economic growth. Moreover, the study examined the degree of mediation effects of FPFs on economic growth and the level of technical efficiency of sampled producers in Kagera and Mwanza regions. The practical example was drawn from the cross-sectional data of 211 individuals randomly sampled from four districts in Mwanza and Kagera regions in Tanzania. The study used the self- reporting checklist questionnaire to capture psychological variables for cross-sectional data. This tool has methodological advantages because it is unbiased and collects the sensitive information (Ghauri, Gronhaug, and Strange, 2020). Moreover, cross-section data are highly efficient in testing the association between two variables, and creating of new theory (Ghauri et *al*. 2020).

The primary data were collected by using a self-administered survey method which was reliable, authentic, and objective oriented because data were purposely collected to address a problem at hand (Ghauri *et al*. 2020). The internal consistency reliability and validity of the data collection tools were evaluated by using Cronbach's alpha and principal component analysis (CPA) techniques respectively as suggested that are suitable for assessing the reliability of a summative rating (Taherdoost, 2016; Cronbach , 1951; Likert, 1932; Takagishi, 2020). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity tests were done as a pre-test for PCA. The dependent variable was an economic growth which was measured by economic output in a region (regional GDP per capita). Moreover, independent variables were physical materials (capital and labour), and they intermediated by psychosocial resources (SWB and PWB). Note, capital of individual was measured by using working capital (total current assets) available in 28 days (a month). On the other hand, the labour was measured as education weighted ratio of total active number of family members, i.e., total number of family members less the number of dependents, and then divided by an individual's psychological education satisfactory level/score. This was done, to reflect the quality of labour in term of education criteria in a family. The latent variables (SWB and PWB) were measured by using 5-Points

Likert scale on each indicators, which are psychological human behaviour scores (*HUBE*), psychological economic scores (*ECOFA*), psychological environmental score (*ENVI*), and psychological demographic score (*DEMO*) (Appendix A).

3.2 Data Analytics

The data were analysed by both linear and non-linear modelling data analytics methods. The linear analytic methods included the automatic linear modelling (ALM), stochastic structural-factor frontier (SSFF) analysis, and structural equation modelling (SEM) to test the linearity assumption of the LC model. The SSFF analysis provided a convenient setting for estimates of technical efficiency of the economic producers. Moreover, SSFF modelling involved the establishment of the empirical model/function that gives the maximum possible output for a given set of inputs. Therefore, the model/ function defined a boundary or a frontier. The SSFF model was modified from the conversional frontier production function (Aigner, Lovell and Schmidt, 1977; Meeusen and van den Broeck, 1977). The SME model offered the estimation of latent (unobserved) variables via observed variables; and model testing where a structure can be imposed and assessed as to fit of the data (Kaplan, 2001).

On the other hand, non-linear modelling of the LC model was done by using a probit model/regression and neural network analysis. The probit model (probability + unit) is a specification for an ordinal or a binary response model that employs a probit regression. The model was estimated by using the maximum likelihood estimates (MLE) procedures. The model was derived from Li, Poskitt and Zhao (2017). The probit model aimed to measure the probability (chances) responses of the economic growth on the changes of both economic and non-economic variables. Hence, the predicted probabilities (PP) were established. A neural network is a set of non-linear modelling tool that consists an input and output layers plus one or two hidden layers. The neural network analysis can approximate a wide range of statistical models without prior assumption of a certain relationships between the dependent and independent variables (Ripley, 1996). That is, if a nonlinear relationship is more appropriate, the neural network will automatically approximate the "correct" model structure (Haykin, 1998; Ripley, 1996). Therefore, no need of specification model for neural network analysis was required.

3.3 Specification Model

3.3.1: The General Linear LC Model Specification

The study examined the linear behaviour by using the automatic linear modelling (ALM) procedures, stochastic structural-factor frontier (SSFF) analysis, and structural equation modelling (SEM). All these analytical/statistical analysis techniques were estimated by the assumption of linear function, hence represent by a general model of specification.

GDP = *f* (Capital, Labour; and mediated by psychological demographic characteristics, psychological environmental factors, psychological human behaviour and psychological economical factors)

$$\ln GDP_i = \beta_0 + \beta_5 \ln CAP + \beta_6 \ln LAB \| \beta_1 \ln DEMO + \beta_2 \ln ENVI + \beta_3 \ln HUBE + \beta_4 \ln ECOFA + \varepsilon$$

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Where, $\beta_{i=0,1,..}$ are coefficients constants of the OLS estimation model, the rest variables are defined on the respective word equations.

3.3.2: The General Non-Linear LC Model Specification

The study only considered the probit regression model specification for examining the non-linear assumption of the LC model. In fact, the probit model is assumed that the ε_1 and ε_2 were drawn from a standard normal distribution, with zero mean, unit variance, and correlation coefficient ρ, that is $(\varepsilon_1, \varepsilon_2) \sim N_2\ (0,1,\rho)$.

Then, the conditional probability function for GDP =1 (i.e., chances of GDP to getting high occurs for given independent variable changes/occurs X). In Probit regression, the cumulative standard normal distribution function $\Phi(\cdot)$ is used to model the regression function when the dependent variable is binary, that is, the study assumed E(Y|X), if Y was let to be economic growth and X includes the economic and non-economic variable, then

$$\mathbf{Pr(Y = 1|X) = \Phi(X\beta)}$$

$$\mathbf{\Phi(X\beta) = \Phi(\beta_0 + \beta_1 WCAP + \beta_2 LAB\ ||\ \beta_3\ DEMO + \beta_4 INVI + \beta_5 HUBE + \beta_6 ECOFA + \varepsilon)}$$

Therefore,

$$\mathbf{\Phi(X\beta) = \Phi(Z) = \int_{-\infty}^{Z} \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{Z^2}{2}\right) dZ.}$$

Where $Z = X\beta$, for $0 \leq Z \leq 1$ for all values of $X\beta$ in economic output (GDP).

4.0 FINDINGS

4.1 Respondents Profile

This study used various cadres of respondents. Mwanza and Kagera samples were 111 and 100 individuals respectively. The male respondents were about 64.5 percent; about 52.6 percent of respondents in a sample were of the age of 18-30 years. The respondents aged in 61-70 years were about 2.4 percent. The married persons were about 62.6 percent and the primary school leavers were about 55.9 percent in the sample. Moreover, college/university graduates were about 9.0 percent. It is evidenced that the study covers broad range of ages from 18 years to 70 years, and education level is broadly extended from primary to university level.

4.2 Evaluation of Data Collection Tools

The study used self- reporting checklist questionnaires and employed the self-administered survey method to collect data. For quality assurance of the data/questionnaires, both the reliability and validity tests were done.

4.2.1 Reliability Tests

Reliability refers to the consistency of a measure. Clearly, reliability is internal consistency, which is the consistency of people's responses across the items on a multiple-item measure (Heale and Twycross, 2015). The commonest method of measuring the reliability is Cronbach's alpha (Cronbach, 1951) (Table 1).

Table 1: Cronbach's Alpha Tests for Internal Consistency Reliability of Measures

Test scale = mean(standardized items)

Item	Obs	Sign	item-test correlation	item-rest correlation	average interitem correlation	alpha
lnAGDP	211	+	0.7680	0.6518	0.3024	0.7223
lnDemo	211	+	0.7268	0.5955	0.3150	0.7340
lnEnvi	211	+	0.6508	0.4956	0.3383	0.7541
lnHube	211	+	0.7035	0.5645	0.3221	0.7403
lnEcofa	211	+	0.6241	0.4616	0.3465	0.7608
InWCap	211	+	0.8162	0.7195	0.2876	0.7078
lnLab	211	+	0.3076	0.0942	0.4435	0.8270
Test scale					0.3365	0.7802

Sources: Author (2020).

Table 1 shows Cronbach's alpha test for internal constancy reliability of the measuring tools. The test denotes the additive scale; here 0.3365 is the average inter-item correlation, and 0.8984 is the alpha coefficient for a test scale based on all items. The signs indicate the direction in which an item variable entered the scale, positive sign means that the item was not reversed. In general, the item-test correlations should be roughly the same for all items (Nunnally and Bernstein 1994). The Cronbach's alpha requires some standard for judging values of its coefficient. But, the interpretation will be done with caution. The values of alpha vary as the number of items, for items less than 10, the acceptable values should be greater than 0.5, and if the number of items is more than 10 items, then the acceptable value is greater than 0.7 (Heale and Twycross , 2015; Nunnally and Bernstein 1994; Cronbach, 1951). In this study, all the judging criteria were met as the average inter-item correlation in tables are almost equal as required, and the value of the alpha coefficient is about 0.7802, for items less than 10. Hence, the data collection tools evident the high internal constituency reliability.

4.2.2 Validity Test

The validity is defined as the extent to which a concept is accurately measured in a quantitative study (Heale and Twycross, 2015). Basically, there are three types of validity, which are content validity that explains the extent to which a research instrument accurately measures all aspects of a construct. The construct validity which explains the extent to which a research instrument (or tool) measures the intended construct and the criterion validity that explains the extent to which a research instrument is related to other instruments (Heale and Twycross, 2015). The principal component analysis (PCA) was used to analyse the validity of measures. Principal component analysis (PCA) is a statistical technique used for data reduction. PCA originated with the work of Pearson (1901) and Hotelling (1933). The objective of PCA is to find unit-length linear combinations of the variables with the greatest variance. Prior- to run PCA, the data suitability

for factors analysis was done by using Kaiser-Meyer-Olkin (KMO) sampling adequacy test. The recommended minimum value of KMO value is 0.5(Field, 2000; Kaiser, 1974). The KMO value of this study was 0.743 which is greater than the recommended value of 0.5. Hence, it is evident that the data were adequately for PCA. Moreover, the Bartlett's test of sphericity test was conducted to examine the strength of the correlation matrix (Table 2).

Table 2: Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Tests

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.743
Bartlett's Test of Sphericity	Approx. Chi-Square	568.648
	Df	21
	Sig.	0.000

Source: Author (2020).

Table 2 shows the KMO and Bartlett's Tests of the data set of this study. The Bartlett's Tests had an approximate chi-square of 302.822, and p-value of 0.000. Therefore the null hypothesis that the original correlation matrix is an identity matrix was rejected at 99 percent since its p-value was less than critical values of 0.01. Then, the PCA was conducted (Table 3).

Table 3: Total Variance Explained in the Extraction of Principal Component Analysis

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.270	46.718	46.718	3.097	44.247	44.247
2	1.097	15.665	62.383	1.270	18.136	62.383
3	0.900	12.855	75.238			
4	0.659	9.409	84.647			
5	0.550	7.854	92.502			
6	0.381	5.447	97.949			
7	0.144	2.051	100.000			

Extraction Method: Principal Component Analysis.

Source: Author (2020)

Table 3 shows total explained in the extraction of principal component analysis. From this table, the study evidenced that only two components have eigenvalues greater than one, which is the recommended value (Catell, 1996). The first principal component eigenvalue is 3.27 that explain 46.72 percent of total variances in the original data. The second principal component eigenvalue is 1.097 which explains about 15.67 percent of total variances in the original data, and the third principal component eigenvalue is 0.8998 which is below the mean value of eigenvalue of one, it explains 12.85 percent of the variance in the original data (Figure 3).

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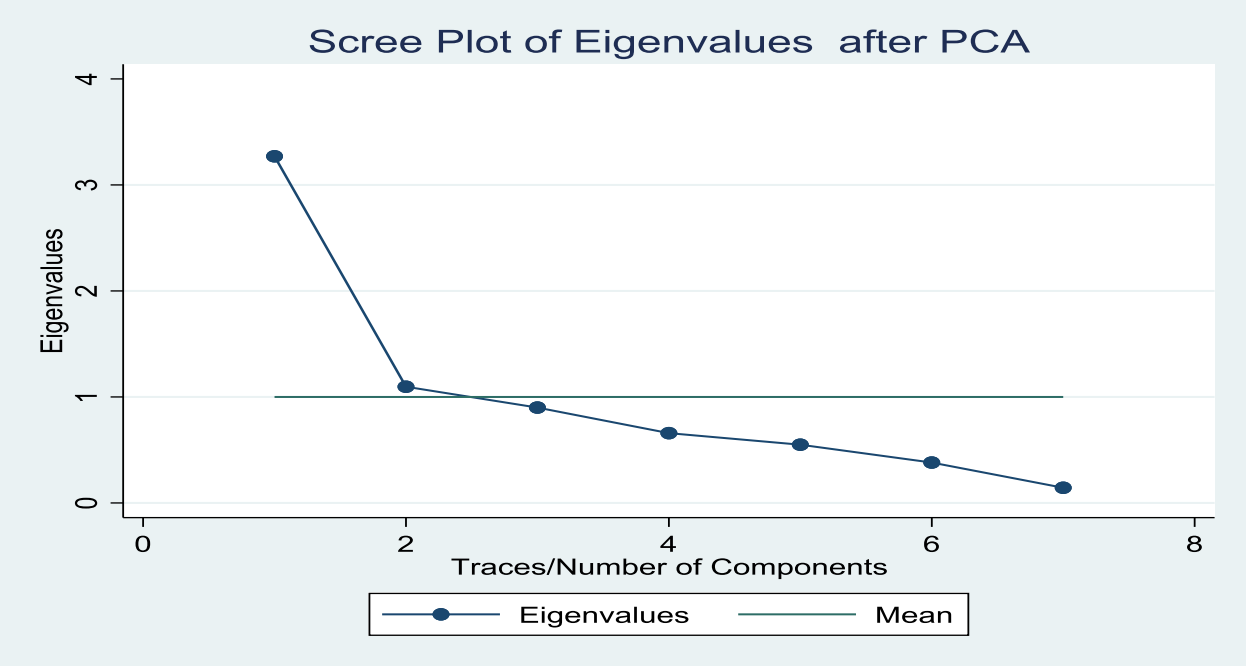

Source: Author (2020).

Figure 3: Scree Plot of Eigenvalues after Principal Component Analysis (PCA)

Figure 3 shows the scree plot of eigenvalues after the PCA. The figure indicates that only two principal components are above the elbow of the curve. Hence, the study considered (retained) only two components, and oblimin rotation method from oblique rotation techniques was conducted. The pattern matrix has shown the existence of unpretentious structure with all factors that representing the strong item loadings (Table 4).

Notably, the pattern matrix and structure matrix confirm construct validity. Clearly, convergent validity was confirmed by pattern matrix and structure matrix confirms discriminant validity in the oblique rotation technique (Hadi, Abdullah, and Sentosa, 2016). Then, the convergent validity was assessed by looking for higher factors loadings of converging items (Hadi, et al.2016). The structure matrix represents the structure of loadings, i.e., the relationship between each item and each factor. Then, the discriminant validity was assessed by cross loadings (Hadi, et al.2016). The table shows that the pattern of correlation that all item of the non-economic and economic factors related to their same construct. Therefore, this correlation evidenced that all items were converged on their constructs. Therefore, the convergent validity was ensured. On the other hand, on the structure matrix, the cross-loading (the relationship between items and rest of the factors) was very low. Therefore, the discriminant validity was ensured (Table 4).

Table 4: Pattern and Structure Matrices for Dependent and Independent Variables

Items	Pattern Coefficients		Structure Coefficients		Communalities
	Component		Component		
	1	2	1	2	
ln AGDP	**0.891**	-0.190	**0.857**	-0.028	0.769
ln Demo	**0.784**	-0.071	**0.771**	0.072	0.600
ln Envi	**0.529**	0.347	**0.592**	0.444	0.467
ln Hube	**0.548**	0.449	**0.630**	0.549	0.592
ln Ecofa	**0.606**	0.077	**0.620**	0.187	0.390
In WCap	**0.910**	-0.133	**0.885**	0.033	0.801
ln Lab	-0.124	**0.879**	0.037	**0.857**	0.748

Source: Author (2020).

Table 4 shows pattern and structure matrices for dependent and independent variables. The pattern matrix represents the pattern loadings, i.e., regression coefficients of the items on each of the factors.

4.2 Linear Behaviour of LC Model

The LC model assumes the partial (mediated) linearity between economic growth and production inputs, particularly the principal economic agent (PEA), i.e., the labour. Hence, in this empirical validation, linear assumption was tested by using automatic linearity modelling (ALM) procedures, stochastic structural-factor frontier (SSFF) analysis, and structural equation modelling (SEM). The aim of using this combination of statistical techniques was to reach a comprehensive and robust conclusion.

4.2.1 Automatic Linear Modelling

In ALM procedures, the study found that the most important predictive factor /variable is capital which has a coefficient value of 0.935; p-value of 0.000 with an importance value of 0.936. Therefore, the study confirmed that, the linear impact of capital and economic growth was significantly at 0.01 level, since p-value of 0.000 was less than a critical value of 0.05. Moreover, psychological well-being (Hube), has a coefficient value of 0.356; p-value of 0.000, with an importance value of 0.037 was confirmed to impact economic growth at 0.01 level of significance, since its p-value of 0.000 was less than the critical value of 0.01. Contrarily, the labour that has a negative coefficient value of 0.074, with p-value of 0.013 and an importance value of 0.018, it confirmed statistically to have negative impact on economic growth at 0.05 level of significance, since its p-value was less than the critical value of 0.05 (Table 5). Clearly, the labour was found significant negatively impacting economic growth, and less important than capital and PWB (Hube). Therefore, the labour requires mediation as per LC model assumption.

Table 5: Estimated Coefficients of LC Model Economic Growth

Coefficients

Target: ln AGDP

Model Term	Coefficient ▼	Std.Error	t	Sig.	95% Confidence Interval		Importance
					Lower	Upper	
Intercept	-10.728	0.636	-16.868	.000	-11.982	-9.474	
lnWCap_transformed	0.935	0.051	18.152	.000	0.833	1.036	0.936
lnHube_transformed	0.356	0.099	3.586	.000	0.160	0.552	0.037
lnLab_transformed	-0.074	0.030	-2.510	.013	-0.133	-0.016	0.018
lnEcofa_transformed	-0.147	0.082	-1.802	.073	-0.308	0.014	0.009

Source: Author (2020).

Table 5 shows model coefficients and importance values of independent variables. The linear model was determined at R^2 =69.9 percent. This means that, model accuracy was about 69.9 percent. Data were prepared automatically to fit the model. The forward stepwise model selection method was used, and information criterion (IC =-534.895) was used to select the best model.

4.2.2 Stochastic Structural-Factor Frontier (SSFF) Model Analysis

The SSFF analysis is the one of linear models that depicts optimality of the LC model by examining the technical inefficiency of respondents (producers).The model assumes that the inefficiency components are normally or half-normal distributed (Table 6).

The SSFF indicated that the capital has the highest significant positive impact on economic growth. It has a coefficient value of 0.886 and p-value of 0.000. The second factor is the Hube (PWB) which has a coefficient value of 0.344 and p-value of 0.000. The third significant factor is a labour which has a coefficient value of -0.077, with p-value of 0.007. All these factors were statistically significant at 99 percent of confidence level. Therefore, structural factors frontier (SFF) was capital, Hube (PWB) and Labour. The rest factors were not statistically significant, hence were omitted in the SFF. This finding confirmed the finding of ALM procedures.

The study examined if the there was the technical inefficiency among the producers. The study used various frontier statistics to test hypotheses of technical inefficiency. Kumbhakar, Wang and Homcastle (2015) suggested effective likelihood ratio (LR) test statistics which uses the critical values for mixed distribution from Kodde and Palm (1986). The LR test of this study was 0.041, since this values was less than critical values of 2.704 (Kodde and Palm, 1986), then SSFF model was appropriate (Table 6).

Table 6: Stochastic Structural -Factors Frontier Normal/half-Normal model

Stoc. frontier normal/half-normal model — Number of obs = 211
Wald chi2(6) = 547.02
Log likelihood = -22.787459 — Prob > chi2 = 0.0000

lnagdp	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
inwcap	.8862318	.0600518	14.76	0.000	.7685324	1.003931
lnlab	-.0772093	.0285454	-2.70	0.007	-.1331574	-.0212613
lndemo	.0855333	.0765008	1.12	0.264	-.0644054	.2354721
lnenvi	-.009629	.0617088	-0.16	0.876	-.130576	.111318
lnhube	.3442383	.0910355	3.78	0.000	.1658119	.5226646
lnecofa	-.1208373	.0762153	-1.59	0.113	-.2702165	.0285419
_cons	-10.00039	.8089719	-12.36	0.000	-11.58595	-8.414836
/lnsig2v	-2.710377	.4353914	-6.23	0.000	-3.563729	-1.857026
/lnsig2u	-4.074535	4.614255	-0.88	0.377	-13.11831	4.96924
sigma_v	.2578986	.0561434			.168324	.3951409
sigma_u	.1303845	.3008137			.0014171	11.99656
sigma2	.0835118	.0508573			-.0161666	.1831902
lambda	.505565	.3555195			-.1912405	1.20237

LR test of sigma_u=0: chibar2(01) = 0.04 — Prob >= chibar2 = 0.420

Source: Author (2020).

Table 6 shows SSFF analysis. The model established the optimal marginal effects of independent variables. The mean technical efficiency of the producers was averaged to 94 percent with a range of 92 percent to 95 percent. This means the producers in general were operating at 0.6 percent below the structural-factor frontier

4.2.3 Structural Equation Modelling (SEM)

Lastly, the SEM was used to mould a final structural LC model based on the empirical evidence from ALM and SSFF analysis. The previous analysis of ALM and SSFF model increased the knowledge on the linearity behaviour of the LC model. Then, at this stage, the SEM was applied to establish an optimal structural economic model. The formative and reflective indicators of the LC model were evaluated in their relevance in the models. The partial least square-structural equation modelling (PLS-SEM) algorithm was established to indicate the overall linear behaviour of both formative (latent) and reflective (manifested) variables (Figure 4). The algorithm of the LC model showed both direct and indirect paths with their "path effects". Most of the indirect paths have positive correlation coefficients (path coefficients), which indicated the effective mediation effects.

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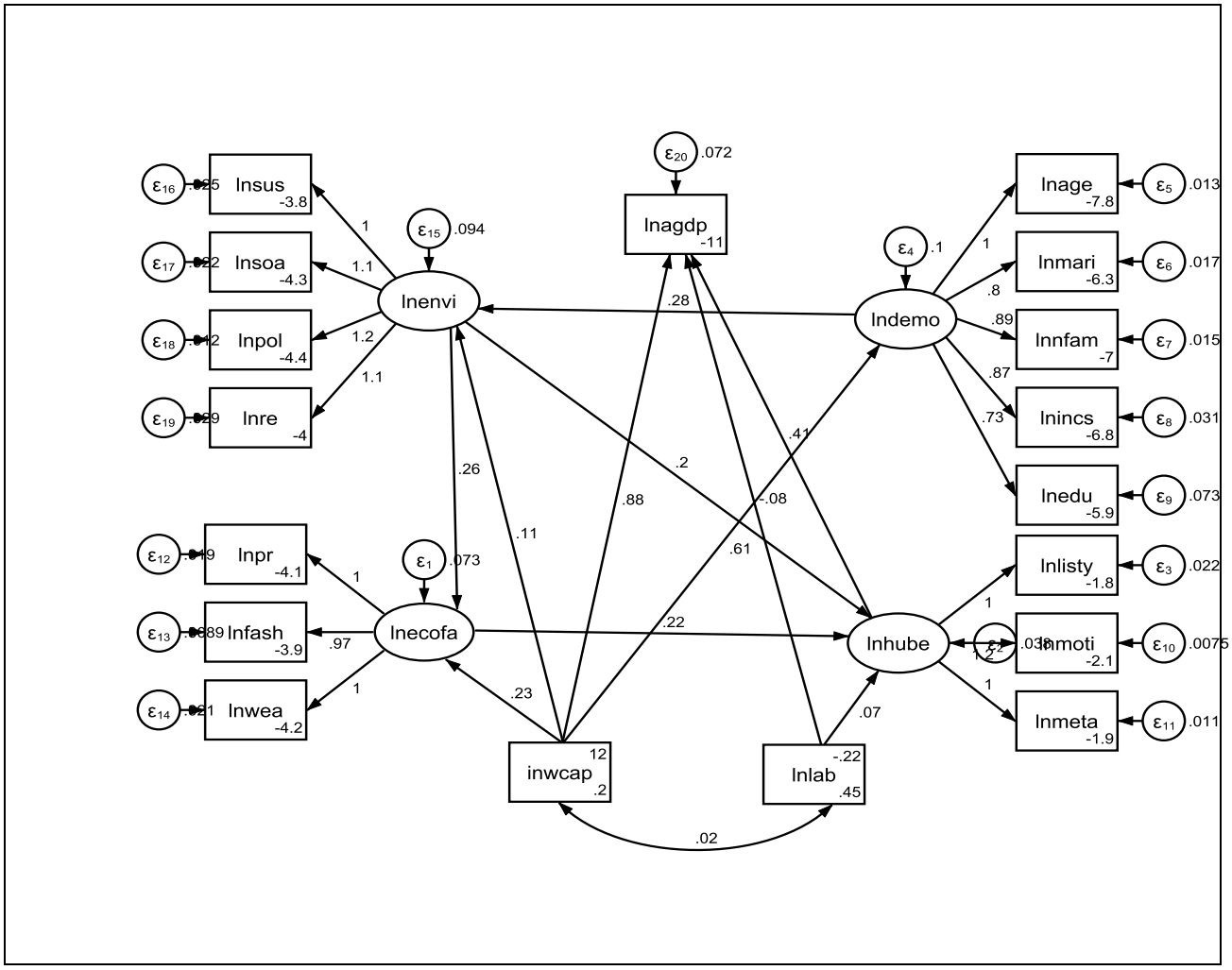


Source: Author (2020)

Figure 4: PLS- SEM Algorithm of LC Model of Economic Growth

Figure 4 shows the final optimal structural model that fully reflects the LC model of economic growth. It is evidenced that PWB has a significant direct and indirect impact on economic growth. But, SWB has indirect impact on economic growth; it impacts economic growth via affecting capital. In general, PWB impacts SWB of an individual, and consequently, SWB influences the basic production inputs (capital)(Di Maria, Peronic, Sarracino, 2017; Kersemaekers *et al*. 2018).

The path coefficients of the structural LC model were determined by SEM with their significance statistical tests, t-value and p-values. The model has a log likelihood of 227.561, the chi-square of likelihood ratio (LR) test of model versus saturated was 214.35, with the empirical probability of 0.000 (prob>chi2 =0.000). Since the calculated/empirical probability value of the LC model is less than critical value of 0.01, therefore the study rejected the null hypothesis that the model is not saturated (Table 7).

Table 7: Path Coefficients and Statistics Tests for the Optimal Structural LC Model

```
Structural equation model                       Number of obs     =        211
Estimation method  = ml
Log likelihood     =  227.56119

 ( 1)  [lnpr]lnecofa = 1
 ( 2)  [lnlisty]lnhube = 1
 ( 3)  [lnage]lndemo = 1
 ( 4)  [lnsus]lnenvi = 1
```

	OIM Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
lnagdp						
lnhube	.4055331	.094583	4.29	0.000	.2201539	.5909123
inwcap	.8835985	.0457511	19.31	0.000	.7939279	.9732691
lnlab	-.0795148	.0284356	-2.80	0.005	-.1352475	-.023782
_cons	-10.78392	.5155243	-20.92	0.000	-11.79433	-9.77351
lnecofa						
lnenvi	.2626195	.0627032	4.19	0.000	.1397234	.3855156
inwcap	.2328846	.0471418	4.94	0.000	.1404884	.3252808
lnhube						
lnecofa	.2214555	.0515332	4.30	0.000	.1204523	.3224586
lnenvi	.1982563	.047019	4.22	0.000	.1061008	.2904119
lnlab	.0700749	.021145	3.31	0.001	.0286314	.1115184
lndemo						
inwcap	.6065857	.0514332	11.79	0.000	.5057784	.707393
lnenvi						
lndemo	.2828833	.0699687	4.04	0.000	.1457471	.4200195
inwcap	.1118	.0643361	1.74	0.082	-.0142963	.2378964
cov(inwcap, lnlab)	.0198345	.0205565	0.96	0.335	-.0204554	.0601245

```
LR test of model vs. saturated: chi2(126) =    214.35, Prob > chi2 = 0.0000
```

Source: Author (2020)

Table 7 shows the path coefficients of the optimal structural LC model of economic growth. Empirically, the model confirmed that key determinants of economic growth were capital, PWB and labour. Both the capital and Hube have positive coefficient values of 0.88, and 0.406, with p-value of 0.000 respectively, since their p-value was less than a critical value of 0.01, therefore, the study confirmed at 99 percent that capita and Hube has positive significant impacts on economic growth. Moreover, a coefficient value of the labour was -0.08, with p-value of 0.005, since p-value was less than the critical value of 0.01, then a researcher was confident at 99 percent that the labour has a negative significant impact on economic growth.

4.2.4 Mediation Analysis of Structural LC model

For better conclusion on linear assumption of the LC model, mediation analysis is important, therefore was done. The mediation analysis was done by using variance account for (VAF) value, which is defined as a ratio of total indirect effects to total effects. In assessing the mediation effect in the model, the study used two effect paths, i.e., the direct effect path (DEP) and the indirect effect path (IEP). The DEP is the effect on basic production inputs (capital and labour) to economic growth. It is evidenced that there was no indirect path from Hube to economic growth, only direct path was significant. Moreover, the path from capital to economic growth, only 5.4 percent of total effects were due to the indirect path. Clearly, the path from the labour to economic growth, about 55.6 percent of total effects were due to indirect path/effects; hence the labour requires a partial mediation as assumption of the LC model requires. The SWB indicators (Demo, Envi and Ecofa) require full mediation because having no a direct impact on economic growth at 100 percent (Table 8). Therefore, only PWB has the significant direct impact on economic growth, SWB impacts economic growth via improvement of basic production inputs (capital).

Table 8: Total Effects, Indirect Effects, VAF and p-values of the Structural LC Model

Model Paths	Total Effects	P-value	Indirect Effects	P-value	VAF	Decision
lnAGDP - lnHube	0.4055	0.000	No path	-	-	No mediation
- lnWCap	0.9340	0.000	0.0504	0.001	0.054	No mediation
-lnLab	-0.0511	0.076	0.0284	0.008	-0.556	Partial mediation
- lnEcofa	0.0899	0.002	0.0898	0.002	1.000	Full mediation
- lnDemo	0.0294	0.008	0.0294	0.008	1.000	Full mediation
-lnEnvi	0.1040	0.000	0.1040	0.000	1.000	Full mediation

Source: Author (2020)

Table 8 shows mediation analysis of the linear structural LC model of economic growth. The PWB has the highest level of the direct impact than other non-economic variables in the structural model. It is composed about 40.6 percent. This empirical observation evidenced that non-economic variables, particularly psychological well-being factors have more impact on

economic growth. Moreover, the PWB impacts subjective well-being of an individual. Specifically, SWB improves the basic production inputs.

4.2.5 Goodness -of- Fit Statistics of the LC Model

In order to increase both an empirical and theoretical justification of the LC model on data processing and modelling, the general statistical check-up of the model was done by using SEM (Table 9).

Table 9: Empirical Statistics Tests for Goodness-of-Fit of the LC Model

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(126)	214.348	model vs. saturated
p > chi2	0.000	
chi2_bs(152)	4184.783	baseline vs. saturated
p > chi2	0.000	
Population error		
RMSEA	0.058	Root mean squared error of approximation
90% CI, lower bound	0.044	
upper bound	0.071	
pclose	0.164	Probability RMSEA <= 0.05
Information criteria		
AIC	-329.122	Akaike's information criterion
BIC	-117.955	Bayesian information criterion
Baseline comparison		
CFI	0.978	Comparative fit index
TLI	0.974	Tucker-Lewis index
Size of residuals		
SRMR	0.048	Standardized root mean squared residual
CD	0.769	Coefficient of determination

Source: Author (2020)

Table 9 shows goodness-of-fit tests statistics. The likelihood ratio reports two tests. The first is a model chi-square test of the LC model, which indicated statistically significant at 0.01 level, since has the p-value of 0.000 which is less than a critical value of 0.01. The saturated model is the model that fits the covariances perfectly. It is accepted at 0.05 level that the model fits as well as the saturated model. The second test was a baseline versus saturated comparison. The baseline model included the mean and variances of all observed variables plus covariances of all observed exogenous variables. Therefore, it is accepted at 0.05 level that the baseline model fits as well as the saturated model. Under population error, the RMSEA value was reported along with the

lower and upper bounds of its 90 percent confidence interval. In this case, the upper and lower bound were used. As the rule of thumb, if the lower bound is below 0.05, hence the hypothesis that the fit is close is accepted (Schumaker and Lomax, 2016). Therefore, it is accepted that fit was close as the lower bound because the lower bound for this study was 0.044. On the other hand, if the upper bound is above 0.10, it is accepted that the hypothesis that the fit is poor (Schumaker and Lomax, 2016). Hence, in this study the hypothesis that fit is poor was rejected because the upper bound of this study was 0.071 which is less than 0.10. The Pclose is the probability that RMSEA value is less than 0.05, interpreted as the probability that the predicted moments are close to the moments in the population (Schumaker and Lomax, 2016). The RMSEA value of this study was 0.058, indicating that the model fits closely. The Pclose was 0.016 which indicated the robust model fits. In baseline comparison there are two indices, which are comparative fit index (CFI) and Tucker-Lewis Index (TLI), or sometime known as nonnormed fit index, both as rule of thumb values close to one indicates a good fit (Pituch and Stevens, 2016). The CFI and TLI values of this study were of 0.978 and 0.974 respectively; therefore the LC model is perfectly fits on empirical data. Moreover, the size of residuals reports the standardized root mean squared residual (SRMR) and the coefficient of determination (CD). A perfect fit corresponds to an SRMR of 0 and a good fit corresponds to a "small" value, considered by some to be limited at 0.08. And, a value of CD close to one indicates a good fit (Pituch and Stevens, 2016). In this study, the value of SRMR was 0.048 which nearest to zero (perfect), on the other hand, CD was about 0.769 which also indicated a strong determination fit of the model.

For better conclusion, the test stability of non-recursive system (stable) of the LC model is very important. The recursive models are designing to be stable in the sense that change of parameters of the model do not significantly affects the model output (Pituch and Stevens, 2016). Clearly, stability of the model concerns whether parameters of the model are such that the model would blow up if it were operated over and over again (Pituch and Stevens, 2016). If the results are found not to be stable, then those cast questions about the validity of the model. The stability is the maximum of the moduli, and the moduli are the absolute values of the eigenvalues. Usually, the two eigenvalues are not identical, but it is a property of this model that they were equal. If the stability index is less than 1, then the reported estimates yield a stable model. The stability index of this study was equal to zero. This indicates that all the eigenvalues lies on the unit circle, and then SEM satisfied stability condition.

4.3 Non-Linear Modelling of LC Economic growth

The aim of examining non-linear behaviour of LC model is to understand the hidden information (latent content) that influences the economic growth non-linearly. Specifically, the study aimed to understand probabilistic responses of economic growth as independent variables changes. Moreover, to reveal or uncovers the hidden or inactive functions of economic growth. In affecting these aims the probit model and neural network analysis were used to examine the non-linear behaviour of LC model.

4.3.1: Probit Regression Analysis of LC model

The probit model/regression gives the information of probability (chances) of getting high economic growth (GDPP =1) or low economic growth (GDPP = 0) as the change of independent

variables happens. This is the psychological - conditioned responses of economic growth as both psychological and non-psychological changes. The probit estimates indicated that the capital increases/shifting z-scores of economic growth distribution to the right (positively), i.e., above the mean by 4.23 scores. Hence, the study confirmed that the capital was significantly increased the probability of getting high economic growth at 99 percent of confidence level, since its p-value of 0.000 was less than the critical value of 0.01. Another physical material resource/variable that impacted z-scores of economic growth distribution was the labour, which reduced z-scores of economic growth distribution by 0.572 score for a unit increase of natural logarithm of the labour. This means that the labour reduced economic growth below the mean or shifted z-scores to left (negative). Clearly, labour intensity reduced the probability of getting economic high; it is increased the probability of getting low economic growth by 0.587 for each unit consumed in the natural logarithm unit. It was significant at 95 percent of confidence level as its p-value of 0.026 was less than the critical value of 0.05(Table 6).

On the other side, the non-economic variable/psychosocial variable, PWB (Hube) has a positive coefficient value of 1.04, which was not significant. Moreover, SWB (Envi) has a positive effect on z-scores of the economic distribution but was not significant. Ecofa has a negative impact on z-scores on the distribution of economic growth but was not significant. Demo increased z-scores by 2.575 rightward to the economic growth distribution. It was significant at 5 percent level of significance, since its p-value of 0.038 was less than the critical value of 0.05. In general, non-economic variables were less probabilistic determinants than economic variables (Table 10).

Table 10: Probit Regression of the LC Model of Economic Growth

```
Probit regression                                 Number of obs     =        211
                                                  LR chi2(6)        =     155.09
                                                  Prob > chi2       =     0.0000
Log likelihood =  -45.55379                       Pseudo R2         =     0.6299
```

gdpp1	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
inwcap	4.234768	.7379288	5.74	0.000	2.788455	5.681082
lnlab	-.5718662	.256729	-2.23	0.026	-1.075046	-.0686866
lndemo	1.366264	.6593238	2.07	0.038	.0740132	2.658515
lnenvi	.206567	.5796831	0.36	0.722	-.929591	1.342725
lnhube	.7362154	.8847403	0.83	0.405	-.9978437	2.470274
lnecofa	-.0112318	.7429591	-0.02	0.988	-1.467405	1.444941
_cons	-51.06731	9.117304	-5.60	0.000	-68.93689	-33.19772

Source: Author (2020)

Table 10 shows probit regression estimates. The Goodness –of- fit of the model was examined by McFaddens Pseudo R^2, which measures the proximity of the model to the observed data; the higher the value is more preferable. In this study the Pseudo R^2 was 0.6299 which signified that the data were better fitted to the LC model. Hypothesis tests of the model was done, hence the a likelihood ratio (LR) test was established, and indicated that the null hypothesis that all

coefficients in the model are equal to zero was rejected at 1 percent significance level. Although, in statistics the comparing of Pseudo R^2 of the non-linear modelling is vaguely not accepted, but it was found that there is a close relation in values as R^2 of ALM which was 0.69.9 and that of probit regression was 0.6299.

4.3.2: Probit Marginal Effect Analysis of LC Model

The probit marginal effect shows the probability of a shifting on (left or right) side on z-score of the economic growth distribution for a unit increase of each independent variable. In this study only marginal effect of capital, labour and Demo variables were considered because were significantly impacted the economic growth.

Table 11: The Marginal Effect of Probit Regression at Mean Values

_Means values	**Delta-Method;**	**Model VCE: OIM;**	**Number of Obs = 211**			
	Margin	Std.Err	Z	P>|Z|	[95% Conf.	Interval]
Hube at (Mean = 0.7199)	0.2659	0.0176	15.10	0.000	0.2314	0.3004
Enviat (Mean =0.6727)	0.2656	0.0187	14.23	0.000	0.2291	0.3022
Demo at (Mean = 0.6264)	0.2422	0.0239	10.15	0.000	0.1954	0.2889
Ecofaat (Mean = 0.7048)	0.2687	0.0175	15.32	0.000	0.2344	0.3031
lnLabat (mean = 0-.2195)	0.2648	0.0162	16.30	0.000	0.2329	0.2966
lnWCap at (mean = 11.9260)	0.1113	0.0358	3.11	0.002	0.0411	0.1815

Source: Author (2020)

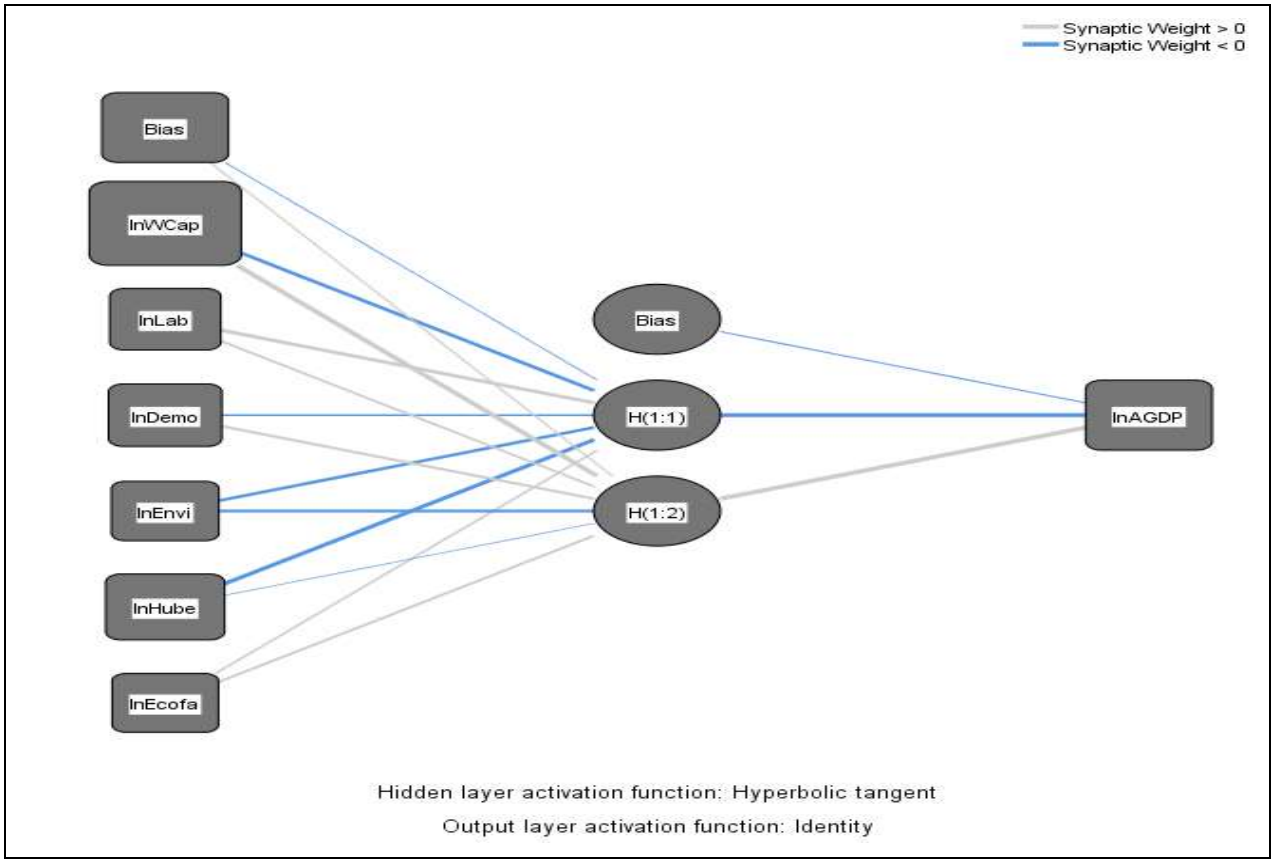
Table 11 shows marginal effects of the probit regression model. Because, capital, labour and Demo were statistical influenced economic growth, only the study deals with them. The probability of economic growth to go high by rising capital at the sample mean (lnWCap = 11.9260) was increased by 11.13 percent. On the other hand, probability of getting low economic growth increased by 26.5 percent when labour rose to its sample mean (lnLab = -0.2195). Moreover, Demo increased to the sample mean of 0.6264, it raised probability of getting high economic growth by 24.22 percent. Moreover, the predicted probability of economic growth to become high in future was averaged to 0.2682 or 26.82 percent in Kagera and Mwanza regions.

4.3.3 Neural Network Modelling of LC model

A neural network analysis is a set of non-linear modelling tool that consists of input and output layers plus one or two hidden layers (Ripley, 1996). The neural network analysis establishes the neural network structure (architecture), which is known as feed-forward architecture because connections in network flow forward from the input layer to the output layer without any feedback loops (Ripley, 1996). The multilayer perceptron (MLP) procedure produces a predictive model for one or more dependent (target) variables based on the values of the predictor variables (Haykin, 1998). Moreover, the neural network can approximate a wide range of statistical models without prior assumption of a certain relationship between the dependent and independent variables (Haykin, 1998; Ripley, 1996). Therefore, if a nonlinear relationship is more appropriate, the neural network will automatically approximate the "correct" model structure.

The feed-forward architecture with one hidden layer was established by using the MLP procedures. The study evidenced a partial mediation from economic growth to Ecofa, Demo and Labour. Also, the study evidenced the clear link or path from economic growth to the capital,

Hube, Envi and Demo, but with difference synoptic weights. In layer one, H(1:1) the layer input which is Hube has a synoptic weight of -0.518 indicated the highest score in the architecture, but was less important than capital. This is because, according to the LC model of economic growth, the capital is the basic input, and Hube is the secondary input to economic growth. On the other hand, the synoptic weight less than zero, means the path or layer requires less or no mediation. Remembering, mediator factors should be positive correlated to the mediated/supported factors. The hidden layer, H (1:2) shows an alternative function of the input layers and the output layers by using latent content "hidden information" that may be significantly effective. For example, the link or relationship between economic growth and labour and Ecofa was shown by hidden layer (Figure 5).



Source: Author (2020).

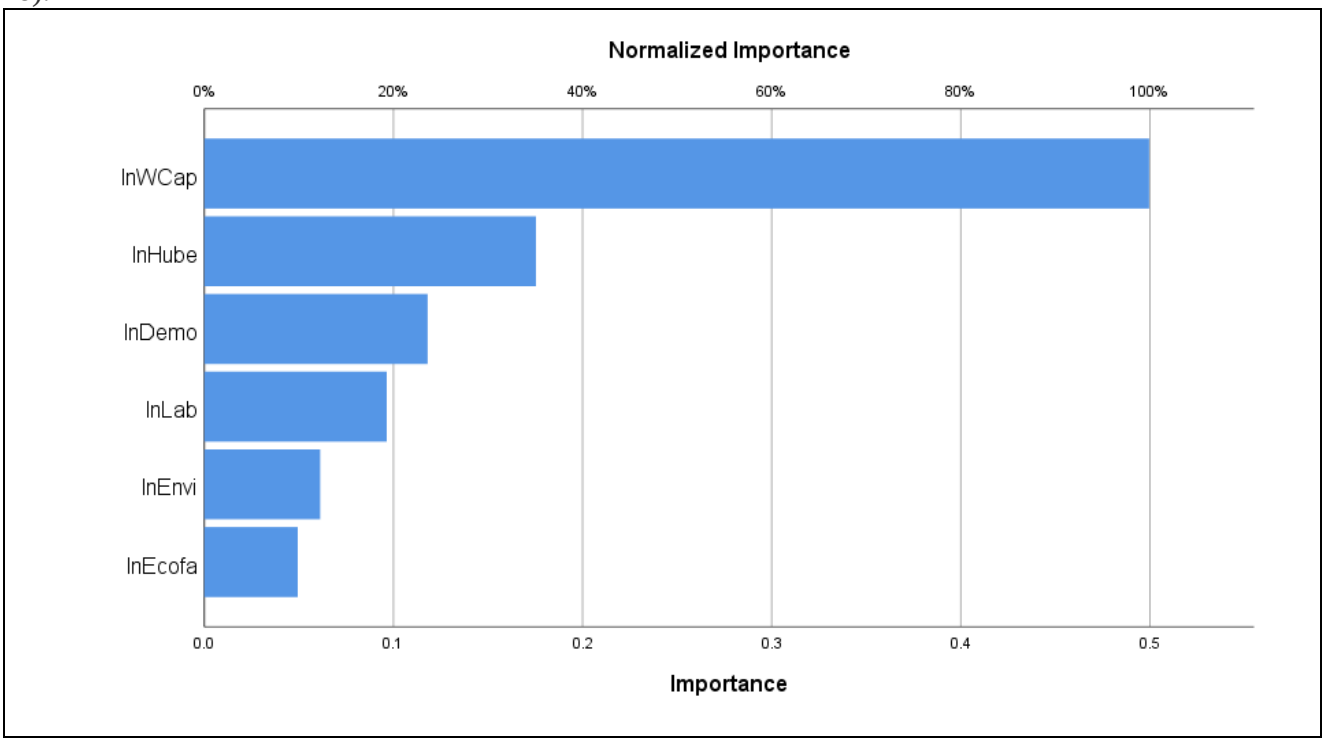
Figure 5: Feed-Forward Architecture with One Hidden Layer of the LC Model

Figure 5 shows the feed-forward architecture of the LC model of economic growth. The hidden layers indicated the mediation effects or require the mediator factors to affect the economic growth or layer output.

4.3.4 Sensitivity Analysis and Efficiency Frontier

To analyse the importance of variables, this study used three methods that are automatic linear modelling (ALM) procedures, neural network analysis (NNA), and efficiency frontier analysis (EFA). The ALM procedures which mapped the importance of independent variables from

capital, Hube (PWB), labour to Ecofa. The Demo and Envi in ALM procedures were eliminated due to their higher mediation effects on economic growth. On the NNA method, the impact-importance of independent variables were ranked from capital, Hube (PWB), Demo, labour, Envi, and Ecofa. These rankings slightly differ from that of the ALM ranking. This is because the NNA ranking considers only relative impact-importance (RII), while the ALM ranking considers both relative impact-effectiveness (RIE) and relative impact-importance (RII) (Figure 6).



Source: Author (2020).

Figure 6: Relative Impact-Importance of Independent Variables under NNA Approach

Figure 6 shows RII of independent variables, which verified that both economic and non-economic variables have importance in the LC model of economic growth. Obviously, the PWB ranked at the top two important inputs (resources) of the LC model. Thus, this is the empirical evidence that both economic and non-economic variables are relevance on the economic planning as suggested by the LC model.

On the other hand, EFA model was used to determine the importance of latent variables (non-economic variables). In this case, a degree of importance was ranked due to the variable relative risk associated to each independent variables and their associated income returns (average GDP per capita). This method ranked variables from most effective to the least effective independent variable, which are Hube (PWB) and Ecofa. The Demo and Envi were out of the efficiency frontier curve (Figure 7). This ranking is optimal and coincides with the ALM ranking. From this fact, the study adhered to the ranking of EFA and ALM approaches. Hence our structural-factors frontiers (SFF) were capital, psychological well-being (Hube), and labour.

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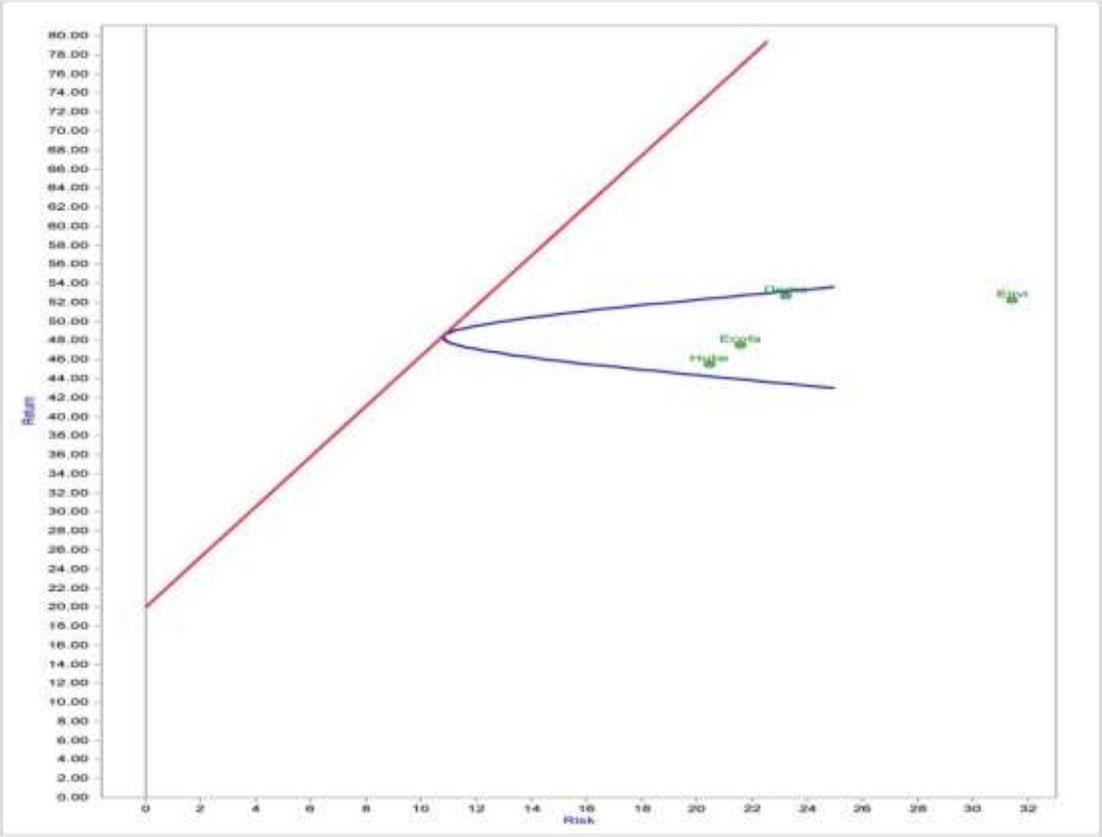


Source: Author (2020).

Figure 7: Efficiency Frontier Curve for Latent Variable for Economic Growth

Figure 7 shows the efficiency frontier of latent variables of economic growth. The Envi has the highest impact value on economic growth but it has the highest risk. Moreover, the Hube (PWB) has the lowest economic return/impact with the lowest risk. Therefore, it was evidenced that the higher the riskier investment or assets the higher the associated return, and it is vice versa.

5.0 DISCUSSION

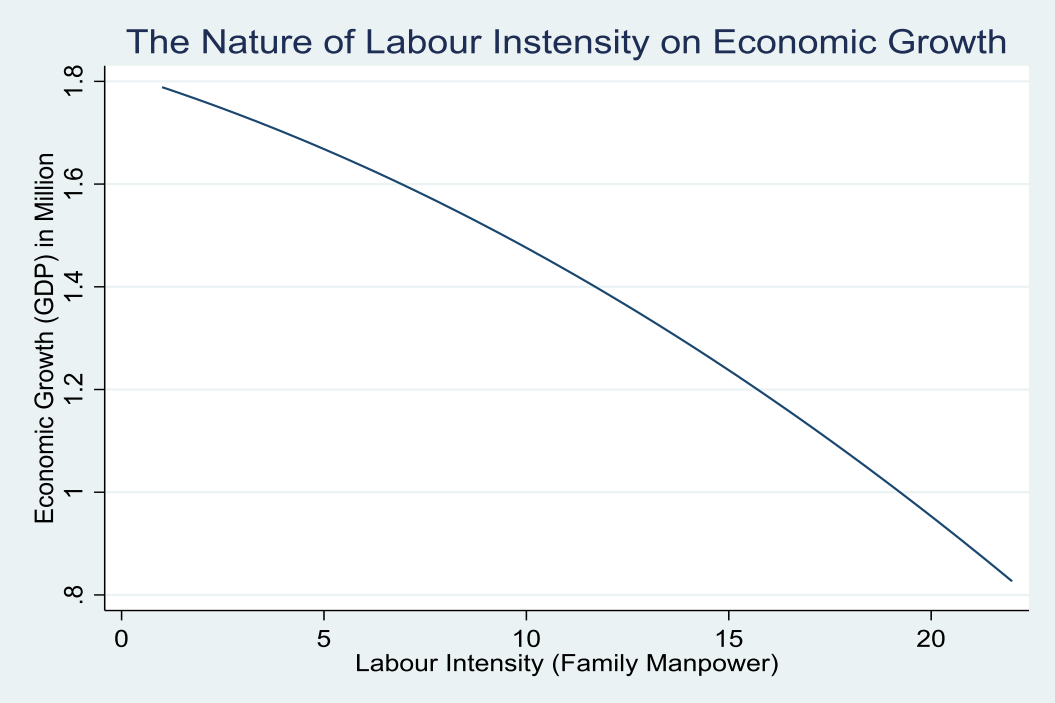
The main issue addressed by this paper was to establish the modern economic model that integrates both non-economic and economic factors. The model was established to provide the guidance for economists and other policy and decision makers on designing and implementing the micro and macroeconomic policy/strategy or plans. The existing theories lack their empirical validity and fitness as they were evidenced to be less effective in fostering economic growth (Fehder, Porter and Stern, 2018; Diener and Seligman, 2004; Okulicz-Kozaryn and Rubia, 2018; Veenhoven, 2019). In addition to that, existing theories are highly fragmented lack a policy

clearance for decision makers. This study reviewed various theories and empirical studies and came to have an empirical based theory/model that integrates both economic and non-economic factors. This model supported scholars that confirmed that economic growth does not fully depends on the economic variables (physical resources) but also are mediated/depends on non-economic variables such as psychological resources and political stability or governance quality (Suh and Choi, 2018; Yi, 2020; Twenge, Martin and Campbell, 2018; Srivastava and Agarwal, 2020; Malhotra, 2020).

This paper attempted to propound the LC model of economic growth which integrates both economic and non-economic variables/factors. Clearly, the economic growth (optimal) should be achieved by the application of both economic and economic factors (Zhang and Zhang, 2019; Vukolov and Orlova, 2020; Okulicz-Kozaryn *et al*. 2018). The model explained both direct and indirect (mediation) effects of non-economic factors on either basic production input or economic growth. The study used mixed methodological approaches to test the empirical validity and fitness of this model, the results are coincident. The study tested the linear assumption of the LC model by using the automatic linear modelling (ALM) procedures, stochastic structural-factors frontier (SSFF) analysis, and structural equation modelling (SEM). The study evidenced the significant positive linear relationship between economic growth and capital, and Hube. However, ALM showed the significant negative relationship between economic growth and the labour and Ecofa. The Demo and Envi were eliminated in ALM processing due to fact that they impacted economic growth indirectly. In SSFF analysis, the same facts were revealed, but Demo and Envi were indicated insignificantly. Moreover, in the SEM analysis, the formative and reflective indicators were examined. The path coefficients and mediation analysis were done to attest the effectiveness of the linear relationship. The SEM analysis showed the same facts of linear relationship behaviour of independent and dependent variables. The variance account for (VAF) was used to test the mediation effects of the paths in the SEM model. It revealed that most of the subjective well-being indicators have mediation effects, but the indicators of psychological well-being have both direct and indirect impact on economic growth. In general the study evidenced that the linear assumption of the LC model was strong with capital, psychological well-being (Hube) and labour. However, the subjective well-being (SWB) indicators which are Demo, Envi, and Ecofa had no direct impact on economic growth, but impacted the production inputs, mostly capital. Most of the SWB indicators require mediation factors on economic growth. Furthermore, SEM evidenced the same empirical facts as the previous linear modelling approaches.

For policy clarity, the study found that the labour was negatively related to economic growth. Moreover, Ecofa and Envi were found to have negative impact on economic growth. The study conducted a post-examination of these variables to understand the further nature or behaviour on impacting the economic growth. For example, the post-examination of this study revealed that the labour has a concave function with the economic growth. This nature of concavity relationship explains the expected utility theory and the concept of marginal utility in the production function (Schoemaker, 1980; Malcolm and Nicholas, 2015). In the expected utility theory, the labour is a derived demand that is required bypass. Then under the uncertainty decision the choice of the production output GDP per capita and the number of labours or family manpower is determined by the concave function. That is, the preference of choice is bounded

by the opportunity available to a person/agent of production. In brief, the risk averse decision makers explained by the concavity nature of cardinal utility function (Schoemaker, 1980). Moreover, in the microeconomics theory, the production function is usually assumed to be concave over some or all of their domain, resulting in diminishing returns to the production input factor (Malcolm and Nicholas, 2015). Therefore, this study evidenced the partial/quasi-concave behaviour/function of the economic growth and labour (family manpower). The nature of labour intensity and economic growth depict the theoretical facts for concavity relationships of factor of production and production output. In the other word, the relationship of labour and economic growth explained by the production possibility frontier /curve (Figure 8).



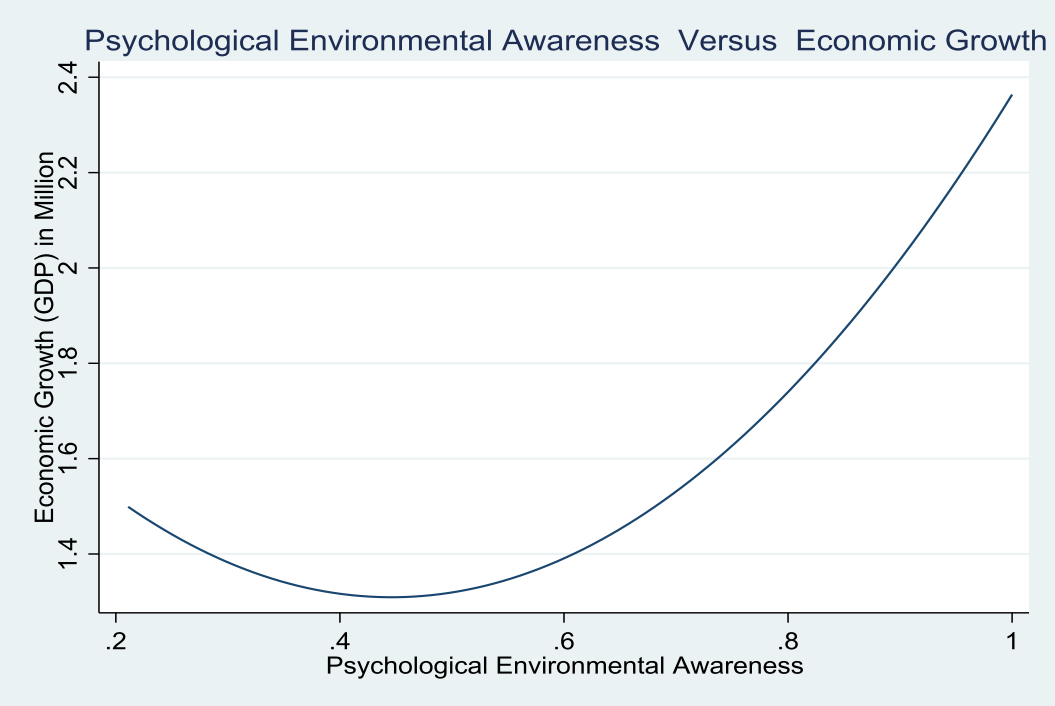
Source: Author (2020).

Figure 8: The Partial/Quasi-Concave Function of the Labour and Economic Growth

Figure 8 shows the concavity relationship between the labour and economic output. The figure explains the production possibility frontier (PPF) for labour and income of individual (GDP per capita). Hence, the study confirmed the economic concept of scarcity, choice and opportunity that explained by the PPF in the figure 8. Due to scarcity of both labour and income of individual, the choice is needed but the opportunity leads the choice of an individual. Hence, the curve converges toward the origin to indicate the limitation of resources (constraints).

On the other hand, the study revealed different from psychological economic factors (Ecofa) and psychological environmental factors (Envi) on economic growth. The study evidenced that they were negatively related to economic growth. However, further investigation revealed that the factors have U-Shaped effect on economic growth. For example, Envi, at the early stage (short-term) or lower scores of Envi, the Envi is negatively related to economic growth. In late stage (long-term) or higher Envi score, the economic growth is positively related to Envi. Clear

interpretation is that, when the psychological environmental awareness of an individual or a nation is very low (in short-term), the economic plan/policy not considers the environmental conservation. Remembering, most of economic activities involve destruction of environment or polluting environments. For example famers at the family level or national level will cut a lot of tree to increase the cultivation areas, which results to erosion/land pollution. Moreover the industrial intensification increases the GDP of a nation, but increases the probability of land, water and air pollution, if it is not well managed or considered in a positive way (implication of low psychological environmental awareness). In a different way, the individual or nation with high Envi scores will set both the economic and environmental policy frameworks that adhered to both economic growth and environmental conservation standards. This stage can take a long time for individuals or a nation to become more psychological aware on environmental issues. For specific example, Tanzania becomes aware on environmental issues in the early of 2000s years, and then the establishment of the policy and regulations regard environments put forward in 2004 when the nation enacted the National Environmental Management Act. People's awareness on environmental issues in Tanzania continued to grow when the National Environmental Policy (NEP) was drafted in 1996 and completed in1997 (Malisa, 2007). Therefore, the nature of negative impact of Envi on economic growth is due to fact addressed by Malisa (2007), that the psychological environmental awareness in Tanzania is still low. This nature of Envi score to impact positively at the later stage, and negatively at the earlier stage configures the U-shaped curve, that represent both the short-term and long-term relationships of the psychological environmental awareness and economic growth (Figure 9).



Source: Author (2020)

Figure 9: The U-shaped Curve of the Economic Growth and Psychological Environmental Awareness

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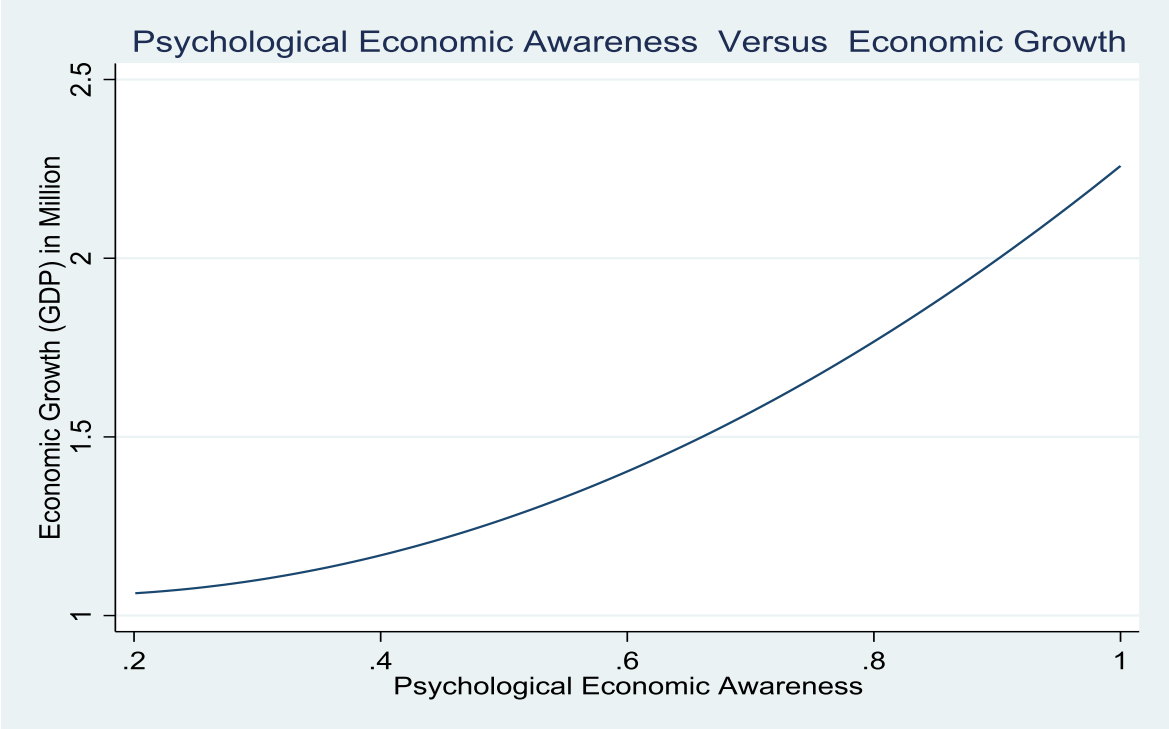
Figure 9 explains the behaviour of an individual or a nation on responding to the economic issues in relative to the change of the psychological awareness on environmental issues. The figure depict that an individual or country that has a little psychological awareness on environmental issues will increase the income (GDP) and the sometime polluting the environment, which is vice versa for the nation than has the higher psychological awareness on environmental issues.

The finding of this study is supported by some scholars. For example, Everelt, Ishwaran, Ansaloni and Rubin (2010) confirmed that in a short-term economic growth impact negatively the environmental policy, as the cost of avoiding environmental pollution reduces the GDP per capita in a country. Therefore, the effective environmental policy framework is required to ensure the long-term economic growth (Everelt *et al.* 2010). However, this study contradicts to Kuznets (1955) and Malcolm and Nicholas (2015) who find the inverted U-shaped when examined the relationship between economic growth and some of environmental quality measures. This study confirmed the U-shape relationship. This difference is due to methodological fault of scaling or measuring the variables of economic growth and environmental qualities indicators. The transformed data/variables behave oppositely to untransformed data/variables. This study used untransformed data/variables. However, if the data/variables were transformed to natural logarithm the inverted U-shaped is valid.

The same fact learned from the relationship between Envi and economic growth in the relationship between economic growth and psychological economic factors. The Ecofa is evidence an extended-U shaped curve (Figure 10).



Source: Author (2020).

Figure 10: An Extended U-shaped Curve of the Economic Growth and Psychological Economic Awareness

Figure 10 evidenced the partial or quasi-convexity function of the economic growth and psychological economic awareness. As the individual becomes aware on the economic matters, the ability of making decisions at a family level also improved. As the consequence, the improvement of making economic decision will increase the probability of an individual income to become high. However, an individual with less psychological economic awareness tends to have less economic impact, because they will not full motivated to engage in economic activities, and seemed to be less or limited opportunistic. This is why the extended U-shaped curve exist to indicates both the impact of a low psychological economic awareness in a short-term and a high psychological economic awareness in long-term on economic growth (outputs).

On the other hand, the study applied non-linear models, which are probit and neural network analysis. In probit analysis the study found that economic variables which are capital and labour have higher probabilistic effects on economic growth distribution than non-economic variables. The capital increased z-score rightward (positively), i.e. above the mean level of the economic output (GDP per capita). However, the labour shifted z-score to the left side of the economic growth distribution; this mean reduces probability of economic growth to get high. The non-economic variables which are Hube, Ecofa, Demo and Envi were found to have less probabilistic power. Only the Demo increased z-score by 2.575 rightwards to the economic growth distribution at 5 percent of significance level. Moreover, the predicted probability of economic growth to go high in future was about 26.8 percent in Kagera and Mwanza. However these values differ significantly, Kagera has an average of 30.2 percent, being with higher probability than Mwanza (23.7 percent). It is evident that predicted probabilities (PP) values are influenced with some other non-economic factors. For example the demographic characteristics such as occupations, age, and marital status were found to influence the predicted probability of individual income/economic growth. In a specific way, the nature occupations significantly influence PP value of an individual. For example this study evidenced that farmers have less PP values than business persons, and business persons have less PP values than teachers and teachers have less PP values than an accountant. Therefore, a farmer although is more technically efficient, has the least PP values, and an accountant being more technically efficient has the highest value of PP. Also, it is evident that economic growth has a hidden relationship/function with Ecofa, under the neural network analysis.

6.0 CONCLUSION AND POLICY IMPLICATION

The paper introduced the latent content (LC) model of economic growth that moulds both economic and non-economic factors. The model was tested empirically under various data analysis techniques and found to be empirically valid and credible. The data used to test the LC model were sampled from Mwanza and Kagera regions and four districts in Tanzania. The study covered 211 individuals. The LC model was tested on two mains aspects; one was the linearity behaviour of dependent variable (economic growth) and independent variables, both economic and non-economic variables were involved. In this test the study evidenced that there was a significance direct relationships between economic growth and capital and psychological well-being, and it is negatively related to the labour. On the other hand, subjective well-being (SWB) indicators were found to be statistically insignificant to impact economic growth. It is evident that they are mediator factors of the capital. The PWB is only a mediator factor for the labour.

Moreover, the study evidenced that the level of technical efficiency of a producer depends on the PWB not on SWB. Also, it depends on demographic characteristics, particularly gender and occupation or nature of work. For example being a male or a farmer increase the technical efficiency of an individual. Furthermore, it is evident that non-economic factors have less probabilistic power than economic factors. Hence, the study concluded that as far as the LC model has a weak non-linear empirical support and linear assumption of the model was empirically supported significantly, then, an optimal economic growth (GDP) is direct related to capital, psychological wellbeing and inversely proportional to the labour. However, the effectiveness of the capital and labour are due to mediation effects of subjective well-being and psychological well-being respectively.

This paper poses both policy clearance and implication. As the policy dilemma on how economic and non-economic variables can be integrated to have an optimal economic model, now this paper cleared the policy dilemma, as established the LC model of economic growth. On the other hand, the inclusion of psychosocial aspects in the policy and strategy setting is encouraged. Specifically, the paper recommends the adoption of the LC model in both micro and macroeconomics planning. Moreover, the consideration of determinants of the LC model in pre- and post-design of economic policy and strategy for decision makers is recommended by this paper. However, this study suggested more study to be done by using longitudinal data to attest this LC model of economic growth as this study only limited on the cross-sectional data.

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Appendix A: Self- Reporting Checklist Questionnaire

Section A: Respondent Characteristics

Kindly, you asked to provide your information regarding on the following attributes. Please be honest to fill or select the appropriate characteristic that fits you.

Name (Optional): _____ Age_____ Sex: Male _____Female_____

Marital status: Single____Married____Widowed_____Separated____ Divorced_____

Education level: Primary level_____Secondary level_____ college/university level____

Occupation:_____ Mobile:_____ Number of family members: ____Number of dependants _____ Average monthly income/consumption in TZS _____

Section B: Questionnaires for Self-Checklist for Psychological Limiting Factors

Please tick the rating column using number from 1 to 5, describing from 1 strongly disagree and 5 strongly agree, such that the provided reason (s) for effect of psychological of the production on economic growth in Tanzania (for the particular factor/variable).

Rating level: 1) Strongly disagree; 2) Disagree; 3) Neutral 4) Agree; 5) Strongly agree							
Factor /latent variable causes (From conceptual framework (Fig.2.1)		1	2	3	4	5
2.1 Demographic Characteristics	2.1.1: Age is a factor that psychologically affects a family income productivity					
	The current age encourage to work for future					
	2.1.2: Marital status is a factor that psychologically affects family income productivity.					
	It is better to be married					
	It is better to be single					
	Widowed are hardly meet the daily basic needs					
	2.1.3: The number of family members is a factor that psychologically affects a family income productivity					
	The number of family members more than 5 is preferable					
	2.1.4: The income level is a factor that psychologically affects family income productivity.					
	The current level of family income is satisfactory					
	The current source of family income is reliable					
	2.1.5: The educational level is a factor that psychologically affect a family income productivity					
	The current level of education is satisfactory					
2.2 Environmental Factors	2.2.1: Environmental sustainability behaviour is a factor that psychologically affects family income productivity.					
	It is better to preserve the forest at the surrounding					
	Not encouraged to pollute either of land, air or water					
	2.2.2: Social awareness on environmental issues is a factor that psychologically affects family income productivity.					

	The culture of preventing environments affects the production level in a family.					
	2.2.3: Environmental Policy is a factor that psychologically affects family income productivity.					
	It is not encouraged to use wood fuel than other energy sources					
	It is better to be guided on use of land and water resources					
	2.2.3: The environmental regulations/rules are factors that psychologically affect family income productivity.					
	It is regrettable to be punished by breaking the law					
	It is better to be bound by rules on environment conservation					
2.3 Human Behaviour	2.3.1: Lifestyle is a human factor that psychologically affects family income productivity.					
	Pain is general avoidable and happiness is encouraged in daily life					
	Rashness and irresponsibility in public life is encouraged					
	Preference of values and personal needs are encouraged in life					
	2.3.2: Motivation is a human factor that psychologically affects family income productivity.					
	This location/region is conducible for work.					
	The government motivates the people to work.					
	2.3.3: Metacognition is a human factor that psychologically affects family income productivity.					
	A defined person and knowledgeable to success					
	A person with a defined way of achieving the goals					
2.4 Economical Factors	2.4.1: Price of commodity is a factor that psychologically affects family income productivity.					
	The price of commodities is fair/affordable					
	The price of commodities are changing faster					
	2.4.2**:** Fashion of product is a factor that psychologically affects family income productivity.					
	It is desirable to get new design of material/assets					
	Beauty and prestigious material/assets are persuadable					
	2.4.3: The unforeseen weather is a factor that psychologically affect family income productivity					
	It is worse when the favourable condition changes to bad					