On the Theory of Knowledge Resource Inequality: Role of Knowledge Capital in Social Transformation

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ABSTRACT

Inequality is an effect of much concern for economists and policy makers. Inequality gives rise to poverty, a phenomenon still troubling the world economy characterized by a gap–wherein the standard deviation between the rich and the poor is too high. Various factors attribute to growing inequality, but one which is often overlooked is–misallocation of knowledge resources. In this paper, we reinforce the concept of knowledge as being a capital resource. Following this, by using a simple model, we attempt to explain inequality born out of its heterogeneous allocation and its discrete nature of distribution as a capital resource. The effect being that, lack of access to quality education for those who need it most creates a phenomenon which we call knowledge resource inequality (KRI).

ORIGINAL RESEARCH PAPER

On the Theory of Knowledge Resource Inequality

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Table of contents

Research Paper

Role of Knowledge Capital in Social Transformation*

On the Theory of Knowledge Resource Inequality

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Abstract. Inequality is an effect of much concern for economists and policy makers. Inequality gives rise to poverty, a phenomenon still troubling the world economy characterized by a gap–wherein the standard deviation between the rich and the poor is too high. Various factors attribute to growing inequality, but one which is often overlooked is–misallocation of knowledge resources. In this paper, we reinforce the concept of knowledge as being a capital resource. Following this, by using a simple model, we attempt to explain inequality born out of its heterogeneous allocation and its discrete nature of distribution as a capital resource. The effect being that, lack of access to quality education for those who need it most creates a phenomenon which we call knowledge resource inequality (KRI).

Keywords: *Allocation, Capital Resource Inequality (CRI), education, Knowledge resource inequality (KRI), economic planning.*

JEL Classification Codes: J31, J24, O33

1. Introduction

Currently, we find no precise definition of what *knowledge inequality* is, or by which it is to be defined. The one that exists about knowledge-based inequalities (Arocena, Göransson & Sutz 2017) gives us some vague idea about the consequences of those processes that gives rise to the distribution of power, and about the politics related to acquisition of scientific and technological capabilities embedded in knowledge. Considering that knowledge is a form of intellectual, intangible capital which has value and utility embedded in it that can be regarded as an asset, there is very little existing explanations ascribing its unequal distribution as a cause of social inequality (Lin 2000; Bouzov 2016). Although it plays significant role in contributing to socio-economic equilibrium, much of that what exists as literature related to its asymmetric allocation concerning socio-economic inequalities arising on account of its inequable provision in the society, is however, inadequate. It is on this occasion that we undertake this research initiative to introduce a novel concept of inequality

∗. This research is one of the best part of a series of investigation and analysis on the role of knowledge as a capital resource in social transformation, and study on the emerging causes of global inequality.

†. I am most indebted to Mousumi Samanta for her kind and helpful suggestions.

associated with knowledge resources. Inequality is a social problem that needs considerable attention (Atkinson 2015). It may arise due to various causes, but its effects invariably result in scarcity or deprivations on account of asymmetric allocation of resources—capital or intellectual, or whether they are economic or social. In fact, it could be observed over the years that the fundamental nature and the basic structure of global inequality is changing with time in different ways (Grusky, Kanbur, and Sen 2006). In a preceding research, a novel concept of resource inequality–*Capital Resource Inequality* (Chatterjee 2020) has been introduced whose basic tenets are grounded on the idea of knowledge as a capital resource. In this paper, we proceed with the same zeal and fervor to look intently into the problem of inequality which is one of the foremost determinants of aggregate poverty according to many scholars (Grusky, Kanbur, and Sen 2006). The goal of this research is to examine the nature of a new emerging form of inequality–knowledge resource inequality, how it gives rise to aggregate poverty, and what factors attribute to growing inequality in modern digital societies. We posit the viewpoint that a different form of inequality akin to *knowledge resource inequality* arises on account of the misallocation of resources meant for education as well as inadequate allocation of *quality* knowledge resources across societies giving rise to socioeconomic imbalances. The study is grounded on the concept of knowledge being considered as a capital resource. We question, despite its important role in socioeconomic progress, why knowledge is not being considered as a determinant of global inequality? We further question whether if growth of knowledge economy is the cause of, or the solution to the problem of growing inequality.

In fact, the development of knowledge economy is closely associated with globalization (Brinkley 2006), and globalization itself is closely related to the development of the services sector which in major part is driven by internet and Information and Communication Technologies (ICT). The universal trend towards knowledge economy and the growing interdependence on knowledge as one of the most vital resources driving major industrialized economies confirms the validity of the assumption that there are better jobs and job opportunities associated with knowledge economies (Brinkley 2006). Undeniably, increasing job opportunities are associated with rapid growth in Information and Communication Technologies (ICT). Information technology (IT) corridors and Special Economic Zones (SEZs) are being created and dedicated entirely to IT/ITeS sectors across the country boosting job creation (Joshi 2009; Das and Narayan 2020). According to Joshi (2009), IT and ITeS are considered as an engine of economic growth driving the services sectors whose spectacular dynamism is contributed by fast economic growth over the past few decades. Pockets of high technology-driven digital industrial clusters have been created to follow the growing demand for manufactured goods, information and communication technology (ICT) products and IT/ITeS services across India and the world (Joshi 2009; Das and Narayan 2020). The phenomenal rise of knowledge processing organizations (KPO) and the diffusion of information technology across the EU, USA and Asia is dependent on the discovery, mining, utilization and rapid sharing of data and information (Cortada 2012). Finally, in this age of innovation—and in ages to come, automation and digitization in management of industrial production (Araya and Peter 2010) will always stand on the shoul-

ders of education and discovery of advanced technologies driven by human creativity. The last one—management of industrial production, is hugely benefitting from digitization process. These developments, nevertheless, reinforce the economic value of knowledge and education. Broadly speaking, all these developments indicate that *knowledge* has become a critical resource (factor) in driving the engines of major global economies. Undeniably, knowledge has become one of the most important determining factors of global growth and development (Bouzov 2016). Therefore, it is not only a fuel–but a vital "macronutrient" essential for economic growth and social development. It might aptly be claimed now that, "Knowledge is our daily need". For its role in utility and use in society, therefore, knowledge has become an indispensible resource whose inequable distribution and misallocation could give rise to severe forms of socioeconomic inequalities–including a type of resource inequality that we call as *knowledge resource inequality* (`KRI`). In this paper, we endeavor to present this new form of inequality in social capital (Lin 2000)—knowledge capital—in its most canonical state, and discuss the effects of inefficient and asymmetric allocation of resources on socioeconomic equilibrium.

2. Background Consideration

It has been assumed that expansion of knowledge economies, in general, do not correspond to growing economic and social inequalities unless a major share of the workforce are classified as managers and senior officials (Brinkley 2006). Rather, on the contrary, such an expansive phenomenon clearly demonstrates increasing job opportunities and job growth. However, this definitely creates a high-wage income inequality in terms of wages earned by highly paid, highly-skilled, high ranking employees with respect to low ranking, blue-collar workers. Besides, employees who are technically better educated or skilled command greater than average compensations than those who are not so skilled or educated (Hatch & Dyer 2004). In other words, educated employees command greater salary in the job market where specialist skills are more in demand than generalist skills. However, some researchers also claim that the employment systems around the world are being polarized towards high technology sectors. But this is not true. Thus, technical and professional education seems not to play an ignorable part either in inducing wage-inequality, as those who are technically competent are much favored than those who are not so. Education–coupled with skills–nevertheless, exercise greater advantage in the job market (Rutkowski 1996). For, education builds up human capital which is a resource as well as an input to production (Romer 1989; Lepak and Snell 1999). Both in theory as well as in practice, endogenous economic growth is correlated to growth in human capital (Romer 1989). Economic theory validates the assumption that the value embedded in intangible human capital like for instance, experience and skills—coupled with knowledge and scientific information affect the rate of economic growth (Romer 1989). Design, as such, to promote knowledge as a factor determinant of socioeconomic equilibrium and to increase the usefulness and utility of knowledge in society to support sustainable endogenous growth, nevertheless, is universally well acknowledged. Based on such paradigms of growth theory, education–or lack of it–plays a decisive role in causing or alleviating the malady of socio-economic inequalities.

At present, research on growing inequality appears to be gaining in favor among economists, researchers and policy makers who apparently intend to understand the deeper causes to design solutions in order to fight with this socioeconomic malady (Basu & Stiglitz 2016; Ghosh and Pal 2007). In a similar tune, we attempt to investigate the mechanism of growing inequality from a different perspective. We examine how knowledge as a capital resource affects socioeconomic equilibrium and how misallocation of this resource could cause inequality and poverty. Basing our argument on several past researches, we consider that the disposable income among the poor is much lower than that of the middle class (Milanovic & Yitzhaki 2001), and such when comparable to the rich are, therefore, petite. It is hence difficult for a poor family to afford the cost of higher quality education provided by private schools and institutions which leaves them with little choice but to accept government-sponsored basic and primary education despite quality concerns. Because access to knowledge and knowledge resources is essential for building up human capital, and with the emergence of knowledge-based economies radiantly reliant on their capacity in developing and utilizing knowledge more efficiently (Clarke 2001), it becomes necessary to educate the younger generation with quality education. The purpose of such quality education is to enable students to think independently and allow them to be creative (Russell 1922). The knowledge gained from such education has value embedded in its utility and use. Creativity allows individuals to produce things that are innovative and novel. New products of inventions are the results of creative endeavors. Knowledge embodied in new products is now the primary source of wealth creation in most emerging and almost all developed countries which demands access to vast amount of data and information in a more meaningful way. Growth of economies are therefore, much reliant on growth of *knowledge* as a "capital resource".

We strongly contend that growth of knowledge economies is the solution to the problem of global inequality and existing poverty. But to prove our contention and validate it with evidence, we embark upon a journey into investigating how knowledge as a capital resource could be the basis of inequality in the post-modern digital economy. In such parlance, we let our design of this work be sufficiently explained herein by adopting a systematic study towards understanding the problem of resource inequality through a chain of reasoning. We design a simple theoretical model to represent a system in inequality–and attempt to study how knowledge inequality arises and what corrective measures or policies could be designed to overcome such inequality.

3. Research Goal and Objectives

The idea of using knowledge to promote and create better societies stems back to the Renaissance period when Sir Francis Bacon contemplated on the idea of Knowledge as Power[1]. The benefit and use of knowledge in society was well acknowledged long before Bacon put forward in his philosophical dispositions the theory that "Knowledge is Power". Empowering people with knowledge through education unleashes the power of education and knowledge manifested in human creativity where intellectual energy is put into use for the betterment of the society (Lehrer 2018).

1. Bacon, F. (1900).Advancement of learning and Novum Organum(No. 18). Willey Book.

The use of knowledge in society thus began to be acknowledged during the beginning of the industrial era when production began to be managed and controlled using knowledge of science and technology. Scientific and technical knowledge brought about revolutionary changes in industrial production by being able to increase efficiency on the production frontier. Homologously, the role of education in social welfare and social transformation soon began to be recognized as well due to the pioneering efforts of several renowned educationists and social thinkers of the times. By and by it was soon universally acknowledged that Knowledge has value as well as utility (Hayek 1945) embedded in it and presently it is also being utilized as a *capital resource* categorized as Knowledge-based capital (KBC)[2]. In fact, the Digital Revolution has taught us that the key indicator as well as the prime determinant of social transformation is information or knowledge (Drucker 1994). We may now well extend the modern inclusive definition of *capital resource* farther beyond the limits of conventional entities considered as assets like land, labour and monetary assets. This being considered, Knowledge is not only regarded as social and economic capital, but it is also counted as a *resource*–human capital resource in a form of "intangible asset". Therefore, asymmetric distribution and allocation of this resource could definitely lead to inequality in social capital (Lin 2000) across social strata.

It has generally been assumed that knowledge as a resource having value embedded in it plays a significant part in economic growth and development of a nation by contributing towards conception of a national knowledge economy. Knowledge is utilized to educe meaningful ideas and inventions that have exchange value and utility, churned out of information and data. Moreover, in order to create new information it requires effort of an educated workforce besides other capital assets necessary beyond human capital. There is also a cost attached to it in terms of investment-in-human-resources (Blaug 1970). All these specify the need for education and training and the requirement of a technically competent workforce knowledgeable enough to handle and analyze such data (information). Indeed education builds up human capital and imparts knowledge and skills necessary for sustaining a knowledge economy. But access to *quality* knowledge mandates quality education which is often inadequate, restricted or restrained in some countries, or discretely available throughout different parts of the world–including in India, despite globalization and continued evolution of digital economies. The cost attached to quality education has been rising over the years in many parts of the world for the reason that education is being commoditized (Tilak 1991; Patnaik 2018) owing to increased rate of return from investments in human capital. Therefore, access to quality education for the poor and the needy has turned out to be quite expensive (Harma 2010 & 2011) which is creating discrete pockets of severe knowledge inequality across different regions of the world, including in India as well. The problem, we believe–is not due to lack of symmetrical allocation of resources alone, but also due to delivery of poor quality of education at the primary school level (Bajpai and Goyal 2004), and on account of lack of adequate number of *good* teachers from whom high quality of education is expected.

2. See for instance, Andrews and Criscuolo (2013). "Knowledge-Based Capital, Innovation and Resource Allocation", OECD Working Paper.

Several questions, therefore, crop up from general discontents arising out of such asymmetrical distribution and allocation of knowledge in societies which has resulted in severe socio-economic inequalities in many countries around the world (Darling-Hammond 1995). Considering the contribution of education to economic growth and social development that leads to overall progress of civilizations, it is with great enthusiasm that we present this short research that we have before us of what is to be a formal analysis of the role of knowledge in social evolution and economic growth. We robustly try to address the persistent widespread social and economic inequalities that seem to be so apparent in the present society in most developing countries around the world, including India. Such inequalities are on account of the extending gap between those who have adequate access to capital resources and those who lack such provisions. Inadequate and poor access to social (knowledge) and economic resources leads to depressed state of an economy the result being that it induces progressive decrease in economic growth and development. Low growth may lead to low aggregate income and widening inequality level which is often the cause of persistent poverty resulting in lower productivity growth rate (Basu and Stiglitz 2016).

Owing to social discontents concerning growing inequality between the rich and the poor, this paper attempts to investigate the causes and uncover the reasons behind such a phenomenon that seems to be quite challenging to public policy making. The path towards investigating the economic phenomenon of inequality such as one we are taking is, however, different. But if we were to take this different path, then we must have a track on which to tread along. Our idea–that in which we believe, stands firmly on the concept of "Knowledge" as a basis of *Capital Resource Inequality* (CRI). We assume–rather we consider that, the role of knowledge as a capital resource has a definite part to play in this equation of inequality. In that respect, misallocation of knowledge resources is one of the primary reasons behind persistent socioeconomic inequality, and, which causes poverty as well. Because knowledge has got a part to play for being one of the causes of inequality-induced poverty, we attempt to examine how efficiently knowledge as a resource should be provisioned among people in a society. And, how efficiently *allocation* of this resource should be "planned" in a better way so that its distribution tends to be more rational and fair among the people in a society? This is our subject of inquiry and investigation in this research work hitherto undertaken.

4. Education and Human Capital

Education and learning creates human capital—these being the primary tools by which foundations of sustainable human resources are build up (Hatch & Dyer 2004). According to Hatch and Dyer (2004), human capital is a source of sustainable competitive advantage. It is universally reckoned that education explicitly as well as implicitly contributes to economic growth (Blaug 1970; Hatch & Dyer 2004) so that there is much need for educational reform to revolutionize teaching which reflects on the core capabilities of students enabling better comprehension, reasoning, reflection and transformation (Shulman 1987). Hence, public policy in relation to expenditure on education and teaching is an important determinant of growth and social advancement (Shaffer 1972). If the human mind is considered as the greatest resource, then the knowledge embedded in and the productivity

accrued out of it ought to be considered as the greatest capital asset too. Education, therefore, is the backbone of a knowledge economy and industrial development. It is the force behind technological advancement and development of specialized knowledge (technical expertise) is dependent on the quality of education being delivered by institutions of professional and higher learning. The value embedded in goods and services driving a knowledge economy have its roots in education (Ozturk 2008). Such value may be showcased or demonstrated in its utility, use, benefit, and esthetics, or, in prestige and pride.

It is true that *Knowledge Economy* provides enough incentives for entrepreneurship which accounts for aggregate increase in national productivity, net exports and job creation. A knowledge economy is built upon and supported by human resources which is one of the most important resources employed in a knowledge economy that is manifested in human capital formation (Ozturk 2008). To that extent, however, to which knowledge economy stands on the shoulders of an educated society, it can aptly be said that education contributes immensely towards a nation's economic growth and prosperity. Education helps to eliminate the unbearable neediness and improves our quality of life by enhancing our standards of living. The intolerable deprivations due to poverty are eliminated by education (Sen 2001; Sen 1995) supporting human capital development. "Poverty", it is often said, "resulting from severe inequality may give rise to socio-economic gyrations", inducing terrible deficiencies "which may force somebody to go without food, shelter and education". To overcome poverty, one needs to fight it with education which is a tool for building up new resources. Beyond that, equality of opportunity should be there for everyone so that unfair advantage is not extended to the rich and the powerful. Rational use of resources which are natural and therefore, scarce—and synthetic resources which are manufactured and therefore, often costly—are necessary to solve the economic problems of inequality and poverty in the contemporary world. Therefore, use of knowledge as a resource for human capital development would reduce the level of inequality prevalent in a society characterized by rapid economic growth. But its use will depend much on its availability as well—and its availability will depend much on its allocation mechanism that would allow fair and equal access to knowledge capital. Inequality may result hence, from the profound effect of disequilibrium in allocation of knowledge as a capital good for public consumption. It may also result either from channelizing of resources meant for public consumption into private consumption, or misallocation of resources by unfair, *questionable* means and *inequitable* methods. Inequality is a great divider which creates a gap between rich and poor–between those who have and those who have not. Knowledge inequality across societies and across different social strata becomes apparent when resource constraint hits the more needy sections of the society. Such constraints may arise due to irrational means of allocation of resources dedicated to the education sector (Bowles 1967). Perception of poverty and inequality are both necessary to design and plan policies that would aim to reduce such economic maladies plaguing humanity ever since the antiquity.

Lack of proper, fair provisioning of educational resources including good teachers and instructional materials becomes the cause of disparity in skills acquired in the long run (Bajpai and Goyal 2004). Such disparity results in inequality in wages

earned or income accrued. The existence of wage inequality between employees of different regions of a same country is due to differences in their skills, abilities and differences in their education levels that appertain to heterogeneity in knowledge capital distribution. Rising wage difference across regions may also be due to structural heterogeneity-induced social externalities (Blau and Kahn 1994). The heterogeneous nature of distribution of knowledge-intensive industries has to be one of the many reasons behind growing inequality in recent times. This is so for the reason that some regions are highly industrialized whereas some other areas lag behind in technology adoption and advancement. Again, the reason behind this is the quality of human resources being made available for immediate engagement in local industries. A deeper search for causes of such disparities would likely bring out the following which seems most apparently, rational enough:

- Nature of knowledge-hinterland of the local area,
- Level of skills and competency of the local people,
- Penetration of (advance) technology across social strata,
- Education level of the local population,
- Quality of local workforce,
- Infrastructure development and logistics,
- Access to quality education and knowledge resource,
- Quality of communication technologies, among others.

Since education and skills have exchange values and since they command heterogeneous prices on the job market, earning is unequivocally correlated to education and skill levels of employees. Skill commands a greater demand in all ages. Those who are highly skilled command a greater demand in the market for employment when compared to those who are less educated and unskilled. This creates a spread—resulting in inequality in wage distribution among the workers which, however, seems to be a general norm. What remains problematic is the wide variation in distribution of knowledge and skills across societies that seem to be the real cause for concern. The problem does not end here. Economists and policy makers have repeatedly insisted on the link between inequality and growth, and thereby have ascertained correlation between technical change and economic growth and the ensuing poverty affected due to absence of economic growth attributable to behavior of the above mentioned instrumental variables (Solow 1956; Acemoglu 2002; Adams 2003;). In other words, technical change is an important factor driving economic growth. Technical change occurs due to innovation in endogenous structural economic factors wherein, knowledge plays an important role. If knowledge is a positive factor contributing to human capital formation, and *if* human capital formation is linked to economic growth, which admittedly is true, *then*, according to mother wit—misallocation of knowledge resources is more likely to create a form of resource inequality. Such heterogeneity in knowledge distribution across social strata is often assumed to be due to various underlying reasons. These may be enumerated as follows;

i. Inefficient and insufficient allocation of knowledge resources across social strata,

ii. Lack of provisioning or access to *quality* education at the primary school level,

iii. Lack of resources dedicated to the education sector,

iv. Dearth of adequate infrastructure in schools and educational institutions supported by public funding,

v. Poor quality of knowledge being delivered to the students at the primary school level,

vi. Deficiency of digital modes and medium of instruction and access to computer labs at the primary school level, and

vii. Little or no provision for *school libraries* at the primary school level.

These are among the most pressing issues associated with the management of national education system of a developing country undergoing socioeconomic transformation. These factors, nonetheless, are still confronting socioeconomic developments and advancement of the deeper pockets of rural India, most countries of South Asia, and several Sub-Saharan African countries—and countries that are least developed, and where inequality is disproportionately higher. Indeed, the growing disparity between rich and poor, and the burgeoning gap in wealth and resource distribution between rich and poor, are both utterly challenging for economists and policy makers alike. One of the primary reasons behind such phenomena seems to be due to misallocation of knowledge resources and heterogeneous externalities accounting for disparity in Capital Resource Allocation (CRI) among the needy and the poor. We have, in effect, stated most of these reasons repeatedly in our previous researches, and stating further all these herein once again, to reinforce our argument that unequal and irrational models of knowledge allocation or provisioning could account for severe social and microeconomic inequalities. Escape from such misery of inequality lies in proper planning of resource allocation based on rational reasons–not rooted in ideological or political causes. We reinforce our claim that in education lays the seeds of germination of great minds and of human capital. Therefore, the place of learning–i.e., schools should be fit enough to accommodate the germinating seeds of lofty brains that would define and determine future productivity of a nation.

5. Knowledge as a Capital Resource

According to Joseph Stiglitz, knowledge could be perceived as a global public good (Stiglitz 1999) since it has utility and value embedded in it. It is an intangible asset. It is also a resource and a critical component of human development. The idea of knowledge as a "capital resource"—or as knowledge-based capital (OECD 2013) is not new, but rather an old concept which has been formally acknowledged as a source of growth and development. Knowledge-based capital (KBC) is an intangible asset that works on the principles of productivity-based innovation which aims to raise global productivity level through investment in knowledge-intensive capital assets (Andrews and Criscuolo 2013). In other words, knowledge as a capital resource is one of the primary ingredients of economic growth supporting digital economies.

Knowledge is imparted by education and obtained from learning which constitutes the touchstone of national development. Education is certainly considered as both a public as well as a private good (Levin 1987), and according to Stiglitz (1999), knowledge obtained from education and learning is a global public good. Now, allocation of public goods is different in a centralized economy (Koopmans 1951) when compared to a decentralized industrial economy. In fact, allocation of goods and resources in a decentralized economy is so different from that of a centralized state, that knowledge is put to use differently under a decentralized state in which delegation of planning and allocation are organized by industries. This difference gives rise to endogenous problems in resource allocation when one is compared with the other. The difference is also about the quality of education being provided by the state when compared to private mediums of schooling (Srivastava 2008; Härmä 2010; Härmä 2011). In a centralized state, the power and the authority to plan and allocate resources lies with the state, whereas, in a decentralized economy, such power is delegated either to the market comprised of organized industries, or to several individuals. Giving the authority and the power to organized industries for planning allocation of resources, however, leads to monopoly, and therefore, delegation of such a mechanism should be decentralized among several different individuals. This leads to competition among individuals that brings out the best possible planning methodologies which could be screened for efficiency and be free from bias. Because knowledge is a capital resource, its allocation process must also be rational and fair so that its benefits could be accrued by all—the rich, the middle class, the poor, and the needy.

Knowledge of and about resources are dispersed among the individuals and the forces of competition comes in to use that existing knowledge. Now, it is important to consider by what means how much resources should be allocated to a particular sector? If economic planning concerning allocation of resources is to be planned, how would it be possible to measure the efficiency of such public planning? Planning, therefore, constitutes an important aspect of executive operation which is a measured approach required for efficient allocation of resources in a society (Koopmans 1951). Planning generally brings in the design of discipline, coherency and precision to an action/operation given that such planning is carried out by competent entities. It gives a definite direction to the course of action based on formulation of a program that is more likely to make undertaking of such an action more systematically efficient.

Indeed much social and economic heterogeneity exist in allocation of goods in a country like India—an economy mixed and emerging in nature characterized by a high degree of socioeconomic inequality. By the same token, so does there arise the need for fair allocation of resources which suggests that the state feels some compulsion to equalize access to resources for those who are marginalized politically, socially, and economically (Basu 2006). Our concern, therefore, is not just restricted to inequality, but beyond that, we attempt to inquire about the basis of (in)equitable allocation of economic resources meant for the marginalized sections of the society. This would positively contribute towards increasing the funding allocated to the education sector, and hence we examine the issue critically in order to gain a deeper understanding of the problem of allocation of resources across societies so

as to design fair and rational means of allotment. Our concern is also about wrong policy implications resulting from faulty planning and inadequate policy designs concerning economically rational basis for allocation of scarce resources. It must be borne in mind that the problem of allocation is not a trivial one—for it indeed results in certain amount of imbalance in apportionment of the share of resources meant for a "specific" purpose. This *specific* purpose is none other than the one which greatly contributes to socioeconomic progress and human development—i.e., education. Education is the *purpose* which in turn, serves other great many purposes too. Now, the disequilibrium being the effect of an unbalanced situation in which parity is lost by causes outweighing other genuine causes—the net effects manifest in widespread prevalence of social and economic inequalities. The damage from such an injurious effect of inequality leaves a permanent mark characterized by a lasting dent which plagues a society for a considerable period of time.

In this paper, therefore, we raise serious equity concerns regarding allocation of resources devoted to national human resources and educational sector, and to address the problem of unequal distribution of resources among those who are left behind to suffer the impact of inequality. It is important therefore, to realize and assess how efficiently education delivers knowledge resources? How efficient is the education process itself? And, how fair is the allocation mechanism and how impartial is allocation of public resources? These are among some of the most pressing questions which we shall attempt to answer fairly enough in this research.

6. Theory of Knowledge Resource Inequality (KRI)

What is the fundamental basis of the origin of knowledge inequality? How knowledge inequality arises in a society? How "unequal access" to knowledge and education induce *social inequality* (Lin 2000)? In order to understand the nature of distribution of knowledge resources across the society, it is necessary to comprehend the policies underlying the planning of such resource allocation, their efficiency, and their effectiveness. And, moreover—in order to comprehend how *access* to knowledge resources is compromised for some but not for all that leads to social inequity, it is further necessary to examine the role of policies that moderate and modulate access to knowledge in society.

Knowledge as a resource is made available discretely across the society. It is delivered by teaching and acquired from learning. Allocation of knowledge in society is a complex socioeconomic process. Allocation of resources, in fact, is a measured economic process whose aim is to make scarce resources equally available among all the people in a society. It is a process of distribution using rational means and methods that would most likely delegate allocation of resources fairly among the people in order to meet their demands for greater welfare of the society. Education provided by national governments at the primary school level is an example of such a welfare scheme which is mostly free in majority of countries so that children from all ethnic and socioeconomic backgrounds irrespective of caste and gender could avail basic and primary education at no cost. This is to encourage growth in national literacy level and promote education among children and adults so that the country in years to come could benefit from an educated workforce. Not to

forget that a country's education status is best represented by its literacy rates (Chowdhury 1995) and its progress and development on education and individual freedom (Sen 2001). Therefore, the importance of mass public education cannot be undermined. Furthermore, because the foundations of a knowledge economy stand on the shoulders of an educated workforce, education is the key indicator of economic growth and development. The birth of the internet technology and the web ushered Globalization that has made this world a smaller place, and where, information could be shared and transmitted instantly and seamlessly. Knowledge is therefore being made available openly and freely in most countries for the benefit of the society.

However, there are few things which leave open the questions as to why there remains persistent poverty despite the world reaping the benefits of globalization. It may be considered that globalization is a product of knowledge-based economy, and it is in this concept the idea of knowledge as a capital resource could be traced clearly (Thurow 2000). An inquiry into the finer understanding of the causes behind rising inequality across the world—and particularly in most emerging economies leaves us in great quandary as to why economics is failing to address the issue of persistent inequality (Basu and Stiglitz 2020). One possible explanation might be that some inequality is bound to remain in the economic system despite economic growth and continued development. Such inequalities correspond to income and consumption, for there exist a high degree of income inequality in most developed and developing countries of the world. Furthermore, the trend in income and consumption inequality is still perplexing for India for it has become quite difficult to ascertain whether if it has increased or decreased during the reform period post economic liberalization (Ghosh and Pal 2007). The accompanying poverty needs to be cared for, in presence of a substantial degree of inequity in access to healthcare and "quality" education. Since *quality* matters most–and because education promotes human capital formation, it becomes necessary for every citizen to have proper access to *quality education* which has been made capriciously inaccessible to the many using different forms of barriers and obstacles to quality learning. Such artificially created barriers impede access to quality education and learning across different social strata. This phenomenon is gesticulating in a severe form of knowledge inequality over the time which manifests as growing income or wage inequality. I strongly contend that the "Right to Quality Education" must be a democratic right for every citizen of a country.

In this research, therefore, we concentrate on one form of inequality which is the subject matter under inquiry herein: *knowledge resource inequality* (KRI). This pertains to structural inequality that involves unequal access to knowledge and educational resources among the general masses. According to Darling-Hammond (1995), unequal access to knowledge and knowledge resources results from funding inequities in public education. Inadequate access to educational resources including teaching materials, course curriculum, teachers and teaching aids also arise due to failure of governments to address the problem of inter-regional social segregation and economic exclusion of the people in remote rural areas (Darling-Hammond 1996). Governments, therefore, should play active part in improving access to knowledge and educational resources to all students irrespective of caste, creed, and gender, or socio-economic background.

Other forms of inequality do exist as well. Some degree of wage inequality would tend to remain irrespective of finer developments in an economy. Among various determinants of wage, knowledge and skills are considered as prime factors. As individuals differ in knowledge and skills that they possess, and since abilities among individuals differ too, all these affect individual earnings to some extent, and, the discretely heterogeneous nature of distribution of knowledge and skills among the workforces also contributes towards wage inequality as well.

Increase in wage inequality may be due to changes in relative demand for skill-intensive goods and services (Topel 1994). However, on the other hand, wage inequality might also have slightly decreased among the workforce following rising supply of skilled women employees that have reduced the wages of unskilled men as participation of women in labor-intensive and high technology frontier have increased considerably over the years. But this could never be a cause for concern as increased participation of women in labor-intensive workforce would naturally tend to reduce social and economic inequalities to some extent. Nevertheless, it is to be seen how knowledge, education level and skills could have a substitution effect on the workforce. It must, however, be acknowledged that technical change and technology affect wages since they favor skilled workers compared to unskilled workers (Topel 1994). This raises overall inequality as knowledge and skills are chief determinants of wage variation and discrepancy, and it is aggregate technical changes favoring skilled workers which raise overall inequality across global workspace and among intra-regional workforces.

We have very well transitioned from an industrialized global society into a globalized knowledge society—a society which is well connected by the web of internetwork—a social order driven by information and knowledge networks. Knowledge is now considered as one of the most fundamental capital resources of production and manufacturing (Bouzov 2016), an input to discovery and invention by research and development (Arrow 1972), and an asset which has value attached to it. Therefore, it is generally felt that there is a definite need and necessity of knowledge in society for "everyone", for every human being has his or her right to better living and right to education. Education enriches human mind, helps obliterate ignorance, improves the quality of life and living, and provides humanity with a source of income and wages. Since knowledge is a capital resource and considered as an input to production, its availability and allocation are important aspects of a rational economic order. By rational economic order, we mean a coherent arrangement, organization, and regulation of human activities which pertains to economic and social wellbeing of the people, and whose benefits are meant to be accrued from such an order of welfare. In allocation of *knowledge* which is a capital *resource*, the role of education in delivering it to the society is of prime importance.

7. On the Question of Accountability

Most emerging countries are witnessing sustained economic growth characterized by inclusive socio-economic development. In such countries, it has been observed that resources which are meant for public allocation though being in great demand—they are, in effect, in great shortage too. There exists widespread disparity in wealth

and income distribution among the citizens of a large developing country. The gap between those having adequate access to economic and social resources and those having little or no access to such resources gives us the idea of the scale and extent of inequality in the social order. But, what it is that gives rise to such a high degree of inequality? Knowledge and education–as it seems for most practical reasons, that these two factors being essential for human capital formation, they are nevertheless, the *cause* of inequality as well. Lack of knowledge depresses economic growth and social progress and is also the reason behind widening wage gap between highly skilled and unskilled workers.

Education is now acknowledged as one of the prime determinants of human capital formation, as also the most vital factor of human resource development (Becker 2009). Knowledge derived from education as a resource is manifested in human capital formation. In post-modern industrial knowledge economies, development of human resource is *knowledge* intensive, and therefore, it is considered as a *capital resource* and an input to production and manufacturing. Knowledge plays a crucial role in fueling the engines of current economic growth and social development (Ozturk 2008; Joshi 2009). The utility or usefulness of knowledge in society is universally well acknowledged (Hayek 1945) as a promoter of intellectual growth and human capital formation. Knowledge—by far, and most commonly, is acquired by education and learning. As for these reasons, and for the general welfare of a nation, there should be enough resources provisioned for the education sector which must–by equity, be rationally allocated among the citizens. For knowledge and information, among others, are considered as public resources which are meant for common welfare of a nation. Resources should be properly earmarked for allocation to the education sector. If such resources are limited, they should be judiciously allocated. And furthermore, "*Knowledge of Technology*" (KoT)—among others, may be considered to be one of such resources believed to be scarce and costly. If education is considered to be the backbone of a knowledge society—and knowledge the driver of the engines of economic growth and development, then it is by no means unfair to question the accountability of policies concerning allocation of resources devoted to the education sector. And by any means, such questions are fair enough.

Indeed, so as it seems—that there remains a lot of disparity in allocation of knowledge resources among the people across different social strata and across diverse regions which can be categorized into two following classes of *knowledge resource inequality*;

(i) "Intrinsic" inequality, and

(ii) "Acquired" inequality.

We shall be discussing about these later on. For the time being, let us enlist some variants of inequalities arising out of very many causes which could be reasoned out as follows; e.g., inequalities on account of geographical differences, gender disparity, ethnic discrepancy, political favoritism, and *allocation inefficiency* arising out of "corruption" in policy and practices of planning and distribution of scarce public resources. The question of inefficiency and misallocation, therefore, is bound to arise, particularly in those countries where resources are scarce and expensive, and predominantly in such emerging nations that are witnessing rapid economic growth and development. This is for the reason that distribution of knowledge across societies

is heterogeneous and access to information either liberal or constrained. But such inefficiency and misallocation can be reduced with ensuant reduction in corruption of policy and practice. Given that knowledge is one the primary drivers of modern economy, it would be interesting to inquire about how knowledge inequality affects economic growth and development of a country? And then, *inversely*, wouldn't it be more intriguing to examine how growth and development affect distribution and allocation of both knowledge and knowledge resources in a society? I do not intend to complicate the questions further. Questions like these, nevertheless, furnish an arena as rich as a minefield of gold. But this is also a field where no miner it seems ever yet succeeded in digging more than a few yards beyond where he or she stands. But the field is promising—for it supplies the explorers with the knowledge filled with the idea of richness about what it may hold beneath the surface.

Coming back to our analysis in this paper, and to keep up with the spirit of dialogue and debate, we shall be discussing on the nature of knowledge inequality which might have some effect on economic growth and development of a country. We seek to find out what such effects could really be. I said it might have "some effect"—but I do not know as yet what that effect might be. However, there is enough evidence in favor of inequality arising out of faulty or inefficient allocation that induces disparity in distribution of public resources, including education (Walker 2012). We shall examine using theoretical modeling of the system the nature of such incongruent effects. We shall further explore how "Knowledge Inequalities" arise, and what remedial measures could be devised for correction of such problems. It may be argued that knowledge and skills command advantage which is an instrument of access to success. Those who are highly educated and skilled are highly preferred as well, for they command greater advantages on the market for jobs. Technical competency is an important factor of aggregate wage discrepancy for the reason that technical knowledge is not only highly valued, but commands a greater degree of preference among the recruiters. Technical knowledge is a resource which is a valued input into production and invention.

8. Importance of Planning

Should all economic activities be planned? What is the role of planning in economics? For, to decide how scarce resources ought to be allocated, the mechanism of allocation should be planned using rational means and methods. And, for optimum allocation of resources, economic planning is a prerequisite–and a good practice as well (Lange 1949). It is useful for determining and developing the criteria of the optimum allocation of resources. It is noteworthy to acknowledge that in any rational economic organization, planning plays an important role in deliberation of routine work (*operations*) and that also includes allocation of resources prudently and in an organized, planned manner. This is also true for a country wherein a system of economic planning exists based on the nature of political governance in existence either endorsing centralized planning, i.e., in Russia or in China, or indorsing decentralized planning, delegated to an organized body of private enterprises.

And it is here where the problem of allocation arises often on account of biased, unorganized planning of economic activities. One cannot deny the power of organized planning for it gives coherence and strength to activities planned. And, one

cannot deny either the adverse effects of asymmetric allocation of economic resources when such planning for allocation goes awry. Now, a question arises–as raised time and again by economists and social thinkers including Hayek (1945)–how should economic planning be done? Should it be planned *centrally,* or should it be delegated and decentralized for *competition*? In similar sense, it could be asked–how public resources for national Education and Research (E&R) should be allocated? Should such allocation procedures be managed centrally (as generally practiced) by following government policies and directives or should such be decentralized for competition? The reason for this is that that competition would likely bring about fairness and transparency in allocation mechanism making it more efficient in the long run. At the same time, it must be ensured that such decentralization process ought not become a costly manoeuvre that would otherwise hinder the primary objective of the mission to educate with quality knowledge.

There seems to be—according to me, a huge gap which exists in understanding "how" knowledge as a resource ought to be distributed, and how it should be provisioned (Chatterjee 2013). Let me explain this a bit—by preparing to go that far which allows one to perceive and understand the economic concept of resource allocation more clearly. Fairness in resource allocation demands efficient planning so that allocation of knowledge resources is effected in the best possible way for socio-economic progress. Knowledge of planning and strategizing is essential for *rational distribution* of resources which are scarce and valuable. This is one of the prime themes for debate and discussion in this paper. Planning is an important strategic activity that requires the knowledge of arrangement, organization, and forecasting of a scheduled or proposed action or operation (Radner 1963). In fact, planning is a preparation that lays the groundwork for an action/operation. It is prudent to have every major or minor activity or course of action planned according to how it should be executed. Planning also helps to predict in advance the approximate outcome of an operation to be undertaken. Good planning reduces various complexities, uncovers potential bugs or glitches and helps bring about efficiency in operations. Inadequate and poor planning kills efficiency and jeopardizes the whole process of an operation.

Inefficient planning of resource allocation process could lead to allocation asymmetry, or resource inequality–a phenomenon proved well beyond cognizance. At the microeconomic level, individual earnings are related to human capital formation, individual abilities, their skills and education levels which affect individual earnings and which allows individuals to earn wages by competing with other wage earners in the job market. At the macroeconomic level, assuming that inequality is associated with public resource misallocation, there seems to be a definite correlation between human capital formation and inequality (D'Erasmo, and Boedo 2012). Furthermore, it may well be assumed that there could exist a close approximation–rather, an asymptotic association which is horizontal but topologically deformed in nature between knowledge capital and income inequality. This could be represented mathematically as a function: $\gamma(x,k) = k\cos x + (1-k)$ wherein, there occurs a continuous transformation of the curve. The variable k denotes total body of new knowledge (inventions, patents, etc.) of a system which is growing with time, $(1-k)$ being the amount of knowledge capital properly utilized, and $\gamma =$ output as `GDP` (x). It is

supposed that countries having low literacy rates fair poorly in knowledge capital utilization and they underperform economically which could be given as $0 \leq \gamma \leq 1$. Such countries often lack proper means to cultivate knowledge capital for they utilize human resources poorly and suboptimally. Problems such as these generally afflict low income and least developed countries (LDCs), or characteristic of certain pockets of rapidly developing countries where access to information—including quality education—is either lacking or insufficient, and restrained. But now, there is one thing worth considering to be asked—who the (rational) agents of allocation are, and who they ought to be? And, how efficient their mechanism of resource allocation really is in relation to the allocation process meant for the education sector? This could be theoretically modeled to explain the mechanism of resource allocation in action.

9. Theoretical Model

The incidence of wealth and income inequality (Galbraith et al., 2016) leading to poverty and malnutrition (Dasgupta and Roy 1986) is common throughout the world and in almost every developing country, but herein we are inquiring about a novel concept of "knowledge inequality"–which is quite emerging and its existence scattered heterogenously. Globally, and locally–as in India, inequality is responsible for persistence poverty and malnutrition (Pal and Ghosh 2007). Besides, inequality is also one of the prime determinants of unemployment (Dasgupta and Ray 1986). This inequality-induced endogenous unemployment is closely associated to allocation and availability of resources. Because resources–whether if they are capital (tangible) or intellectual (intangible), such as knowledge or information resources–determine the levels of production and endogenous growth, it is important to bear in mind that their suboptimal and irrational allocation may lead to inequality.

In lieu of that, we design a simple model to represent a system in (knowledge) inequality. This is meant for studying the effects of the dynamics of resource allocation dedicated to the education sector of a knowledge economy. The model specifies several variables that are employed to define the system in which knowledge as a resource is utilized in the society. Knowledge is used as an input to production, and it is also consumed as data and information required for design and discovery of new products and services. It is obtained by education and from learning. Besides, knowledge is used in industrial production as a raw input (capital asset or material) and it is the key input to research and development (R&D) activities. Technological advancements and specialization demand not only greater access to information—but it also require specific knowledge of things (technological processes) employed in innovation or invention process. That one must reason with finest explanation in order to understand the underlying principles of a phenomenon call for yet deeper analysis and examination by which discovery of new rules of process could help define a particular phenomenon in question. Now, the rational basis for the need for a theoretical model behind a phenomenon is; what explains it? What explains the persistent poverty and overarching inequality in the contemporary world? Therefore, we describe these events using a system of equations containing a model of inequality where knowledge as a capital resource plays a significant part in the contemporary world. The model depicts in a nutshell the elements of knowledge economy which constitute both human and capital resources.

Let us consider the elements of a knowledge economy as a system being defined as:

$$y = (\alpha_1 + p(1 - k_{t+1}) / \vartheta_{t+1}(x_1 + x_2 + x_n....)) \qquad \text{eq.1}$$

Wherein, α_1 is defined as the constant of the system, p denotes budgetary allocation to the education sector, k_{t+1} denotes the growth of knowledge resources over time, x_1 and x_n being the variables of human resources, investments and capital assets, the technology factor being ϑ, whereas y categorized as the output in terms of GDP. The total knowledge of the system k_{t+1} is dependent on the growth of technology and technological advancements over the years defined as ϑ_{t+1}. Now, the ratio of the system defined herein $\alpha_1 + p(1 - k_{t+1}) / \vartheta_{t+1}(x_1 + x_2 + x_n....)$ must correspond to $y \gtrneqq 1$ which is unity or greater. A value $\gtrneqq 1$ denotes positive knowledge growth and a value less than that corresponds to technology growth. The growth of technology is advantageous but it must correspond to growth in new knowledge as well as that which would most likely manifest itself in innovation frontiers defining further socioeconomic development. In that respect, it may be agreed upon the point which at best defines a state of equilibrium in a knowledge economy. Growing investments in the education sector or allocation or more fund does not always indicate that all is well. Rather, it has been observed that if such funding and resources having been allocated to education sector are low and deficient but well utilized efficiently, then that would most positively contribute towards knowledge equilibrium. Therefore, more stress ought to be given to rational and efficient utilization of available resources meant for social and community education, including primary schooling, human capital growth and development of human resources which most likely define overall national ontogenesis.

From the model in eq.1 given above, it could be well ascertained how knowledge inequality arises within a given system defined by variables which represent different elements and entities comprising a knowledge economy. Two different kinds of knowledge inequality–*intrinsic inequality* and *acquired inequality* mentioned above in section seven needs to be discussed and explained herein in relation to the model. "Intrinsic inequality" could be defined as a form of disparity which is already present in a society plagued by other socioeconomic maladies; e.g., overweening poverty, low productivity, low literacy rate, lack of proper healthcare and family planning, presence of communicable diseases, among others. Acquired inequality–on the other hand–is a form of synthetic or *extrinsic inequality* due to environmental factors and other externalities not accountable to human interventions. Like for instance, recurrent flooding and natural disasters, severe drought, famine-like situations, pandemics similar to CoVID-19, often contribute to severe form of inequality which results in growing disparity in income and wages. When such externalities constringe on resources which are already scarce—by rendering them more costly, and therefore, when it leads to overwhelming state of deprivation, the vicious cycle of inequality-induced poverty, sets in. When the most basic necessities of bare subsistence are gradually compromised, it leaves the suffering people with very little choice but to quit thinking about affording quality education to their children, for, most of their disposable income is already spent on food.

10. Conclusion

We conclude this research with a simple note. That knowledge has become an indispensable resource required for growth and development. It is a resource to which there must be fair and adequate access for its most efficient utilization. Since education is the building blocks of a nation which educates students and imparts knowledge that can be perceived as a commodity, proper access to quality knowledge is a must for everyone in a society. Knowledge is essential for human capital formation and the most essential ingredient of human resource development. Therefore, inefficient, asymmetric allocation of this capital resource may result in a severe form of inequality which we call Knowledge Resource Inequality (KRI). This paper provides a general description of this new form of inequality and defines it using a simple theoretical model.

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