

# AI Data Space Interplay as Knowledge Resource in Building Human Capital as tools for Growth using Automated NLXs<sup>1</sup>

YAMINI AGARAWAL\*  
AMAN AGARAWAL\*\*

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## Abstract

Artificial Intelligence (AI) interventions include the heavy reliance on machines to do the matching that may be based on the data supplied. In the markets the information asymmetries and a lot of information contained from data suppliers may not give the correct information and perception which may form the basis of labour market clearing in many jobs that need skills beyond repeated actions. Human based skills is needed in all job markets and hence the role of the recruiting, training, development and assesment and monitoring continue to be a tough algorithm beyond the data collections, assesment to pre given algorithms and also on the specifics of the job requirements. Cyber security threats, frauds and other humanly interventions of subconsciously driving the market to desired outcomes may also influence the system. This needs to be taken care and monitored when the AI algorithms are trained to develop the National Labour Exchange (NLXs) as proposed in Agarwal, Agarwal, Agarwal and Agarwal (2017) that meets the SDGs and stakeholders needs and labour market information and manpower requirements.

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## I. Introduction

HUMAN CAPITAL DESIGNATES personal attributes considered useful in the production process. IT is enhanced and propagated through education, training, intelligence, skills, health, adaptive AI techniques and tools, and other qualities employers' value, such as loyalty and punctuality. Human Capital is an intangible asset and perceived to increase growth, productivity and profitability as a whole. It is never listed as a part of balance sheet of any organization. In the 18th century, Adam Smith referred this concept "Human Capital" in his book "Wealth of Nations". Accordingly to Adams Smith, improving human capital through training, knowledge,

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\* Professor of Economics and Finance & Dean (Research), Indian Institute of Finance, 45A, Knowledge Park III, Greater Noida, Uttar Pradesh 201310, INDIA

\* Professor of Finance and Director, Indian Institute of Finance, 45A, Knowledge Park III, Greater Noida, Uttar Pradesh 201310, INDIA

education and experience leads to a more profitable enterprise. In 1960s Theodore Schultz compared human capital to other forms of capital. According to him, companies must invest in the education, training, skilling and enhanced benefits of an organization employees. All this has great economic value for employers and the economy as a whole.

The best part of human capital is that it is not immune to depreciation except unemployment, injury, or loss of specialized skill. Human Capital tends to migrate in global economies from developing economies to developed economies. Certainly there is need for human capital retention through various attractive economic policies. Besides, human capital cannot be easily measured like debt or equity. It equates more to intellectual property/ capital. In short, human capital is the economic value of a worker's abilities and skills.

Human Capital is the main reason for accelerated growth and expansion for many countries. Human Capital leads to more innovation. Innovation leads to more growth by creating ability to absorb new technologies by human beings. Knowledgeable and skilled workers can make optimum use of economic resources. It leads to higher rate of participation of labour force. It results in reduction of gap between rich and poor. Better quality of human being (population) means faster economic growth.

Data and knowledge, is often called "Gold", which is a valuable resource, when used properly, managed and utilized, lead to decision making, innovation and overall growth and prosperity in business and society. It is highly reusable. Whosoever controls it has a competitive edge. Data is like raw material that fuels innovation, creates new opportunities and opens door for future growth. Due to its reusable property, it is more valuable than money. Data copying is very simple. One can loose money but acquired knowledge protects you, whereas one has to protect wealth. Knowledge always increases as we spend more and more and vice versa. Knowledge is power as it helps positively shape society, which benefits everyone as a whole. Data is raw, unorganized and unprocessed facts. While information is data, that has been given context, link and meaning. On the other hand, knowledge is understanding and application of information, often gained through experience, skilling or education. It leads to critical thinking, problem solving and creativity which are essential for all economic, political and social fabric of an economic society to grow.

Data and Economic growth are intrinsically linked. Data driven strategies coupled with advancement in data analytics and AI, provide opportunities for innovation, optimization, evidence -based decision making lead to improved efficiency, customer satisfaction and competitive advantage to achieve survival, sustained growth and to establish right balance among national and international organizations along with personal human growth. For sustainable growth, it is important to increase awareness and increase in participation rate. Sustainable well being encompasses interconnectedness with people and interconnectedness with nature. This synergy involves not only measuring human capital but also contribution of their conscious decisions to the well being of the future.

Ben, Douglas and Philip works lead them to recieve the Nobel Prize in 2022, significantly advanced our understanding of banks and financial crisis. Banks are essential intermediaries for growth and prosperity and for human

well being. Banks create liquidity, offer long term loans to borrowers along with the facility to savers to access to their money when needed long- term investment is the basic ingredient for prosperity and economic growth. Research work enhanced understanding of banks, bank regulations, banking crisis and how financial crisis should be managed. Using historical sources and statistical methods, Bernakes analysis depicted which factors were important in the drop of gross domestic product at the time of Great Depression in an economy in 1930. Deposit insurance from government is a solution to depositor at the time of rumours about the vulnerability of the bank. Their theoretical models explained why bank exists, how banks perform a societal important function as an intermediary between savers and borrowers.

Goldwin recieved the Nobel Prize in 2023 for her models advanced understanding of women's labour market outcomes. She uncovered key drivers of gender differences in the labour market. Golden researched on two central "Women Issues". One why there is an increase of women labour participation especially of married women in economic activities over past half century globally. Second, there is persistent gap between men and women earnings in the same period. According to Goldwin, it is "U-Shaped female labour force function in economic development and economic history'. Initially, great numbers of women worked in agriculture, but this participation declines due to industrialization, social norms and a change of labour market into more male dominated sector. However, with education, participation of women increases into the labour force. Hence, it results in U-shaped supply curve of women labour force. Her "A Grand Gender Convergence" paper explained flexibility in job has a great impact on closing gender gap (technology impact). Access to birth control, changing aspiration, flexible workplace policies resulted in higher number of women to pursue careers, education and reshaping the role of women in the labour market.

Acemoghu, Johson and Robinson works lead them to recieve the Nobel Prize in 2024. Their works focused on understanding the impact of political and economic institutions as national prosperity. Their work explained why some nations thrive while others fail miserably. Strong and inclusive institutions (which provide opportunities for everyone) are key to overcoming global challenges. Their work demonstrated the importance of societal institutions for reducing the vast differences in per capita income across nations. Along with this, they also provided guidance on the formation of policies to promote economic development.

Card, Imbeus and Angrist recieved the Nobel Prize in 2021 for their research work demonstrated the economics of education and school reform, social programs and the labour market, the effects of immigration, labour market regulation and institutions, and econometric method for programmes and policy evaluation. Angrish explored Beckers hypothesis on a trade-off between child quality and quantity by exploiting variations in twin births and parental preferences for compositions of siblings of mixed sexes, with evidence rejecting the hypothesis. All the three used "natural experiments" to analyse labour market effects of minimum wages, immigration and education. Minimum wages does not necessarily lead to fewer jobs.

The "Natural Experiments" as the Nobel citation states are "a rich source of knowledge. Besides methodological work, their empirical research that

delved deeply into issues of employment and education, bringing light – and hard data – to matters such as effects of education, military services, lifelong earnings, class size, many kinds of policy experiments on educational outcomes, more relevant in policy discussions and families making decisions. They shifted the focus of applied research to pay more and more careful attention to causal effects and changed the practice of econometrics. One of the methods – “differences in difference” – is frequently used to analyse policy changes. The other method is “instrumental variables”. This links a source of variation, hopefully unrelated to outcomes and cofounders, called the instrument, which in turn should affect the outcome. The natural experiment methodology is not just used for labour economics but also in many other fields of economics also. There is “credibility revolution” in microeconomics due to substantial improvement in empirical research design and renewed attention to causal relationship.

Milgrom and Wilson jointly worked for improvement to auction theory and inventions of new auction formats gained them the Nobel Prize in 2020. Wilson is an expert on Game Theory and its applications. His work on pricing of priority service for electric power has been implemented in the utility industry. Other contributions to game theory includes wage bargaining and strikes and in legal contexts, settlement negotiations design of real world auctions. The confluence of the price between the buyer and seller is an economic equilibrium. Auction theorist designed rules for auctions to address issues that can lead to market failure. The design of those rulesets encouraged optimal bidding strategies in a variety of informal settings. “Winner’s Curse” is when the winning bidder loses out and gets struck paying more than the item is actually worth. Wilson examined how the winner’s curse unfolded (oil companies, mineral extractions, etc). Milgram and Wilson’s solution was elegant. What if the auction sold licences all at once? “Simultaneous multiple round auctions” (SMRA) – all items are put up for sale at once and buyers can bid on any subset of items. Because bidding is done in rounds, it mitigates the risk of “Winner’s curse”. Penalties for withdrawing a bid were also imposed to help ensure auctions run smoothly and fairly. Canada, Finland, Germany, India, Norway, Poland, Spain, Sweden and U.K. have all used different versions of this novel format of auctions. Milgram and Wilson have both sought out more fundamental explanations why? Both used game theory to study the strategic interactions among decision makers (Buyers & sellers in market). The thing is to go beyond the standard paradigm to look inside and outside to what is really going on in greater detail.

Banerjee, Duflo and Kremer works lead to them to receive the Nobel Prize in 2019, which focused on using field experiments and randomised controlled trials to assess the effectiveness of various policies succeed and others failed. Their work shifted the field towards more rigorous, evidence-based approach. In short, their work demonstrated the power of rigorous experimentation to improve understanding of poverty and to develop more effective policies and interventions to alleviate it. Their works clearly gave an implementation structure for inducing growth and development from the grass root level focusing on enriching human capital through eradication of poverty and healthcare needs of the society.

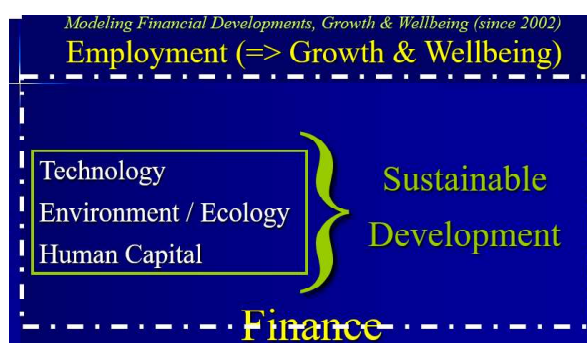
Romer and Nordhaus works broadened the scope of economic analysis by designing the tools that are necessary to examine how the market economy has a long term effect on nature and knowledge, which led them to receive

the Nobel Prize in Economics in 2018. Globally knowledge transforms people's lives. However, growth has progressed at different rate over centuries. It also varied from country to country. Their work explained that Endogenous growth where technology advances do not just flow in from external-exogenous –sources (Classical/ Neo-classical application and earlier economic models), but they are created by purposeful activities in the market place. Their work helped in designing institutions and policies that can enhance human prosperity by fostering the right conditions for technological development. Nordhaus designed simple, but dynamic and quantitative models of the global economic-climate system, called "Integrated Assessment Models" (IAMS). His model addressed questions about the desirability of global scenario and specific policy interventions. Both highlighted spillover effects (externalities) on society, had global reach and long-term consequences of inefficiencies.

The Solow Growth Model, which yielded him the Nobel Prize in 1987, explains many feature of economic growth, but not large and persistent differences in growth rate. According to Solow, for persistent long-run growth, labour becomes increasingly productive due to technology advancement (assumption). According to Romer, technology simply arrives exogenously. Ideas for new good and services –produced by new technology can be created in the market economy. Romer demonstrated how such exogenous technological change can shape growth along with right policies and process. Physical and human capital is rival goods. How to have non-rival goods to have growth driven by accumulation of ideas, unlike growth driven by accumulation of physical capital, does not have to experience decreasing returns. The new knowledge can benefit entrepreneur and innovates anywhere in the world, now and in the future. However, markets generally do not fully reward the creation of new knowledge. It means as long as the new knowledge is socially beneficial-too little R&D is conducted market incentives for R&D come in form of monopoly profit. Under-provision requires well-designed government interventions, such as R&D subsidies and patent regulations, not only within the country but also globally. Romer's and Nordhua's contributions are crucial steps towards in addressing central questions about the future of humanity.

Thaler received his Nobel Prize in 2017 for his research contributions on how do human traits govern individual economic decisions and what effect do they have on decisions and what effect do they have on markets as a whole? Thaler has analysed economic decision making with the aid of insights from psychology namely the tendency to not behave completely rationally, notions of fairness and reasonableness, and lack of self control. Thaler's insights have been applied by policy makers in many areas, including healthcare, energy, environmental protection, consumer protection, education, unemployment and national security. United States created selected bodies of experts called "nudge units" to improve social policies by augmenting them with nudges. Richard introduced "Nudge theory" in a behavioural science concept that proposes people's decisions and behaviours can be influenced in predictable way by small changes in how choices are presented. Whole emphasis is an understanding how people think and make choices, incorporating cognitive psychology and behavioural economics insights to "nudge" people towards a particular decision or outcome to achieve health, wealth and happiness.

The Models proposed by J.D. Agarwal and Aman Agarwal since 2002 based on their works at the Italian Parliament, Finland Parliament, Uzbek Parliament, European Parliament, Danish Parliament and Swedish Parliament at various forums outlines the need for human capital, environment and technology to induce sustainable development surfaced by finance for long term growth of societal prosperity (see Figure 1).



**Figure 1**  
**Model for Financial Development, Growth and Wellbeing**  
**(Agarwal, and Agarwal, 2002)**

Similarly, the works of many other authors who aligned their thoughts to the development of economy and its problems include Chanakya / Kautilya (4th Century BC) on Arthshatra, the 1st ever written text in Economies in 350 BCE even valid today countering Adam Smith's work on "The Wealth of Nations" making Chanakya (Kautilya) truly the father of economics in real sense.; Copernicus (1517) ; Bodin (1568) ; Hume (1748); Hetzel (1987) ; Mill (1948); Fisher (1911) ; Keynes (1924); Friedman, (1956, 1970); J.D. Agarwal (1978); Aman Agarwal (1999, 2001, 2003); Joseph Stiglitz (2003, 2007); J.D. Agarwal (2004); Martin Wolf (2005); J.D. Agarwal and Aman Agarwal (2005, 2007, 2017); Hubert Fromlet (2005, 2008); J. D. Agarwal and Aman Agarwal (2004, 2006, 2007, 2022); Aman Agarwal, Yamini Agarwal and Saurabh Agarwal (2006); Mario Baldassarri & Pasquale Capretta (2007); J.D. Agarwal (2008, 2013, 2017, 2018); J.D. Agarwal, Manju Agarwal and Aman Agarwal (2014, 2015, 2016, 2017); WDR (2016) ; WDI (2010-18); GEP (2015-17) ; J.D. Agarwal, Aman Agarwal and Yamini Agarwal (2016, 2017, 2018); RBI Bulletin (2000-17); Economic Survey (2000-18); J.D. Agarwal, Manju Agarwal, Aman Agarwal and Yamini Agarwal (2016,17,18,20); Manju Agarwal, Aman Agarwal & Yamini Agarwal (2018, 2019); Aman Agarwal and Yamini Agarwal (2021, 2022, 2023) and Aman Agarwal and Krishna Nath Pandey (2023). The works highlight the socio-political will to develop economic systems, processes and operation through different means of economic and financial structures of the economy.

It is also observed that the Literature on wages and salaries also present a dismal picture in terms of inequalities of incomes to different wage earners. Most exclusive focus has been placed on the characteristics of workers and on the changes in their relative demand. But these do not explain the variability in wages among workers of similar individualistic characteristics. It has also been found that the labour at all level is exploited both in terms of

the time frame and the wages paid to them. It is also witnessed that the quality of life of labor is poor around the world. The gap between the wages/salaries of lowest paid and the highest paid in a company is too wide leading to desperation and high level of turnover and lower productivity. Wage inequalities are hence observed between enterprises and within enterprises. A strong labor market institution, like the exchange IIF proposed, and wage policies can help reduce these disparities.

There is also danger of labor unrest in situations where labor is exploited beyond a particular level. However, if there is a mechanism where they can have an opportunity to seek gainful employment, help raise income level, quality of life and level of job satisfaction. Such mechanism would greatly help both the job seekers and job providers and the nation to utilise this resource (wealth) effectively. Labor as a resource has time dimension. If not utilized to contribute and generate wealth at a given time is wasted forever for the contributions which could have been made during that time. It is unlike other natural or man-made resources which do not get wasted over time. There is an urgent need to provide a mechanism wherein the gap is filled up through an agency set up at National or Regional level in different countries of the world. An attempt has been made in this paper to propose such a mechanism.

People seek income security by participating in the workforce. Income security includes employment, employment protection, wages (including minimum wages), collective bargaining, benefits and allowances to workers with families, reservations to mitigate inequalities, healthcare facilities to employed and their families, incentive based system to mitigate risk of inflation, pension protection, affordable housing schemes or special segmented labor housing schemes and fringe benefits along with employment benefits. Tax Rebates, Negative Taxes, Social Insurance schemes and other specific schemes have been in existence for the benefits and children and families that are not included in the labor workforce. Alarmingly high Un-Employment, Under-Employment, informality, dangerous and unhealthy work surroundings, declining real wages and inadequate social provisioning is increasing the number of working poor. Social Security scheme contributory or non contributory never cover the economically active stream of workforce that unable to earn the minimum substantial levels of income to pull themselves and their families out of the trap of poverty. Non-contributory programs for such workforce can help them reduce the impact of poverty. Information on health care, education, conditional cash transfer programs, cash for work programs also known as public employment programs, skill development programs or vocational training programs, entrepreneurship development programs, small and medium enterprise development programs, self help group programs despite being advertised do not reach the ultimate beneficiary because of lack of information and public awareness. A social security system that guarantee dissemination of these information in native's language along with the official languages can play a key role in creating sustainable inclusive growth that can eradicate poverty and break the vicious circle of poverty.

Social Protection as policy responses are key measures to reduce high and persistent levels of poverty, economic insecurity, and income inequality and to increase investments in human capital and human capabilities

especially when there is weak aggregate demand during recessions or depressions. The National Labor Exchange (NLXs) is one such social protection measure that the governments / markets can adopt within their fiscal space which would provide for policy response that can address the challenges of reducing poverty, vulnerability and inequalities leading to inclusive growth while building the human capital capacity with informed demand potentials and provisioning for Universal human right that is social security creating avenues for social and economic development. It would foster inclusive and sustainable growth in the economy and its economic systems by correcting distortion in product or factor markets created by the information asymmetries of labor supply curves.

## II. Data, AI and Knowledge Resource

Data usually organized into structures such as tables that convey information into quantity, quality, facts, sequencing and formal interpretation. Generally, data is used in scientific research, economics, history, psychology, financial and any form of human organization activity. National Income data, per capita income, per capita consumption index, unemployment rates, census data along with regional and religious figures etc. provide raw facts from where useful information is extracted as per the need and objective of research projects. Field data is collected in uncontrolled environment. Whereas, experimental data is generated through controlled scientific experiment. Statistical, Econometrics and logical techniques are used to analyse data for presentation, discussion, visualization and /or other forms of data analysis. When data is presented in reference to some relevant context it is known as information. Contextually, connected pieces of information it is viewed as data insight or intelligence. Stock of insights and intelligence over time is known as knowledge. Advances in computing technologies have led to very large quantities of data, usually referred as petabyte scale.

It is observed that high-performing service organizations are using data and AI to generate revenue while cutting costs-without sacrificing the customer's experience and satisfaction. AI application includes machine learning algorithms to understand customers questions and requirements providing satisfied responses through AI, chatbots, future prediction of customers needs, further improve efficiency and at the end leads to enhancement of customer's satisfaction (ultimate goal of any entrepreneur-big or small). AI also enabled CEO's to free its critical staff to focus on complex and high value cases that requires critical thinking by automating routine tasks and by self service desk. AI enabled knowledge management by analyzing, identifying patterns and trends and recommendations based customer's behavior.

Artificial Intelligence (AI) knowledge include Machine Learning Algorithm (to detect patterns), neural network (to process data through neurons), Deep Learning (to analyse customer interactions), Natural Language Processing (NLP) (can analyse transcripts of contact centre conversation). Transcripts can provide CEOs the symptoms of happiness/ discomforts or discontentment. Chatbot interfaces allow and help contact centre to answer & resolve customers queries at a much faster pace than otherwise. For example, a powered chatbots can query multiple data sources simultaneously and instantly find appropriate answers to common and

complex questions. It reduces time and energy both. Similarly, in insurance industry and especially in health insurance industry, AI tools like "Unified knowledge" and "Generative AI" can integrate and centralized all customers information, can assimilate all customer's e-mails automatically along with answer to common queries. It makes very simple for agents, researchers, doctors and policy makers. AI systems may improve through vast exposure of data, patterns, trends, relationships and human behavior that human being may miss in natural exposure.

Way back in October 1950, British techno-visionary Alan Turing published an article called "Computing machinery and intelligence" in the Journal "MIND" "May not machines carry out something which ought to be described as thinking but which is very different from what a man does? After 75 years, AI gave machines the ability to learn from experience and perform cognitive tasks, which once thought to be reserved for human intelligence. AI is rapidly spreading globally in all parts of human civilization. AI enables self driving cars to navigate different paths to reach designated destinations. Chatbots pop up when we visit e-commerce websites . AI powered personal assistance in home devices AC, TV, doorbells, houselocks, CCTV, etc. AI is going to boost the world economy. According to Mckinsey Global Institute forecast, by 2030, AI will create \$13 trillion worth of additional activities. AI system work by combining large amounts of data with intelligent algorithms. However said, "most applications of AI have been in domains with large amount of data". With the advent of "Web", large amounts of data become available in digital form. "Genome Sequencing" started generating massive amounts of data.

AI system are different but related to robotics. Robotics perform tasks by themselves or under guidance of people (factory workers, cooking, even live-on partners, etc). Most games use AI networks at different levels. AI has the potential to revolutionise our lives in number of ways and the benefits are far exciting. Through AI, there is an increase in productivity and efficiency at the workplace. Innovative AI solutions leads to newer products, services and market opportunities. AI's potential benefits are vast and varied in every field, accelerated research, development and growth all over the world. However, world faces number of challenges due to application of AI.

- i. AI is capable of processing millions of social media network interactions and gaining insights that can influence user's behavior. In the long run it may affect demand and supply of product as a whole.
- ii. There is a fear in common man all over the world that AI and robots may eliminate some positions. This may lead to increase in unemployment everywhere. However, AI will create more new jobs for tech-savvy workers. There will be both positive and negative impact on employment generation.
- iii. There might be an impact on white collar jobs in different fields globally.
- iv. New jobs will be created through AI but many people will not have that skill needed for those positions. Risk of Job mismatch will be there.

Yes challenges are there. Important question is - Can machines replace human as the dominant force on the planet? and No , IS A big NO.

Some may argue that we are or will soon be on that point. The truth which I feel that it is transition phase. More investment is required for

retraining, reskilling and workforce development in time to come. Machines complement human beings but can't replace human being. Machine lack the ability to make decisions outside their programming. Machines are only tools for the growth and development, without self awareness and to extrapolate based on available information. On the other hand, human intelligence not just to capture information, but if about how we apply our knowledge in real life/ world situations. Experiences shape our understanding and gives us unique perspective as human beings. The complexity of human brain is characterized by our ability to learn, adopt and experience. AI is great power for future growth. However, great power comes with great responsibilities.

The challenges of AI growth are much more than job displacement. There are concerns of privacy, security and ethical implications of AI decisions. There might be unintended negative consequences if AI system is not designed and managed responsibly. Ensuring that AI benefits humanity and does not lead to catastrophic devastation/ consequences, we need a global treaty and international cooperation to establish ethical principles guidelines, AI governance rules for AI development and to harness infinite potential of AI while safeguarding global human future.

### **III. National Labour Exchanges and Building Human Capital**

The National Labour Exchange (NLXs) proposed at various global forums between 2014-2017 by Agarwal, Agarwal, Agarwal and Agarwal (2017) is a centralized platform that gives access to job seekers and provider to offer services and employ people. The system provides access to information on the jobs and applicants verified through national identity cards like Aadhar for the for the markets to clear at the wages provided at the market clearing wages. The employment can be physical or online, onboard or off-site or work from home. The financial integration of the systems provide the transfer of funds from one entity registered to another entity. The entities can be individuals, organizations or groups or any legally identifiable identity. The jobs of knowledge dissemination are already on the online platform and further consultations can further be made through the online platforms for all jobs- medical, engineering, commerce and arts. The platform provides for the connect between the provider and seeker to meet the needs of both the industry and aspirant. It also provides assessment of the employer and employee through feedback rating that can be viewed by both the parties for future references. It also provides ratings and certification of the work undertaken and also to the ability of the person to perform the work as per their education, age, experience, demographic background or any other variable considered important for the job in question. Similarly, it outlines the job descriptions and job providers ability to provide jobs at market acceptable terms. The transparency, accountability and accreditation by market forces can help improve the market reach perfectly competitive market structures in factor markets where the demand is a derived demand. The opportunity to seek multiple jobs, switching job, seeking job can be priced as the per ability and the experience of the job seeker and reduces the physical inconvenience to a click of the button option. Many platforms like Uber, Ola, Zomato, swiggy, urban company and other provide such facilities in the different segments of operations. NLX tries to achieve Pareto optimality between job seekers and job providers. By

connecting working force with employment opportunities, NLX increase both demand for and supply of skilled labour. NLX acts as central platform for job seekers and employers. Recruitment process becomes faster with NLX by reducing time, energy and streamlining the whole process of placement. This matching process enables entrepreneurs to access the talent they need, boost productivity, creativity and innovation, foster economic development. NLX ensures that workforce adapt and become competitive in a rapidly changing economic landscape, ultimately benefitting both people and the economy as a whole. By collecting and analyzing data on labour force trends, skill gaps, technology trends, etc, human capital development policies can be modified accordingly.

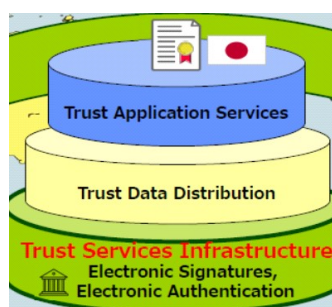
The data space created through National Labour Exchange can be used to mitigate the problem of unemployment and skill development as the universities and their graduates can log into the platform as and when they graduate or seek possible job opportunities. The ability of the artificial intelligence to select the right job, opportunity and also the talent may be an essential element in bringing the optimal results to the search. The role of the artificial intelligence in matching the job features with the job talents shall be provides at city specific levels, state specific levels, national, regional or international levels depending on the mobility specification of the job seeker and job requirements. The financial market for transfer of funds is integrated at the present levels to meet the requisite requirement of transfers across India and from international transfers. The verification of the job seeker and job provider and detection of unusual activity in any manner can further secure the system from cyber frauds or other security hazards. Job descriptions based on the industry, gender specification, skill specification and other safety and remuneration specification classifications can be used to for further segmentations. Similarly segmentations can be created for the job seekers.

Artificial Intelligence (AI) is nothing without data for which it is essential to have continuous porous interaction between data engineering, datasharing and artificial intelligence. The data collection and data generation with respect to the context, sensor data, master data and transaction data need to be sourced from the external and internal data ecosystem. It needs to be stored and pre processed with persistence, data cataloging, quality assurance and cleaning. The data sharing and data curation needs data spaces with shared digital twins, data usage contracts and semantics interoperability. The foundation of the model for National Labour exchange needs to develop the model and train and fine tune it with the data available, engineering and cognitively recognized to create a data value in the ecosystem that generates leads for both the seekers and providers of jobs. Machine learning and large language models shall be used to for data usage for AI. Data driven intelligence in the models of data value for AI would then create agents that help improve the model or retrain it to the needs of the market system.

Trust is an essential element of every relationship. It has the ability to create value from processes, products, services and relationships. The value is well placed in the financial system where we trust the governments and central banks. The entire financial system is based on trust which creates financial value for all. Similarly all function of the organisation whether

marketing, finance, production, human resources are all based on the ability of the trust they generate with the stakeholders through their processes and the reflective learning people gain through their interactions. Trust can be built and can pay rich dividend in the form of higher sales, higher salaries, commitments of employees, partners, children, goodwill and others. One is willing to place a value financially to trust in terms of the premium one pays for the next best alternative. The study in a methodological method builds on Trust and its financial value well recognised but not acknowledged in the literature and teachings of life and management. The study explores how Trust can be build and changes over time. It also explores the mathematical experiments in defining trusts and provides for the means for valuation (Agarwal, Agarwal, Agarwal and Agarwal, 2023).

The National labour exchange (NLXs) to be created needs Data spaces' transformative potential for generative AI which will be based on four key pillars namely data sharing infrastructure; Business ecosystem; regulatory ecosystem; investments and milestones (see Figure 2). The data sharing infrastructure needs to develop Trust based hierarchies that share information through that is authentic, distributable and can be application based for the seeker (Agarwal, Agarwal, Agarwal and Agarwal, 2023; Satoru, 2025).

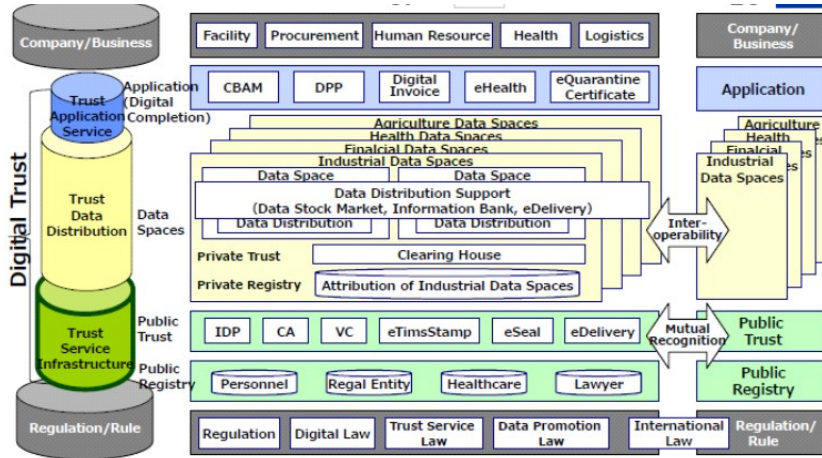


Source: Satoru (2025)

**Figure 2**  
**Achieving Trust in Global Data Economy**

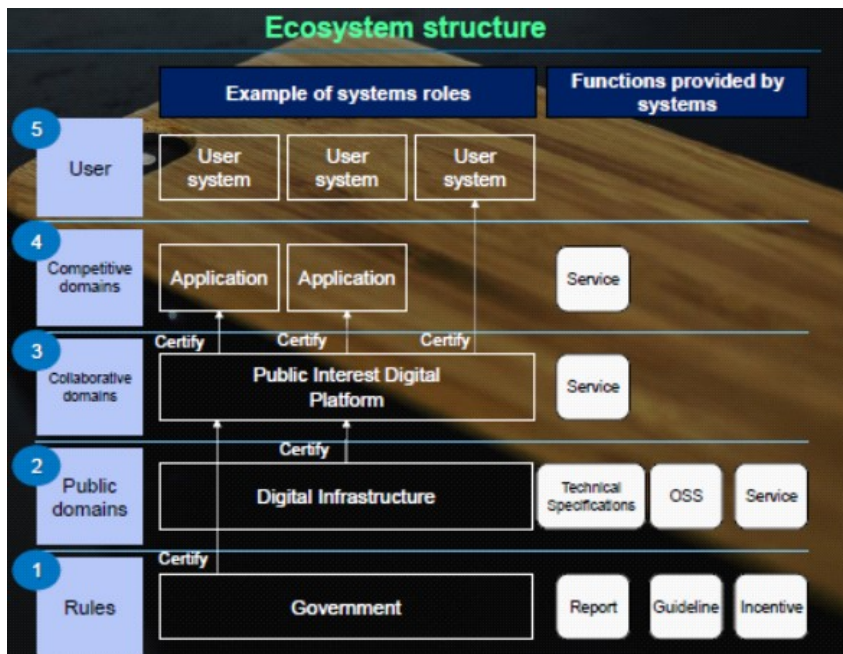
The Business Ecosystem needs to be defined and maintained as per the need of the market (See Figure 3). It needs to provide for the integration of all the industries with foundation of regulations, digital laws, trust service laws, data promotion law, International laws. The public registry and public trust is essential with all other digital infrastructure to support the authentication and use of data with AI.

The regulator ecosystem must provision for sufficient security, safety and market innovation that meet international standards through the framework that supervise and impose penalties on deviation from international standards and provision for any internal growth and development of opportunities within the system (see Figure 4). The regulator framework needs to provide for the reporting norms, guidelines for operations and also incentives for the development. The framework can be integrated with other regulatory system meeting regulatory requirements on employment or servicing taxes, also digital transfers and record keeping of overall activity of the economic developments (Mertens, 2025).



Source: Tezuka (2025)

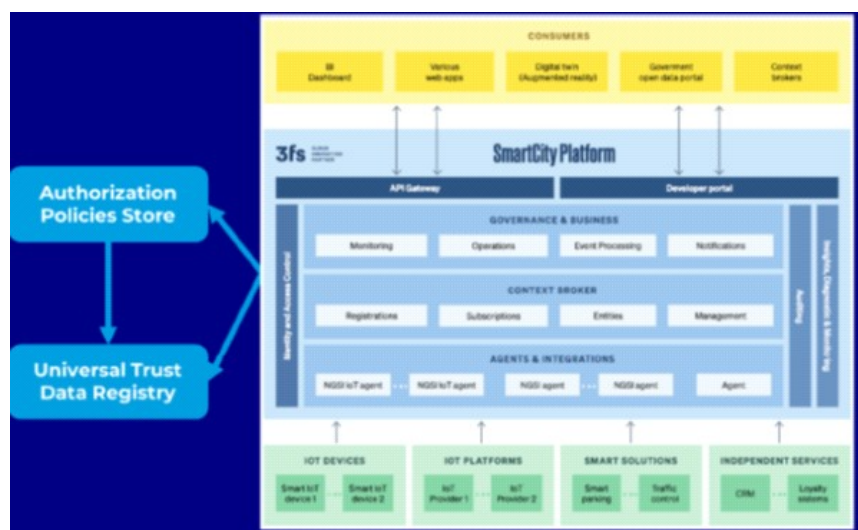
**Figure 3**  
Digital Trust Data Space in Business Ecosystem



Source: Mertens (2025)

**Figure 4**  
Provision for Regulatory Ecosystem

The fourth pillar is investment and milestones which needs to be provided with the development of smart city platforms (see Figure 5) that accommodate for the National Labour Exchange (Agarwal, Agarwal, Agarwal and Agarwal, 2023; Mesazaro, 2025).



Source: Mesazaro (2025)

**Figure 5**  
**Trust, Investment and Milestones in Smart City Platforms**

Overall the economy gains with the AI intervention in the labour market with the development of Universal Trust Registry at various nodes of operations and smart city infrastructure that support business ecosystem to distribute, disseminate and collect the requisite information on the labour markets in the different states, integrating them into one large market segment for distribution of labour hours as per the needs and assessment of the labour markets for the demand and supply of labour in the market. This would also create labour market clearing norms with perfect information.

#### IV. Theories on Labor and Employment : Review & Synthesis

##### 4.1 Classical Theory and Labour Markets

Adam Smith's seminal work "*Wealth of Nation 1770*" can be considered to be the classical economics. Although it was Karl Marx originally coined the term "*Classical Economics*" ranging for the period 1830-1875 referring to David Ricardo's economics with a major bearing from Adam Smith's and Petty's work. While suggesting a framework for efficient labour market we cannot ignore the reference to the classical economics, which gave new twist to labour market during a period when industrial revolution was leading to vast changes in Western Europe. It was also a period when capitalism was emerging and replacing feudalism and imperialism in which slavery and exploitation of labor was quite prevalent.

In connection of labour and labour markets, classical economics recognized that the income produced by various factors of production i.e. land, labour and capital is the national income instead of King's income.

Classical economics also recognized that total wealth increases when two parties freely agree to exchange things of value because there is profit in exchange for both parties. In the context of labor markets, employer and employee would be involved in exchange. However, for classical economists, market is not the best way to serve the common good. The observations of classical economist that markets generally regulate themselves holds good in case of efficient labour markets.

We believe and support the assertion of classical economist that market function with minimal government interference. This holds true in case of labor market through policies of reservation, minimum wages, pay commission determining wages and salaries and labour related regulations as against the Keynesian theory of government interference which emerged during great depression, when firms were failing and labor were being laid off.

In our opinion the Classical economist's theory of value or price is relevant in terms of labour market. Petty's assertion that there is a par between land and labour assigns importance to the contribution of labour to wealth and national income. While Adam Smith's assertion that national prices distinct from market prices were sum of natural rates of wages, profits (including interest on capital and wages of superintendence) and rent, recognizes the contribution of labour in generating wealth. Despite the fact that Adam Smith described rent as price determining factor, David Ricardo disputed Adam Smith's assertion and stated that labour theory of value was a price determining factor than rent. In the present context Ricardo's assertion is better approximation. In our opinion Ricardo's view is more relevant in the context of efficient labour market and our proposed model for generating full employment, maximizing wealth, (both individual and national) and social welfare.

The proposed model would induce competition both among employers and labour to maximize the productivity, wealth, GDP and social welfare. Adam Smith's fears about the dangers of monopoly in labor market would be automatically taken care off.

#### 4.2 Neo Classical Theory & Labour Market

Alfred Marshall and other Neo Classical economists believed that there is one theory of Value and distribution. In connection with labour and labour market, Neoclassical Theory states that labor makes a conscious consumer choice between work and leisure while estimating the consumption of goods on the Y-axis and leisure-work tradeoff on the X-Axis. Labor supply curve is well known to be backward bending. The trade off between consumption and leisure can be shown using a utility curve which is  $U(C, L)$  where, C is the consumption of goods and L is consumption of leisure. Let L be amount of time he spends on working out of  $L_0$  as the total time. He is with leisure hours  $h=L_0-L$ . Let  $\bar{U}$  be the indifference curve with set of pairs of (C, L) which give the same utility level. If the real hourly wage is w, the income from wages. Budget constraint is given by  $C \leq wh + R$  where, R expressed in real terms, is the set of resources like Investment Income, transfer income and even gain from undeclared or illegal activities. A wage is demand of an individual for hours of work he substitutes for leisure. Wage is not the sole determinant of supply of labor but factors like personal wealth, income derived from other sources, spouse income, education level and household

production<sup>1</sup> play an important role. Tradeoffs are more complex than a simple allocation problem between work and leisure. The decision of the consumer is expressed as

$$\underset{[C,L]}{\text{Max}} U(C,L)$$

Subject to

$$\begin{aligned} C + wL &\leq R_0 \\ 0 < L < L_0 \\ C > 0 \end{aligned}$$

Given that the agent is disposed of the potential income  $R_0$  obtained by dedicating the entire endowment of time to working and that he or she buys leisure and consumer goods from the income he derives.

For Interior solutions with strictly positive labor supply curve  $\mu \geq 0$  to denote Lagrange multiplier associated with budget constraint

$$l(C, L, \mu) = U(C, L) + \mu(R_0 - C - wL)$$

With partial derivative to the upper and lower bounds of utility given as  $U_L$   $U_U$   $U$  respectively.

First order condition is met when

$$U_c(C, L) - \mu = 0$$

$$U_L(C, L) - \mu w = 0$$

Complementary Slackness condition is given by

$$\mu(R_0 - C - wL) = 0, \mu \geq 0$$

Utility function increases with each of its components and budget constraint is binding such that the first order condition is

$$\mu = U_c(C, L) > 0$$

With budget line

$$C + wL = R_0$$

Optimal solution is  $C^*$  and  $L^*$  given as

$$\frac{U_L(C^*, L^*)}{U_c(C^*, L^*)} = w$$

$$C^* + wL = R_0$$

The basic model suggests that as labor supply increases when wage is low and subsequently diminishes as it becomes extremely high. With the concept of utility and consumer choice between two products work and

leisure, one based on the utilities of the commodities can derive indifference curve. The convexity of the indifference curve would give the marginal rate of substitution  $\frac{U_L}{U_c}$  between work and leisure which would decrease as one moves to the south-east direction of the indifference curve.

Since the marginal rate of substitution also represents the slope of the tangent to an indifference curve, an agent offers strictly positive quantity of hour of work if and only if the following condition is satisfied that is

$$\frac{U_L}{U_c} < w$$

The labor would supply work hours only if the wage rate is higher than the reservation wage<sup>2</sup>. The reservation wage would be defined as

$$W_R = \frac{U_L(R, L_0)}{U_c(R, L_0)}$$

With respect to the reservation wage, the labor supply is strictly positive if and only if the leisure considered as a normal good. Increase in non-wage incomes or other resource endowments increases the reservation wage.

The labor supply curve is a combination of substitution effect and income effect. Hicksian elasticity which is also compensated elasticity suggests that income of a labor varies for him to stay on the same indifference curve. Demand for Leisure  $L^*$  is function of wage and potential income given as

$$L^* = \Lambda(w, R_0)$$

The corresponding labor supply is  $h^* = L_0 - L^*$  called the Marshallian or uncompensated labour supply curve. Partial derivative would give the effect of the non-wage income on the leisure demand and can be given as

$$L^* = \Lambda_2(w, R_0)$$

The impact of variation in wages is by differentiating function with respect to  $w$  such that

$$R_0 = wL_0 + R$$

$$\frac{\partial L^*}{\partial w} = \Lambda_1 + \Lambda_2 \frac{\partial R_0}{\partial w}$$

With

$$\frac{\partial R_0}{\partial w} = L_0 > 0$$

where,  $\Lambda_1$  is the usual compound substitution and income effects in the theory of consumer which is partial derivative of function  $\Lambda$  with respect to wages.

Marshallian Elasticity or Non-compensated elasticity takes the real variation in the income resulting from the variation in wages. Hicksian Supply of labor arrived at by minimizing the consumer expenditure and it is given by

$$\underset{[L,C]}{\text{Min}} C + wL$$

Subject to

$$U(C, L) > \bar{U}$$

where,  $\bar{U}$  is the exogenous minimal level of Utility.

Hicksian Elasticity of labor supply is given by

$$\eta_w^h = \left( \frac{w}{h} \right) \left( \frac{\partial h}{\partial w} \right)$$

Hicksian elasticity is called compensated elasticity. Marshallian and Hicksian elasticities are linked by Slutsky equation as:

$$\eta_w^{h*} = \eta_w^h + \frac{wh}{R_o} \eta_w^{h*}$$

The part after the addition in the equation represents the global income effect and is positive if the leisure is a normal good.

Substitution effect dominates over income effect above the reservation wage and income effect dominates over the substitution effect after the global effects swells to reach a certain level.

Stiglitz (2001) also found much relevance to efficiency wages<sup>3</sup> which lead to unemployment<sup>4</sup> in equilibrium too. On the labor supply curve one needs to further estimate the impact of overtime remunerations, progressive income taxes, fixed cost to jobs and flexible versus fixed working hours. Further, family has considerable role to play in participation of a labour force. Unitary Models and Collective Approach takes into account this consideration and its utility functions with enlarged constraints that impact the decision making ability of individuals or a particular labor group. Additionally, economists have a choice to select from static versus dynamic models of labor markets. Within the income-leisure choice framework, unemployment simply has no interpretation as a consequence of the assumptions that jobs are instantaneously available at market clearing wage rates known to the labor, Mortensen (1986).

In a dynamic model, labor one must make his or her choice over life cycle measured over different interval of time periods. The utility function then produces different consumption and leisure allocations for different time periods. To understand the utility function better they may be temporally separated and be called instantaneous utility of a given period. The equality between marginal rate of substitution and current wages is maintainable in all time periods. This wage would be cumulatively creating marginal utility

of wealth. Elasticity is then called intertemporal substitution elasticity. Marginal utility of wealth is a stochastic process where the multipliers of wealth utility depend solely on the interest rates.

Aggregate Employment in any economy fluctuates a great deal with business and economic cycles. Real business cycle theory proposes the intertemporal substitution of leisure as the principal cause for fluctuations in the employment levels in an economy. Shocks in an economy of technology, allocation and distribution impact the rewards of labour and capital to which the factor markets respond in their supply curves. According to theory of real business cycles, employment is very sensitive to small changes in wages. Further, level of employment may also be influenced transitorily by movements in interest rates as increase in interest rates have an inverse movement towards consumption of goods. Employment levels in an economy are also impacted by the financial incentives given for early retirements or continued wage earners. "Yet the theories that we were taught paid little attention to poverty, said that all markets cleared - including the labor market, so unemployment must be nothing more than a phantasm, and that the profit motive ensured that there could not be economic discrimination" Stiglitz (2001).

The proposed model may take care of employment levels in a country automatically and induce building up right kind of Human Capital which is interlocked with the AI, Data and Machine Learning frameworks.

#### 4.3 *Keynesian & New Keynesian Economics and Labour Market*

Theories forming a part of Keynesian economics are based on John Maynard Keynes book 1936 - *The General Theory of Employment, Interest and Money*. Keynesian thought in the book was highly affected by the issues, challenges and problems of Great Depression (1931-36). Subsequent extensions of Keynesian theory was influenced by the happenings of World War II (1939-45), and post war expansion and changing world economic order (1945-73).

In Keynesian view aggregate demand does not necessarily equal the productive capacity of the economy. It is influenced by a number of factors and at times erratically affecting production, employment and inflation. He advocated government interference as opposed to classical and neo classical economics prescriptions. According to the Keynesian Economists the private sector decisions lead to inefficient macroeconomic outcomes and require government intervention particularly through monetary policy and fiscal policy in order to stabilise output over the business cycle particularly during recession. According to Keynesian assertion, there are situations in which a depressed economy would not quickly self-correct towards full employment and potential output.

In the Keynes theory, interaction of aggregate demand and aggregate supply determines the level of output and employment in the economy.

According to Keynes the wages that are determined are nominal and not real as negotiated between the employer while according to classical economists mass unemployment during great depression was due to high and rigid real wages. Keynes further asserted that it would be difficult to cut wages for various reasons. He also rejected the idea that cutting wages would help in recession.

Keynesian theory does not hold good in the normal situations as it fail to deliver results in seventies due to oil shock of 1973 and economic problems of 1970s. During this period many economies experienced high and rising unemployment together with high and rising inflation. In 1990s there was an advent of New Keynesian Economics. It provided modified and provided microeconomic foundations for New Keynesian theories, which dominate mainstream economics now.

The need for cutting wages nominal or real does not arise if there exist efficient labour market. Efficient labour market would also take care of problems of unemployment, underemployment in different business cycles. We hope the proposed model would prove to be worthy of ironing out some of these issues.

#### 4.4 *Econometrics of Labor Supply Curve*

Econometric empirical estimates indicate that the labor supply equation often contained as regress and hours  $h$  worked by a given individual with regressors or control variables as hourly wage, Income other than current wage and  $\theta$  as the vector dimensions of  $(n, l)$  comprising of  $n$  parameters in a double log model framework. The model frameworks commonly in use are ANOVA, ANCOVA, Logit, Probit, distributed lag model with Kyock transformations using the vector dimensions as the regressors. In a life cycle model a two stage budgeting process may be used by using a distributed lag model considering marginal utility of wealth as one of the explanatory variables.

#### 4.5 *Job Search Models*

Unemployment cannot always be a reasoned by the acts of the unions or minimum wage laws (Stiglitz 2001) there would be more to the reason for existence of natural and cyclical unemployment. Burdett (1978) work explained the job-to-job transitions and wage growth with the same employer. Pissarides (1979) search model with an employment agency, no wage variability and the separation rate is exogenous. His search models are random search and search via an employment agency favoring random search for increasing the overall matching rate. Job searches may register themselves with agencies and receive offers or may apply themselves to different jobs. Jobless workers may choose random searches. Firms, on the other hand, may use advertisement to optimize their strategy. He assumes that firms offer same wages to rule out search on the job. Fraction of unemployed, let's say  $S$  may register themselves with employment agencies such as  $S < U$  where  $U$  is the total unemployed Labour force. In a simple one open position, with total number of firms  $V$ ,  $R$  firms register themselves with employment agency. Vacancies left for random searches taken as  $A$  are given as  $A = V - R$  Jobs that are over are given at a rate  $\delta$ . Total separation are given by  $\delta(L - U)$ ,  $L$  given as the total labor force and  $U$  as the unemployed labor force. Probability that a vacancy will not be searched by any of those Unemployed workers  $S$  is given by  $(1 - 1/A)^S$ . Probability the number of vacancies will be filled  $1 - (1 - 1/A)^S$ . Total number of job matched by random searches be  $x$  and by employment agencies be  $y$ . The total number of job matched will be  $x+y$ .

Unemployment Equilibrium will be given by

$$x(S,A) + y(U,R) = \delta(L - U)$$

Probability that a job seeker would receive job from Employment agency is given by  $q = y / U$

Probability that a job seeker would receive a job by random search is given by  $p = x / S$

$$\Omega^U = b + \frac{q}{1+r}W + \frac{1-q}{1-r}\Omega^U - q.h$$

$$W = w + \frac{\delta}{1+r}\Omega^W + \frac{1-\delta}{1-r}W$$

where, Registered Job seeker receive benefits  $b$ ; Random search costs is  $c$ ; Agency charges for job searches is  $h$ ; Return per vacancy be given by  $w$ ; Lifetime returns of the employee be  $W$  which would be function of  $\Omega^u$ ; Return of unemployed working not in the Random searches is given by  $\Omega^u$

Unemployed engaged in random search would then be

$$\Omega^W = -c + \frac{p}{1+r}(W - \Omega^U)$$

By substituting the  $W$  and  $\Omega^U$  we get

$$\Omega^W = \frac{p}{r + \delta + q}(w - b + q.h) - c$$

Let  $\pi$  be profit per employee for a firm,  $\rho$  be the cost of capital for each vacancy,  $\alpha$  be the advertising cost per vacancy. Profit of a filled vacancy would be  $\pi - w - \rho$  per period. Let  $\Pi$  returns from a filled position for a firm. Let  $\Omega^A$  returns from a vacancy not registered with employment agency

$$\Omega^A = -\alpha - \rho + \frac{a}{1+R}\Pi + \frac{1-a}{1+r}\Omega^A$$

$$\Pi = \pi - w - \rho + \frac{\delta}{1+r}\Omega^A + \frac{1-\delta}{1+r}\Pi$$

Returns from registered vacancies be given as  $\Omega^R$ ,  $\Omega^R$  is the return before registration,  $v$  is the agency charges for a successful match

$$\Omega^R = -\rho - \frac{g}{1+r}\Pi + \frac{1-g}{1+r}\Omega^R - gv$$

$$\Pi = \pi - w - \rho + \frac{\delta}{1+r}\Omega^R + \frac{1-\delta}{1+r}\Pi$$

$$\Omega^A = \Omega^R + c$$

At equilibrium both methods are useful  $\Omega^A = \Omega^R = 0$ . Market equilibrium would satisfy simultaneously satisfaction of

$$\begin{cases} \Omega^W = 0 \\ \Omega^A = 0 \\ \Omega^R = 0 \\ -x(S, A) - y(U, R) - \delta U + \delta L = 0 \end{cases}$$

where, net marginal returns from random search are zero, then two mean that the returns from opening up more vacancies are zero and the unemployment pool is constant over time.

Hall (1979) provides for direct interaction between the factor and the firm. He estimates the equilibrium unemployment rate using the notion of unemployment and employment durations. Efficient durations using the human resource concept are defined as the cost of recruitment and training for firms and for the labour as the cost of finding a job. With  $V$  firms offering jobs to  $S$  job seekers such that the probability of finding a job is  $1/S$ . The probability that the agent would receive no job is given by

$$1 - f = (1 - 1/S)^V = [(1 - 1/S)^{-s}]^{-V/S}$$

where,  $f$  is the finding rate of a job  $S \rightarrow \infty$ ,  $(1 - 1/S)^{-s} \rightarrow e$  and hence the job finding rate would be

$$f = 1 - e^{-V/S}$$

$$\rho = V / (f \cdot S)$$

$$V/S = -\ln(1 - f)$$

where,  $\rho$  is the number of vacancies needed to be opened for one job opening.

$$\rho(f) = -\ln(1 - f) / f$$

$$S = (1 - f)S + s \cdot E$$

where,  $s$  is separation rate and  $E$  is number of employed workers.

Unemployment rate ( $U$ ) would then be given as

$$U = \frac{(1 - f)S}{E + (1 - f)S} = \frac{s}{s + f / (1 - f)}$$

when,  $\lambda(s)$  probability that job is filled as a function of separation rate then expected cost is given by  $w \lambda(s)$ . Unconditional probability that the job is vacant is  $s$ . Conditional probability given by  $s \lambda(s)$  flow of offers would be given by  $\rho(f) \cdot s \cdot \lambda(s)$ . If  $\mu$  is the cost of an offer to the firm then it would be minimized as follows

$$C(w, s, f) = w \cdot \lambda(s) \cdot (r \cdot s \cdot \rho(f) + 1)$$

Effective income would be given as where  $u$  is the expected time the agents or worker expect to unemployed.

$$y = (1 - u) w \frac{f}{(1 - f)s + f}$$

$$s = f = \arg \min \left\{ \left( 1 + s \frac{1 - f}{1 - f} \right) y \cdot \lambda(s) \cdot (\mu \cdot s \cdot \rho(f) + 1) \right\}$$

Burda and Profit (1996) consider define their search activity with respect where and how many jobs to apply for. They identify the cost dimension to the job search process based on the cost for appearing for an interview. Each spatial unit has an agency. Random searches are possible. Cost of interview is  $c$  once the candidate is shortlisted. Let  $i$  be the region of origin and  $j$  be the region where the applicant has applied and  $i \neq j$  then interview cost is increased by  $a$  such that total cost of interview is  $c+a$ .  $f$  denoting the job finding probability,  $m$  the search intensity,  $r$  the interest rate then objective function of a job search in region  $j$  is given by

$$\max_{mj} [1 - (1 - f_j)^{mj}] w / r - m_j (c + a \cdot D_{ij})$$

where,  $D_{ij}$  is the distance between the two locations. Optimal search intensity is observed by the author to be increasing given the wage and decreasing in discount rate and cost of applying job assuming that the expected income in unemployment is zero and is given by

$$mj = \begin{cases} f_j^{-1} \ln(f_j (w/r) / (c+a) D_{ij}) & f_j (w/r) / (c+a) D_{ij} \geq 1 \\ 0 & \text{otherwise} \end{cases}$$

Burda and Profit (1996) and Ommeren and Straten (2005) provide for distance from the work place as an important explanatory variable for job search. Franz (2006) gave the Single wage offer model in discrete time which found optimally, the present value of acceptable wage offers must be equal the present value of the returns to search. Also, reservation wage decreases with search costs. Reservation wage increases with unemployment benefits and wages as the value of employment must exceed the value of unemployment. An unemployed person would accept a job offer or supply his services if the wage offer is more that the reservation wage which  $w = w^R$ . The probability to receive a job offer is  $q$  and vector  $z$  represents individual characteristics like age, sex, qualifications. On an assumption that the chances of getting a job are decreasing with wage offer due to high and increasing competition. The probability of a successful match is given by along with the present value of the reservation wage as follows:

$$p(z, w^R) = \int_{w^R} q(z, w) f(w) dw$$

$$\sum_{t=0}^{\infty} \frac{w^R}{(1+r)^t} = \frac{(1+r)w^R}{r}$$

Unemployment benefits as  $b$  and cost per period search as  $c$  then present value of expected wages and cost of search would be given by

$$\frac{(b-c)(1+r)}{r + p(z, w^R)} + p(z, w^R) \cdot E(w/w \geq w^R) \frac{1+r}{r(r + p(z, w^R))}$$

Optimum discounted returns to the wage would be equal to discounted reservation wage given by

$$w^R = \frac{r(b-c) + p(z, w^R) E(w/w \geq w^R)}{r + p(z, w^R)}$$

Reservation wage once affected by individual characteristics would vary as follows

$$\frac{\partial w^R}{\partial p(z, w^R)} = \frac{E(w/w \geq w^R)(r + p(z, w)) - r(b-c) - p(z, w^R) E(w/w \geq w^R)}{(r + p(z, w^R))^2}$$

$$\frac{r(R[w/w \geq w^R + c = b])}{(r + p(z, w^R))^2} > 0$$

McCall (1970) gave classical search model. He identified the loss of a job as a capital loss, and a spell of unemployment as an investment in searching for an acceptable job. Mortensen(1976) is an extension of the model presented here. The special feature of the model is that it considers multiple offers that are made to the agent for his choice of the highest bid. The model assumes perpetuity of work for the agent with no separations or quit from employment. Once a job offer is refused, the agent cannot retrieve it back. The cost of search is  $c$  per time period and  $\beta(h)$  is the discounting factor for time  $\tau$ . The distribution of wage is given as  $F(w)$  with  $n$  job offers in a given time period and  $n$  being the random variable that follows Poisson distribution given by

$$q(m, \tau) = \frac{e^{-\lambda\tau} \lambda^{\tau m}}{m!}$$

where,  $\lambda$  is the arrival rate. Continuous discounting rate is given for  $\beta(\tau) = e^{-\tau}$ . If the agent receives multiple offers he chooses the maximum then the wage function would be  $w_m = \max\{w_1, w_2, w_3, \dots, w_m\}$  which follows an extreme value distribution  $G(w_m)$ . Assuming  $F(w)$  and  $q(m, \tau)$  are time invariant the Bellman equation would be given as where  $\Omega$  denotes the value for search,  $b$  the value for leisure period,  $W(w)$  value of employment

$$\Omega = (b - c)\tau + \beta(\tau) \left[ \sum_{m=1}^{\infty} q(m, \tau) \int_0^{\infty} \max(\Omega, W(w)) g(w_m) \partial w + q(0, \tau)\Omega \right]$$

$$\Omega = (b - c)\tau + \beta(\tau) \left[ \sum_{m=1}^{\infty} q(m, \tau) \int_0^{\infty} \max(\Omega, W(w) - \Omega) g(w_m) \partial w + q(0, \tau)\Omega \right]$$

$$W(w) = w\tau + \beta(\tau)W(w) = \frac{W(w)}{1 - \beta(\tau)}$$

Probability of receiving more than one job offer in infinitely small intervals of time is zero.

$$r\Omega = (b - c) + \lambda \int_0^{\infty} \max[0, \{W(w) - \Omega\}] \partial F(w)$$

Reservation wage would be given by

$$w^R = b - c + \frac{\lambda}{r} \int_{w^R}^{\infty} (w - w^R) \partial F(w)$$

with  $\int$

$$w^R = \frac{r}{r + \lambda} (b - c) + \frac{\lambda}{r + \lambda} E(w) + \int_0^{w^R} F(w) \partial w$$

Wage distribution is characterized by the mean and variance. Shape parameters have been well defined in the literature with different distribution depending upon the nature of the distributions. Most commonly accepted forms are mean preserving spreads which means that reservation wage is increasing function of time, decreasing in cost of search and increasing in the mean wage distribution.

These models can hence be used to determine the wage at which the labour can be listed on the exchange for trade of his or her services.

**V. National Labour Exchange : Model for Full Employment (Agarwal, Agarwal, Agarwal & Agarwal, 2017)**

The existing literature takes Labour as physical or manual labor in terms of man hours or a wage earner. It does not treat labor as wealth for himself or for the Nation. Labor – a valuable resource, as wealth generates income and wealth for himself and contributes towards GDP through value addition and wealth for the nation. Labor not used in time to is lost forever and is a national resource lost. It is divisible like any other resource like land and capital or a factor (as defined in classical economics). A nation as well as an individual can ill afford such a valuable resource in a given time. Wage paid to labor is a cost exactly the interest paid use of capital, rent paid for the land, and depreciation for using an asset, cost of depletion of mines etc. Accordingly, labor is a resource and a wealth. All other resources by

themselves cannot generate wealth without the use of labor. Treating labour as a wage earner or physical or manual labor is not proper. Any theory based on this concept in our opinion is outdated, redundant and inappropriate. The labor is to be looked at in this new perspective i.e. as resource or wealth exactly any other resources including as securities. There is need to use this resource through a mechanism whereby this wealth can be effectively utilized through capacity building through human resource. This can be done by having National Labor Exchange along the lines of National Stock Exchange of India, Bombay Stock Exchange or Commodity Exchanges Worldwide where information about the jobs available and jobs offered are traded freely to utilize the available human resource. It will give boost the market driven economic system in the labor market. To the best of our knowledge there is no such labor exchange in any country of the world.

For such a National Labor Exchange, information about the resource available in a country or world economy is pertinent. As rightly pointed out by Stigler (1961) Information is valuable resource and knowledge is power. It is critical to build Human Capital tuned to AI, Data and ML structures within the work forces, as has been clearly reflected in the works of Nobel Prize Winners since 2015.

Many of the major political debates over the past two decades have centered around one key issue: the efficiency of the market economy, and the appropriate relationship between the market and the government, Stigler (2001). Stigler (2001) further in noble prize winning lecture said that the Pareto Optimal states are not a reality and we do not live in a world of Pareto Optimal best possible efficient frontiers. These states belie us for the want of information efficiency. Imperfection of Information, absence of markets and dysfunctional institutions were a reality. Recession and Depression with massive unemployment echoed the market failures<sup>5</sup> which Adam Smith (1776) invisible hand could not correct in all market including goods, labor and capital markets. Stiglitz (2001) reiterated that market imperfections caused by information asymmetries magnified economic shocks and made them persistent. Pooling information and reducing the information asymmetries could lead to correcting some part of market failure that leads to allocation or distributional distortions.

Labor market in economic theories implicitly assumes perfect information and labor as wage earner or physical or manual labor. It believes that each individual knows everything about all the existing job offers and he or she is just choose the number of man hours he or she would like to contribute to earn a desired wage which is offered as per segmented market determined wage rates<sup>6</sup> which are universally known and accepted. Firms also do not know the productivity level of potential employees but may be better informed about their market conditions than the labor<sup>7</sup>. The chief cost for firms is time and money spent by them in developing and retaining the requisite human resource. Unfortunately this assumption of perfect information is not true in the real world. The only means to achieving some symmetry is signaling by workers and screening by employers. The real world is full of contradictions, segmentation and paradigms of changes over time and space. Information between the labor and firms is not symmetrically distributed. Information asymmetries create inefficiencies in market for exchange.

Imperfections arise because buyers and sellers do not have perfect knowledge. The forces of demand and supply tend to be distorted by creation of convex or concave elasticity of the two forces namely demand and supply. Interactions are dependent on the so formed demand and supply curves. Such demand and supply curves are dependent on the information on the quantity and prices, in case of labor markets, labor hours and wage rates. What, How and For Whom is the labor as a resource, supplied or demand is a continuous question answered in an asymmetric information constrain that continues to exist and distort supply and demand labor curves in all world markets which lead to market failure in the system. With the growing rate of unemployment and specialization of the labor markets, it becomes important for international agencies and governments to take a step to reduce the asymmetries in information exchange of the labor with the firms

The asymmetrical distribution of information that leads to knowledge creation creates inefficient frontiers that interact with each other to provide unstable equilibriums (small amount of information imperfection could have a profound effect on the nature of the equilibrium, Stiglitz, 2001). The effects tend to magnify themselves with subsequent equilibriums drawing from the past experiences or past perceived supply or demand curves. Creating inefficiencies in exchange and affecting most the vulnerable groups of the society as information and knowledge creation is transmitted and absorbed in the value chains by them at fading end tails of the distribution.

Inefficiencies in exchange would further spoil the allocation and distributional efficiencies in the market. The basic premise of exchange is based on the free play of demand and supply forces under perfect information symmetries. Information became a commodity with the introduction of information technology that transcended barriers of boundaries and regulations with online platform fast changing the landscape of exchange. However this exchange could not be reached to the labor market which continues to grapple with serious problems, associated with world market suffering from recessions, adverse labor market condition and growing poverty among vulnerable groups. Governments and international agencies have been cooperating to develop social protection frameworks that transform jobs, labor markets and economic systems into frameworks that can eradicate poverty and create new meaning to shared prosperity. Information Communication Technology has reduced the real time gaps in information which introduced allocation and distribution efficiencies and effectiveness in many markets. Labor is not a commodity, It is a resource i.e. wealth of a nation. The focus of all governments is to generate employment rather than effective use of national resource - labour i.e. wealth. Labor deserves to be positioned in the market for exchange with least information inefficiencies that result in allocation and distributional inefficiencies not only in factor markets but also in the product markets.

Economic organizations take on a new meaning when they are considered from the point of view of information Stigler (1961). He further argued that prices change in varying frequency and unless markets are centralized no one will know all the prices which various sellers (or buyers) quote at a given time. Information is costly to obtain and returns in the future are uncertain, in the labor market, Stigler (1962). Information affects decision making in every

context – not just inside firms and households, Stiglitz (2001). It is this information that needs to be freely accessible to the household and firms. Accessibility of this information would play an important role in reducing poverty and enabling several old models of economics that do not hold good to approximate their goodness with this near perfect information transmittal system. As reiterated by Stigler (1961) who while recognizing the importance of information, argued that once the real costs of information were taken into account, even with imperfect information, the standard results of economics would still hold. He further argued that with economies of scale, competition among firms would eliminate the profitability of quoting very high selling prices and low buying prices and will render impossible some of the extreme price bids which in context of wage inequalities can easily draw its parallel when a centralized market system like National Labor Exchange which, as, proposed to be developed would register and take record of the entire labor force of an economy. It would result in greater efficiency in all respects like in the capital markets and financial markets. Greater the reduction in the average cost with volume, the smaller will be dispersion of wages. Search<sup>8</sup> would be simpler and repetitive searches would not command premium but unique searches would command premiums. This would optimize the search process for both the buyers and sellers. Identification of buyers and sellers would reduce the cost of search. In case of markets for part time workers there would an opportunity for price discrimination in individual contracts. Expected savings of search the National Labor Exchange would create would be the present value of all expected savings of the buyers and sellers. Specialization in labor and differentials in wages<sup>9</sup> would add to the search costs for firms and labor. A new firm or labor would not be exploited by the market as the norms would be transparent and accountable. Some known benefits of this centralized labor market at the national level which would also highlight the dispersion in the wages would be (a) Larger the expenditure on labor greater would be the saving from the search and better the quality of search (b) Greater the number of repetitive demands for a specified labor the more effective would be the search with labor contract being more standardized with standardized pays with more effective search results (c) Greater the number of similar labor offerings the more similar the wage demands leading to lesser dispersions in standardized wage rates (d) the saving on cost of search would be smaller, greater the integration of the geographically diversified and differently specialized labor markets. The effects of pooled information and comparison would lead to higher utility indifference curves for both the firms and labor and would reduce the cost of search. The distribution of demand and supply would be self evident and it would be possible to empirically estimate the same. Correlations between several factors like gender, race, educational qualification, wealth, experience, marital status and network effects could be easily estimated by determining the correlations between successive wage rates<sup>10</sup> within a group of similar and dissimilar labor class. Policy guidelines for discriminating between relevant knowledge and skill to one that become obsolete leading to structural unemployment's could be signaled through the demand of the firms and innovation driven demands in the labor market. Monopoly created in the collection and dissemination of information would benefit the overall economy by streaming informal segments of the society into formal economic segments and introducing the economic systems and its development to unorganized sector.

Governments need to step in to develop National Labor Exchanges along the lines of the National Stock Exchange that would digitalize the records of labor at a micro unit like a district and link it with a social security number like the Aadhar Card in India or Social Security Number in US which can further be linked with income tax numbers like the PAN Card in India and other national identities like the Election card and mobile numbers. Presently in India the Income Tax Returns are linked with national identities like the Aadhar Card, Mobile numbers, Emails and Bank Information for digital transfers. The Exchange would digitalize the records of the labor to estimate the supply of the different specialized labor in different parts of the country on one exchange. It would create one NATIONAL market for labor exchange, uniting the country and its countrymen to one Common Working Platform removing the discrimination of regional imbalances, labor immobility and information asymmetries that create distortion in the demand or supply of labor.

The organization structure of the National Labor Exchange can be along the lines of National Stock Exchange / Bombay Stock Exchange / Commodity Exchanges Worldwide with some modifications. This structure could have representatives from Trade Unions, from industry or industry chambers or associations, government and NGOs.

The Exchange may require to filter of the information for the Domestic and international firms, domestic and international government, International agencies and financial institutions on the labor available with simplest filters of skilled, semi skilled and unskilled labour class. With further classifications based on age, gender, experience, race, caste, education, financial status and wage requirement. The registration of person or persons would be free of charge with a fee charged from a gainful employment for any employment advertised on the exchange. The pricing of the hours of labour services can also be done via Goal Program Model Approach (Agarwal, 1969, 1988). The exchange can also earn from the advertisement that the firms would like to release to seek the required labor force. The government sector which suffers from lack of transparency in recruitment at various levels can introduce their employment vacancies on the exchange which would permit greater penetration to the markets. Transparency, Accountability and efficiency can be reached to the people by giving them access to the Information Communication technology that would introduce exchange of their labor services either as an OTCEI exchange or an exchange like the National Stock Exchange. Legal Consultation on creation of employee contracts or disputes of layoffs would also be dealt by a special legal cell of the exchanges. The Legal cell would also advice employees on whether a labor contract is exploitative or not and what would be quantitative and qualitative implications of such contracts. A fee or charge may also be taken by the exchange for providing such legal advice.

Any discord in the labor matter would be resolved in the exchange via arbitration request from the firms or at the behest of an employee which can be further addressed by the courts of the land. This would reduce the cost of strikes or other discords that prove to be expensive for either the firm or the employees. The exchange would also enable labor reforms that are much needed to provide the requisite impetus to the manufacturing and other sectors in the economy. The exchange would reduce the search costs, add convenience and confidence to the markets. The exchange can find

penetration with the Jan Dhan<sup>11</sup>, AADHAR and Mobile (JAM) trinity that the present government has initiated to reach to more and more people. The introduction of the new contract class of labour in the agriculture sector with contract farming would also find gainful employment once they are registered with the exchange.

Social Protection Scheme and introduction of any transfer payment can also be easily identified and introduced through this exchange, whether it is distribution of unemployment allowance, or minimum job offer like in MGNREGA<sup>12</sup> or the cash subsidy transfers to the vulnerable groups would also be permitted using the exchange.

Foreign Direct Investment in need of requisite labour would be well informed about the availability of labor, its nature, quality and wage distribution before they plunge into taking the decision to invest in any region or part of the country. Malpractices of lower wages than the minimum wage rate or the corruption in distribution of wages either at the private and public level would also be rectified if the labor employment records are linked to bank record and the exchange ensures that the employers pay their dues to the labor. The exchange would also play a key role in preventing child labor as the excesses would match the deficits. Gainful employment can then be linked to loan grants for health care, education and skill development for weak and vulnerable. Labour Markets aide the primary source of income security for the present and future of an individual needs, the exchange would play a major role in smoothing incomes and matching them to aggregate demands creating a structural paradigm change in the exchange in labor markets empowering them to take advantage of economic opportunities. Social protection Schemes tend to support men and women by stabilizing their incomes in the event of unemployment, employment injury, disability, sickness and maternity. They ensure that they have at least a basic level of income security but do not provide an equitable opportunity to earn with dignity. The schemes are a burden on the governments expenditure and do not ensure livelihoods in a permanent course of life. The exchange would provide for a renewed opportunity to reenter the work life in case any of the above circumstances arise.

The payment to labour should be based on return to labour on the basis of value addition, rather than as wages as is being currently done. Payment of wages is exploitative on one or the other ground. Labour is resource (wealth) as much as land or capital and deserves return to labour. The proposed work states that the wages paid to labour should be replaced by "*Return to Labour*" based on value addition. Return to Labour would be automatically directly linked to productivity. It would give dignity and enhance or reduce return.

#### **VI. Human Capital, AI and the NLXs**

The work on the automated National Labour Exchanges (NLXs) draws upon the well celebrated work of the economic, financial, social and political spheres of markets that affect labour, industry, productivity and overall development. The proposition of the automated National Labour exchange provides for a digital market space where the national and international labour and employers come and interact to hire the most suitable choices available for their jobs. A centralized yet ubiquitous system that allow

exchange of manhours and not physical men and women for work. The manhours or labour hours can be exchanged through interactions over calls, verified through aadhar or any publicly accepted ids and provision to price discoveries of the manhours with requisite evaluation from the market. The labour hours shall be equally held responsible for their actions as the employers for their feedbacks and ratings shall be publicly available. Further education qualification, certification and other work attributes can be well qualified with ratings across board through market determined systems.

There presently exist many online platforms that provide for employers and workers to meet together. They include naukri.com, linkedin, shramportal and others. Also there are aggregators of specific seller services like Amazon, Zomato, urban company and other that offer aggregation of labour services for a specific purpose. They however do not offer a unified set of service meant only for the entire employable class. They need to have a similar set up like the National Stock exchange that permits stocks to be traded nationally and internationally, this should similarly offer manhour exchanges across the board for the development of the overall economy. Even the Delhi Government tried to initiate the Rozgar Exchange and the Uttar Pradesh Government had made announcements to open NLXs for efficient market performance and reducing un-employment in their respective states. Many works in the past have also indicated that services of people are often restricted to search cost by both the employers and employees and also due to information asymmetries. The National Labour exchange provides for the eliminating the search costs and information asymmetries. Further bringing close, accountability and responsibility on the both the parties through transparency and information dissemination. A penalty to the non performers or the irresponsible stakeholder is provided in the market visibility of actions that offer incentive for good actions through market evaluations. The limitation of digital divide can be overcome through collaborative systems developed at the village and other smaller units of the economy and also coding the system with voice enablers, colour codes and understandable patterns which make the user interface acceptable for the illiterate also as technology by itself is not subservient to the literate world.

Labour is considered as a resource that self generates itself. It is traditionally offered through different means. The most traditional forms were the employment exchanges where one could register for offering one's services, advertisement in newspapers like Employment News, newspapers and digital medium have also been helpful in providing access to information of the offers that are available in the market. Most often the outcry is the limitation that many private jobs are taken informally without advertisement and the government jobs are advertised a fewer times. Many job seeker in the market do not know where to go. They are not aware what and whom to approach. A digitalized exchange with its presence in every nook and corner with community registration like RWAs, village boards or panchayats or even other super market owners can provide access to labour to the digitalized medium or exchange so proposed. The classical economist believes that supply creates its own demand and the *lassiez faire* is most efficient form of resource allocation. Reducing the limitation of information, user's interaction and also provisions for interaction of supply and demand with verifications can offer a medium of full employment in the labour

markets with wage discoveries governed by the market regulations. This does not limit the offering of the social labour market created by the government or the derived demand market created by the private sector or the one offered in partnership. It is an automatic way of generating wealth for the nation, society, communities and individuals. It also creates a Census or the survey of the total population available for employment in the market. Population Census by itself could have generated the data for the information of each and every person living in India. The survey can itself contain the working population group and their educational qualifications and work profiles to meet the need of the country. The availability of manhours is crucial to the understanding of their employment.

The resource is crucial as it has the ability to organize and utilize all the resources namely, land, labour, capital and entrepreneurship. It is able to productively outperform its outcomes by newer innovation, creativity and ability to connect with the thoughts, ideas and deliberations that transcend borders and offers progress and productivity. The biggest social protection to the labour force is ability to transcend from one job to another in same or different organizations. The network externalities offered by the exchange provide the social protection of earning without prejudice and but by work referrals and work credits which are bilateral. The credits earned by both the employee and employer can be used to credit rate their working abilities. This does not in any way diminish the possibilities of work provided protection in the form of health insurances, pensions, gratuities, allowances and perquisites associated with well being of the labour market participants. It also does not diminish the need for government protected schemes of high interest rates for specific groups, pension plans, government jobs and grievance readresal mechanism through labour courts.

Fiscal consolidations have affected the manner in which labour is employed in the generative social capital institutions like public sector undertakings, basic services and other necessitated merit goods. The egalitarian approach to distributive justice was found in many ways through the institutions developed in the many countries of socialistic ideologies. They created middle order structure irrespective of social backgrounds through the job offering the government and non government institutions. They also set the benchmark of expectation of what was good and most desired in the forms of labour remunerations which is fully build on market determined structures. The strength of the structures do outline the survival of the fittest but for all other that need help, there is a need for a lending hand which may or may not be fully sufficed by the exchange itself unless special mention to the specially needed people is made as part of the public policy and framework of this exchange so proposed. Adam Smiths assertion that national prices are distinct from market prices and were sum of the natural rates of wages, profits and rent recognize the contribution of labour in generating wealth.

Further our study also proposes the transparency and accountability in the labour markets as part of the need for social justice and order. It improves the utility of the individual, society and nation at large by improving their decision taking ability as specified in the unitary models and collective approach. Mornstand (1956) provided the income-leisure approach by

which the unemployment simply has no interpretation as a consequence of assumptions that jobs are instantaneously available at market clearing wage rates known to the labour. Unemployment cannot always be reasoned by the acts of the unions or minimum wage laws. (Stiglitz 2001) there would be more reason for existence of natural & cyclical unemployment. Burdett (1978) explained the job-to-job transitions & wage growth with same employer. Pissarides (1979) search model with an employment agency, no wage variability and the separation rate is exogenous. His search models are random search and search via an employment agency favoring random search for increasing the overall matching rate. McCall (1970) gave classical search model. He identified the loss of a job as a capital loss, and a spell of unemployment as an investment in searching for an acceptable job. The labor (man hours) is to be looked at in this new perspective i.e. as resource "Wealth" exactly like any other resources including as securities. There is need to use this resource through a mechanism whereby this wealth can be effectively utilized through capacity building through human resource. Recession and Depression with massive unemployment echoed the market failures, which Adam Smith (1776) invisible hand could not correct in all markets including goods, labor and capital markets. Stiglitz (2001) reiterated that market imperfections caused by information asymmetries magnified economic shocks and made them persistent. Pooling information and reducing the information asymmetries could lead to correcting some part of market failure that leads to allocation or distributional distortions.

## VII. Summary & Conclusion

The challenges to any market with Artificial Intelligence (AI) interventions include the heavy reliance on machines to do the matching that may be based on the data supplied. In the markets the information asymmetries and a lot of information contained from data suppliers may not give the correct information and perception which may form the basis of labour market clearing in many jobs that need skills beyond repeated actions. Human based skills is needed in all job markets and hence the role of the recruiting, training, development and assesment and monitoring continue to be a tough algorithm beyond the data collections, assesment to pre given algorithms and also on the specifics of the job requirements. Since the job provider and job supplier would know their internal weakness which can be challenged through the rating mechanism but it shall not be full proof to render desired results but yet would make the markets and participants accountable for their actions. Cyber security threats, frauds and other humanly interventions of subconsciously driving the market to desired outcomes may also influence the system. These need to be taken care and monitored when the AI algorithms are trained to develop the National Labour exchange that meets the SDGs and stakeholders needs and labour market information and manpower requirements.

The proposed work provides a General Theory of Employment, Wealth and Efficient labour market through setting up of a National Labour Exchange and their interlock with AI, Data and Machine Learning will help build a stronger and resource rich society along the lines of the Nobel Prize works of the last 7 years. The National Labour Exchange can be a vehicle of facilitating information for available jobs i.e. employment opportunities at given return to labour and availability of labour offering the services for a return based on

their value addition. The proposed work will fill the existing gap of asymmetrical information. The paper proposes setting up of a National Labour Exchange along the lines of National Stock Exchange, Bombay Stock Exchange and Commodity Exchanges Worldwide in order to promote efficiency in the labour market, full employment and generating wealth and positive contributions to GDP. The paper also considers that Labour as a valuable resource and a Wealth of the Nation, having potential to generate more wealth. The paper opposes the concept of Wages or Price of Labour as in classical economics, but supports ricardo's theory of Value and Laissez faire through efficient labour market. The paper opposes Keynesian theory outlining Government Intervention to generate Employment though Monetary Policy changes and Fiscal Policy as Keynesian theory based on the book on "The General Theory of Employment, Interest and Money" is a product of Great Depression of 1931-36 not reflecting normal economics and business conditions in the economy when business failed and labour laid off in abundance. The paper critically evaluates various theories on Labour.

The proposed work would induce competition both among employers and labour to maximize the productivity, maximizing wealth, GDP and social welfare. labour, instead being idle or underemployed would prefer to pick up a job with lower return. It would provide transparency, avoid exploitation of labour, Efficiency in labour market would help foreign investors, to know about the skill, experiences, qualifications and desired return of labour in a country. This is in turn will remove any fears regarding the availability of labour in a given industry.

The payment to labour should be based on return to labour on the basis of value addition, rather than as wages as is being currently done. Payment of wages is exploitative on one or the other ground. Labour is resource (wealth) as much as land or capital and deserves return to labour. The proposed work states that the wages paid to labour should be replaced by "Return to Labour" based on value addition. Return to Labour would be automatically directly linked to productivity. It would give dignity and enhance or reduce return.

The proposed work would create one NATIONAL market for labor exchange, uniting the country and its countrymen to one Common Working Platform removing the discrimination of regional imbalances, labor immobility and information asymmetries that create distortion in the demand or supply of labor. It would encourage labour at all levels to acquire certificates, degrees, skill and focus on maximizing productivity so as to qualify for a composite score that is high to get better return on jobs and choice of firms.

The National Exchange model hence offers Exchange where Man Hours are Traded like Scrips in Stock Exchanges; Automatic verification of Degrees, Ranking and Rating of Qualifications Obtained; Gender Neutral Framework; AI based Matching of Orders and Use of Data and Machine Learning to Connect Employers and Man-Hour Pricing. A new firm or labor (man-hours) would not be exploited by the market as the norms would be transparent and accountable. Some known benefits of this centralized labor market at the national level which would also highlight the dispersion in the wages would be (a) Larger the expenditure on labor greater would be the saving from the

search and better the quality of search using AI, Data Science & ML; (b) Greater the number of repetitive demands for a specified labor the more effective would be the search with labor contract being more standardized with standardized pays with more effective search results using AI & ML; (c) Greater the number of similar labor offerings the more similar the wage demands leading to lesser dispersions in standardized wage rates; (d) the saving on cost of search would be smaller, greater the integration of the geographically diversified and differently specialized labor markets. The effects of pooled information and comparison would lead to higher utility indifference curves for both the firms and labor (man-hours) and would reduce the cost of search using Data Sciences with advanced AI & Machine Learning.

NLXs which, as, proposed to be developed would register and take record of the entire labor force of an economy. It would result in greater efficiency in all respects like in the capital markets and financial markets. Search would be simpler and repetitive searches would not command premium but unique searches would command premiums. The effects of pooled information and comparison would lead to higher utility indifference curves for both the firms and labor and would reduce the cost of search operation. The distribution of demand and supply would be self evident and it would be possible to empirically estimate the same using Data Science. Correlations between several factors like gender, race, educational qualification, wealth, experience, marital status and network effects could be easily estimated by determining the correlations between successive wage rates within a group of similar and dissimilar labor class. The exchange can find penetration with the Jan Dhan, AADHAR (Social Security Number given by National Governments) and Mobile (JAM) trinity that the present government has initiated to reach to more and more people. The introduction of the new contract class of labour in the agriculture sector with contract farming would also find gainful employment once they are registered. Social Protection Scheme and introduction of any transfer payment can also be easily identified and introduced through this exchange, whether it is distribution of unemployment allowance, or minimum job offer like in Digital Currency (like Digital Rupee) Agarwal, Agarwal, Agarwal & Agarwal (2015, 2017, 2018, 2020, 2022; Agarwal and Pandey, 2024) will facilitate streamless e-transfers like cash movements and ease in NLXs settlements. MGNREGA (Rural Employment Scheme in India) or the cash subsidy transfers to the vulnerable groups would also be permitted using the exchange. NLXs as proposed would also help Rating Certificates, Diplomas, Degrees, skill development and experiences based on Scores and would facilitate transparency in the Efficient Labour Markets.

The proposed Model of creating efficient Labour Market through National Labour Exchange will facilitate an automatic way for Full Employment, generating wealth for the nation, firm and labour, easy access to information about the availability of labour (man hours) and jobs. It would also help save employment costs in a Market Driven Economic System with Asymmetric Information. National labour Exchange as proposed would also help Rating Certificates, Diplomas, Degrees, skill development and experiences based on Scores and would facilitate transparency in the Efficient Labour Markets. It would automatically adjust the return to labour based

on value addition and economic and business conditions avoiding the problems of laying off. Efficient Labour Market would facilitate perfect or nearly perfect mobility of labour through National Labour Exchange.

India has made enormous strides in the last 79 years of India's having regained independence. India enjoys a rich heritage, intense diverse cultural and socially rich setup. Economic growth and development in India, since 1980, has been amongst the fastest in the world; social indicators for literacy, education enrollment, disease and mortality, and gender have steadily improved; and poverty has fallen since the mid-1970s (World Bank, 2000). All this is despite having a population base of around 1.3 billion people, which had been growing at the given Hindu growth rate of 2.3% till 2010 and at 1.7% henceforth. India today stands to be THE Youngest Nation globally with over 1.45 billion people (with 60% of total population below 35 years of age and over 70% of young working population (between 15-45 yrs of age). Various international agencies have forecasted India to be amongst the top three (3) economic nations by 2015-2025 (J.D. Agarwal, 1994, 1995, 2001; CFO Survey, 2018; Arun Jaitley, 2018) with an unprecedented growth between 2020-2025 averaging 6.5% despite Covid-19 and various odd of Wars / Tarrifs and Global Uncertainty and Slowdown. Despite recent turbulances, we hope to achieve the dream vision pictured by our Honorable President (Late) Dr. APJ Abdul Kalam jee in his work "India 2020" and our Honourable Prime Minister Narendra Modi in his speeches since 2014. All this has been made possible only because of the dedicated and law abiding citizens of this Great Nation, who are the soldiers of the socio-economic growth and the vision of our leaders who are the pillars behind success of our sustained democratic progressive Bharat.

It has been widely observed and projected by numerous research studies that globalization and financial developments in the world economy have altered the economic frameworks of both developed and developing nations in ways that are difficult to comprehend. The persistent rise in the dispersion of current account balances of the world as a whole, wherein the sum of surpluses match the sum of deficits has grown substantially since the World War II (J.D. Agarwal & Aman Agarwal, 2001; J.D. Agarwal, 2004; J.D. Agarwal & Aman Agarwal, 2017). These global trends has led to creation of extensive levels of in-equalities of income, gender disparities, gender pay differences, civil disorders, un-employment and lowering standard of livings enhancing poverty and deprivation Globally. India has tried to shield itself from such disorders; however the 1% of Global population having 50% Global wealth (Nov 2017) is a clear indication of challenges that lie ahead. In India it is estimated that 57 Indian Billionaires own wealth equal to Bottom 70% of India's Population (Credit Suisse, Nov 2016). The Government today is perplexed with this challenge to serve the society and induce equitable growth through creation of Jobs & Growth. The initiatives undertaken by the government under the Making in India campaign and the 21+ programs launched and monitored by the Prime Minister Narendra Modi himself in the last 4 years to induce financial inclusion, enhance banking, spread digital dividends, control inflation & money supply through drives like demonitisation, jan-dhan yojna, interlocking AADHAR and GST are expected to yield long term fruits which would be visible and appreciated in the coming 10 years. The mass support for most of these drives is a clear

evidence of the faith and support by the people of India to foster these achieved. We have seen that countries in Asia and the Pacific, which are close to our hearth, have also not observed impressive and sustained growth which is inclusive and reduces poverty effectively without keeping up impressive rates of public and private investments in education, healthcare and infrastructure. Inclusive development and poverty reduction needs to focus on human capital development, social capital development, gender equality and development, and social protection. Human capital development would mean to create the necessary infrastructure for education, primary health care, and other essential services. Social capital development would mean facilitating participation of the poor and underprivileged in providing community based services in microfinance, health and natural resource management while reducing the leakages from the system that transfers benefits to the poor including setting up systems like AADHAR enabled databases, which is steps ahead of the Social Security Number systems adopted in USA.

India, the baby elephant, is projected to grow at 6.6 % in 2025 (IMF-World Bank) despite recessionary trends in the world economy. Successful implementation of demonetization and GST in a large economy like India is a case of learning for most economies despite Global Recession, Wars, Trade Tarrifs, Covid-19 and many other impediments. The government in the past decade has also launched schemes like the Pradhan Mantri Jan Dhan Yojana, Atal Pension Yojana, Pradhan Mantri Jyoti Bima Yojana, Pradhan Mantri Suraskha Bima Yojana, Pradhan Mantri Kaushal Vikas Yojana, Pradhan Mantri Awas Yojana, National Career Service, Pradhan Mantri Ujjwal Yojana, Pradhan Mantri Jan Aushadi Kendra, Standup India and Digital India Program that have reached the poorest of the poor and connected them with the economic growth and development story of India. Cash Subsidy transfers and AADHAR enabled social incentives has reduced leakages from the public distribution systems. With highly leveraged corporate balance sheets, growing NPA problems it has been challenging to seek growth in private sector investment. It is the need of the hour to debate the policy frameworks which would guide sustainable growth and development in emerging and developing economies like India while taking into consideration the effects on agriculture, healthcare and climate change. This will help India to unlock the demographic dividends we have possessed for centuries.

We at IIF feel that Labor is the most important resource that utilizes natural or capital resources in most productive manner to create and generate wealth for nations, companies, organizations and for themselves (see "The Theory of Employment, Wealth and Efficient Labour Markets through NLx" by J.D. Agarwal, Manju Agarwal, Aman Agarwal, Yamini Agarwal, Finance India, September 2017 Vol 31 No 3). Despite the technological revolution and advancements in the artificial intelligence, labor continues to be supreme and guides the functioning of all economic events and economic systems. Labor in itself is wealth of a nation. But it is not effectively utilized. Labor suffers from lack of employment opportunities, poverty, poor wage, income variations, immobility and many other problems. In developed economies, wages constitute about 70 % to 80 % of the pre-tax income and post transfer payments with at least one working member in each household. However in developing and emerging economies this share is less than 50% for example it is 40-50% in Argentina, 40% in Peru and 30% in Vietnam. Self

Employment is the main source of income in most of the developing and emerging economies for lack of employment opportunities, information, corruption, lack of transparency, and accountability in recruitments and lack of skills and adequate training. Despite the importance of labor in the world economy, labor market is far from perfect for lack of necessary information available.

Labor market in economics implicitly assumes perfect information. It believes that each individual knows everything about all the existing job offers and he or she is just to choose the number of hours he or she would like to contribute to earn a desired wage which is offered as per segmented market determined wages rates. The implicit assumption is erroneous and suffers from distortions. It makes the analysis of labor market to be far from reality. Besides this, there are a number of other distortions even in the most developed and efficient labor market such as : existence of gender discrimination both in terms job profile, number of hours, wages and promotions. In some countries, reservation policy based on caste both in terms offering jobs and promotions, immobility of labor, wage differentials due to nature of work or type of employer create labor market imperfections. Theories developed in the past are the foundation stone, an important base, hold due importance for any further work in this field. However, with the changes over the last century, complexity and size of labor market and innovations and information technology it has become necessary to revisit some of the works developed so far. It is imperative to develop a mechanism or policy framework to deal with some of these and other distortions in the labor markets so as to bring about near perfect situation in the labor market to help both the job seekers and job providers and reach near full employment situation and take care of some of these other distortions.

India marching into the next decade is strong, confident and having robust engines of Growth. It now with due diligence and profound structural framework to be provided by government, regulators and the leaders of India, which can convert omnipotent markets to yield growth momentum to jobs (employment), reduction in in-equalities of income, reduction in gender disparities (work/ pay) and bring Indians out of the nexus of poverty as we say in Chandragupta's period and India's historical periods as the Golden Bird. The biggest security to labour is his manhours and its credits that he encashes over his lifetime. The exchange provides him with the opportunity to use these credits at his will with information and knowledge at the core along with technology of artificial intelligence, data and machine learning to create efficient markets through enhanced Human Capital.

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