Economy and the Fourth Industrial Revolution

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Dedication

Dedicated with all the love in the world to Bernardo Antonio, my parents and brother for their unconditional support and being the fundamental pillars for every step of my life.

Maria Belén Bravo Avalos

We dedicate this research to our daughters Jinelle and Diana Paula for being the engine that drives us.

Pablo M. Ochoa Ulloa and Diana V. Duque Torres

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Introduction

The evolution from an agrarian to an industrialized economy took almost a century. The industrial revolution had started in Britain during the mid-eighteenth century, yet the American settlements trailed faraway behind the motherland to some extent due to the profusion of land and shortage of workforce shrunk expensive investments in machine production. However, the transition from hand-made to machine-made products spawned a new era of human practice that had commenced with enhanced productivity and efficiency that made the quality of living much better than had ever been known in the pre-industrial world. Further, the key to the fast-changing economy of the initial Industrial Revolution were new industrial strategies to improve efficiency. This had started with the Outwork System whereby little chunks of a bigger production process were accomplished in various individual homes.

The fourth industrial revolution portrays a world where people toggle between advanced domains and disconnected reality coupled with the application of innovation and technology to empower and govern their lives. It epitomizes a basic change in the manner we live, work, and

associate with others. It is a new era of human progression, empowered by phenomenal innovational impetuses appropriate with those of the first, second, and third industrial revolutions. These advances are blending the physical, computerized, and natural worlds in a manner that creates enormous potential and a likely threat at the same time. The speed, width, and profundity of this revolution are compelling us to reconsider how nations grow, how industries generate value, and even being human. (Xu et al., 2018)

The First Industrial Revolution originated in 1760 with the innovation of the steam engine. The steam engine endorsed the evolution of agriculture and medieval society to the new manufacturing practice. This evolution involves the utilization of coal as the primary energy source whilst trains were the major mode of transportation. Prosperous landlords had procured their lands from the village ranchers and started to cultivate in their fields by having their lands fenced. The landlords coerced small ranchers to become occupant farmers or to surrender farming and move to the cities to work in industries. Britain is the first nation where industrial related production was launched. In the late eighteenth and in

the start of the nineteenth century there were tremendous socio-economic changes in England which by and large was known as the First Industrial Revolution or humbly the Industrial Revolution (IR). The IR relocated the country businesses to towns and experts turned into wage laborers. The British colonial nations were an essential source of sugar, tobacco, and cotton. The development of textiles was at the core of the IR. (Mohajan, 2019)

The Second Industrial Revolution was instigated in 1900 with the ingenuity of the internal combustion engine. This prompted a time of swift industrialization utilizing oil and power to control large scale assembly and production. The Second Industrial Revolution was an incredible leap ahead in innovation and society. Novel technologies in the fabrication and manufacturing of steel, production of oil, and power paved way for public planes and automobiles. Historiographers have marked the years from 1870-1914 as the time of the Second Industrial Revolution. While the First Industrial Revolution influenced the growth of factories, for example, coal, iron, railways, and textiles, the Second Industrial Revolution recognized the growth of power, steel, and

petroleum. A substantial number of progressions that happened during this period had to do with new products just supplanting old ones. For example, during this time, steel started to supplant iron. Steel was being used for construction work, modern machines, railways, ships, and various other things. Production of steel made it feasible for rail lines to be constructed at economical prices, which further flourished transportation. It is difficult to envision when power was not a typical extravagance. Nevertheless, the start of the Second Industrial Revolution was simply such a period. Prior to the prologue of public power, candles and gas lights were utilized to light homes and industries. The introduction of public power drove many novelties. In 1876, Alexander Graham Bell designed the phone. Thomas Edison and Joseph Swan at last idealized the thought of the electric bulb in 1879. ("The Second Industrial Revolution: Timeline & Inventions", 2020)

The Third Industrial Revolution (TIR) began in 1960 and was categorized as product automation with the implementation of data innovation and electronics. One of the primary triggers of the TIR started in 1969 with the improvement of the Advanced Research Projects Agency Network

(ARPANET), which was an early packet exchanging network and the main network to deploy the protocol suite TCP/IP. It set off the improvement of the Internet, and with it the digital age. Like past revolutions and upheavals, the TIR is driven primarily by innovational developments in assembling, distribution, and energy mechanisms. The TIR was global, yet it is likewise local, presenting the term “glocal”. The TIR had changed the manner in which we work, produce, and engage. It fundamentally transformed the manner in which we designed and managed urban communities and districts. It likewise prompted the glocalization of manufacturing and the re-shoring of occupations. (Roberts, 2015)

The Fourth Industrial Revolution includes product designs shaped by computers and Three-Dimensional (3D) printing, which can generate solid objects by constructing progressive layers of materials. It is an opening to help everybody rather than sheer technology transformation it includes pioneers, strategist, and individuals from all income clusters and countries, to harness congregating technologies and to create a comprehensive future. It probably is going to cut obstacles among innovators and markets due to new innovations such as 3D printing for

prototyping. For instance, tissue engineers utilize fast prototyping strategies to generate 3D porous scaffolds. The 3D printing method creates frameworks with a novel miniature and macro design and this thus helps to shape the new tissue as it recovers. Growing patterns in Artificial Intelligence (AI) directs us to huge monetary interruptions in the coming years. (Liao et al., 2018). AI frameworks that clearly resolve complex snags represent a danger to the human workforce yet offers new roads to economic development. Innovative technologies will incorporate distinctive logical and technical orders. Robotics technology can and will transform us sooner rather than later. In fact, robots are mechanized devices. They cook food, play our music, record our shows, and even run our vehicles. The Internet of Things (IoT) is the Internetworking of actual gadgets. In general, the IoT is projected to offer sophisticated connectivity of gadgets, frameworks, and services that goes ahead of Machine-to-Machine (M2M) communications and covers a range of applications and domains.

During the First Industrial Revolution economic development in Britain was contributed by Textile industries. Cotton materials had grown in

England. By 1900, 40% of the entire world's cotton yield and merchandise was produced near Manchester. The textile industry of Britain adorned the world, particularly the colonized nations in fleece, cotton, and linen. The iron and steel industry had developed significantly during the IR. During this period a large part of the iron utilized in Britain was imported from Russia and Sweden. During the IR a small segment of the British economy had improved. Somewhere between 1780 and 1989, the compensation was raised. In the USA, real per capita product doubled and the Gross Domestic Product (GDP) of America grew by seven-times between 1865 and 1920, which was higher than at any other time in US history. During the IR frameworks of transportation, banking, and communications improved. The IR likewise improved the way of life of the rich however the majority of the populace was left at the bottom of the social ladder. (Nardinelli, 2020)

During the Second Revolution, the normal pay of a US metropolitan family was $738. 66% of that earning was spent on food and warming. After managing other expenses, a family could save just $44. However, there was quick financial development in the late nineteenth century. A

relatively old economy with a moderate speed of change to a new one with a rapid speed. GDP turned out to be in excess of about 1.7% per year. The US economy additionally experienced persistent and progressively fast-tracking real per capita growth of 1–2% every year for the following two centuries Industrial production, had expanded at a constant pace of about 5% every year from 1790–2014. After the Civil War, a new economy emerged in the USA based on steam-powered production. By 1929, the vast majority of Americans had power, indoor piping's, four-fifths had cars, 66% had radios, and almost 50% of the populaces had coolers and phonographs. From 1816 to 1836 America had a capital of $35 million. European nations created railroads, mines, power plants, and banks. Europe overwhelmed the world economy by the start of the twentieth century. (Haradhan, 2019)

The Third Industrial Revolution had achieved a huge expansion in re-shoring and localized production. The ramifications of TIR had significance on economic planning and development. The evolution of a concrete economy during TIR favored export-based businesses that were crucial in building a strong institution for new hybrid industries. The local

economic development was centered around new cross-bred businesses and financial activities that influenced assets and offered a virtual substitute for information, skills, and innovation by gaining these through the web and internet. Perhaps the best change that the TIR offered is the transition to a more circular economy. The circular economy is a term coined to portray an economy that is intended to reduce waste so that emissions, material streams, and nutrients were intended to reenter the biosphere securely. The circular economy is centered around the rebuilding of regular capital, and the replacement of non-renewables with sustainable resources. The TIR was a huge driver in the improvement of green city economies, particularly in the transformation from non-renewable to renewable energy use. (Ben-Ami, 2015)

The Fourth Industrial Revolution (4IR) may influence society and the economy in various ways. First, a large number of individuals around the globe are probably going to utilize online media daises to relate, learn, and convert data. A lot of inventive creators and contenders will have effortless entry to digital platforms of sales, marketing, deals, and dispersion, along these lines improving the quality and cost of products

and services. Customers will be relatively more engaged with the production and supply chains. The fundamental impacts of this revolution on the business climate are the effect it will have on buyer expectations, quality of the product, the push toward collective modernization, and developments in industrial structures. 4IR will certainly influence enterprises across economies. 4IR could enormously stimulate monetary and economic development in the future. Transportation, trade, and other market fragments could profit, and new remunerating jobs could also be generated. There are anyway potential challenges of laborers being dislocated because of automation and greater pay imbalance. During 4IR global trade has been more swift utilizing blockchains since it offers agility in executing payments than the conventional letter of credit. These innovations could ease delivery and customs handling times by 16-28%, boosting global trace by 6-11%. (Obijole, 2020)

Industrial revolutions and developments are fundamental for the modernization of agriculture. The expense of production is high and profitability is low. We need farm vehicles, harvesters, pumping sets, etc.,

to modernize agriculture. To increase efficiency, we need fertilizers, composts, pesticides, and weedicides so on and so forth. These are essentially industrial products. Without industrial developments, these merchandises can't be delivered.

Chapter I - Basic principles of economics

Economics is considered to be the science of evaluating the consumption, distribution, and production of products along with services. It emphasizes the interactions and behavior of economic agents and the way through which the economies work. Microeconomics evaluates the fundamental components within the economy, which involves individual markets and agents along with their interactions as well as the outcomes of interactions. Individual agents might involve sellers, buyers, organizations, as well as households.

Macroeconomics determines the economy as a system where investment, saving, consumption, and production interact. The factors like public policies, economic growth, currency inflation, land, capital, and employment of the resources of labor create an impact on such components. The basic principles of economics are as follows:

Individual make rational choices

It is identified as one of the basic principles of economics, which means that individuals act in their own best interest with the information

available to them. The rationality principle is the fundamental principle of economics, which states that people are rational and more modest. As per Popper's rationality principle, agents act in the most appropriate way according to the objective situation. It is also an idealized conception of human behavior used to drive a model of situational analysis.

In general, most individuals are rational; for example, individuals eat food, play nice with others and go to work, and many more. If individuals behaved irrationally, then there would be no opportunity in the world to predict their behavior. It is assumed that people are rational and make decisions based on the decision-making process. It assists in recognizing the factors that influence decision-making. The rationality principle states that people make the best decisions as per their own desire for happiness.

In addition to this, the rationality principle is based on the assumption that people adapt their actions to the situations and issues as they experience them. Popper speculates rationality as an individual attitude, which means preparedness to judge conceptions and ideas of people as critically as possible and adapt them.

The rationality principle of economics assumed that persons always make decisions that offer them the highest amount of personal utility. These rational decisions offer people the greatest satisfaction provided the choices available. Besides this, rational people often make decisions by comparing marginal benefits and margin costs. A rational decision-maker takes action when the marginal benefit of the action exceeds the marginal cost. The rationality principle indicates that individuals systematically do their best when they achieve their objectives and opportunities.

Economics principle implies that making rational choices does not mean that they make the best long-term decisions. Moreover, the rationality principle of economics assumed that individuals behave in a rational manner and consider alternatives as well as decisions within the logical arrangement of thought as opposed to the involvement of emotional, psychological, or moral components. Rational thinking allows individuals to make decisions in new situations by giving steps that assist in gathering relevant information. The rationality principle assists others

in improving their thinking capabilities and maximizes their rational thinking.

Opportunity costs

Another basic economic principle is opportunity costs, which refer to the value of the highest foregone activity. However, the opportunity cost principle is related to a scarce resource. The concept of opportunity cost plays a significant role in managerial decisions and helps in choosing the best potential alternative to solve a specific issue. Opportunity costs of a particular product are considered as the value of the inevitable substitute products that resources utilized in production and could have generated. The concept of opportunity cost is explained with an example.

Suppose a boy had two kinds of fruits – one mango and one apple and if a bad boy desired to seize fruits, then the best way for the boy is to drop one fruit and run with the other so that she can save at least one fruit at the cost of the other. When the boy drops one fruit and runs with the other, the opportunity cost of the fruit he saves is the inevitable alternate of the fruit he lost. This shows the opportunity cost principle of

economics. Opportunity cost is regarded as the major concept in economics, which represents possible benefits businesses, investors, and individuals miss out on when selecting one substitute over another.

Moreover, the concept of opportunity cost is applied in everyday life by people even though they are unable to coherent its importance. This principle of economics is beneficial in decision making, including a selection between diverse alternative courses of action. When resources are scarce, it becomes difficult to produce all the commodities. But for the production of a single commodity, people need to forego the production of another product. It means the firm is forced to make a choice as everything that one desires are not available.

In addition to this, the opportunity cost of a decision is regarded as the sacrifice of substitutes needed by that decision. However, opportunity costs display the revenue or benefits inescapable by pursuing one course of action than another. The principle of opportunity cost implies the measurement of sacrifices, which can be real or monetary. This principle is important because it assists in determining the relative price of diverse products and appropriate allocation of different resources.

The opportunity cost is nil when the resource has no alternative use. The opportunity cost principle is significant in decision-making, and every choice has an opportunity cost. It is recognized that opportunity cost refers to the value of the next best substitute and ensure that scarce resources are utilized effectively.

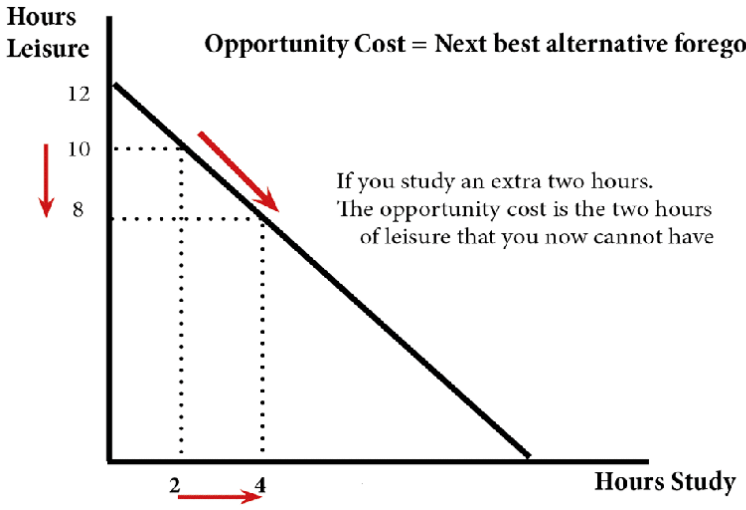


Figure1: Opportunity Cost Principle

(Source: Chen, Bao, Wu & Wang, 2020)

Incremental principle

It is identified as the basic economic principle of economics, which aims to maximize profits or raise revenue in the business. The general rule of the incremental principle is that the total cost of the product increases by increasing the production, and concurrently profit also rises. However, the incremental concept comprises assessing the influence of decision alternatives on costs and revenue, focusing on the changes in the total cost and total revenue resulted from the change in prices, procedures, investments, and products that might be at stake in the decisions.

Other than this, incremental cost and incremental revenue are the two basic elements of the incremental principle of economics. Moreover, the incremental cost can be defined as the change in total cost resulted from a particular decision. In contrast, incremental revenue can be defined as the change in total revenue resulted from the specific decision.

Based on the incremental principle, a decision can be regarded as profitable if it maximizes revenue in comparison to cost or decrease more cost than revenue. A decision is also considered profitable if it reduces some costs to a greater extent as compared to others and raises some more

revenue than it decreases others. The incremental principle is highly related to the marginal cost and marginal revenue concepts in the theory of economics.

Furthermore, the incremental principle is identified as the most significant principle of economics, but it contains certain drawbacks, which are as follows:

- The principle is applicable only during the short period
- The incremental principle can be applied only when there is excess capacity in the concern
- It cannot be generalized because of the variable observed behavior of the business

Moreover, incremental reasoning does not reveal that company has to fix the price at incremental cost or accept all orders to cover incremental costs. The core of the incremental principle is that decision made is required to be considered as rational and sound if it maximizes revenue more than costs or decreases costs more than revenue. Nonetheless, incremental reasoning is closely connected to two significant concepts of traditional economics, which include cost and

marginal revenue. Change in cost brought by the change in the process of production is referred to as the incremental cost, and it is more flexible than marginal cost.

Discounting principle

The discounting principle of economics usually describes the comparison of money value in the present and future time. The discounting principle can be applied in business; for example, in the business, every people prefers to do cash sale instead of credit sale by giving a cash discount for cash sale. The main reason for this is that an individual will get a dollar today, which is more valuable than a dollar tomorrow.

On the other hand, individuals will get a dollar in the future and not get a discount for a credit sale. As per the discounting principle, if a decision impacts costs and revenue in the long-run, all costs along with revenue should be discounted to present values prior to the possibility of a valid comparison of alternates. However, discounting can be referred to as the procedure utilized for transforming future dollars into an

equivalent number of present dollars (Attema, Brouwer & Claxton, 2018). For example, investing $1 today at 10% interest is equal to $1.10 in the coming year. One can utilize the discounting principle for determining the value of future payment or revenue. This principle can also be displayed when saving money in a bank account that earns interest.

The discounting principle demonstrates the value that will be received by comparing the money between the present and future times. The principle generally depends on the depreciation and inflation rate of the present financial terms that should be expected in the future. In today's environment, money has time value, which means a rupee that will be received in the future does not be similar to a rupee of the present day. In order to measure the present value of a rupee in the future, the techniques of this principle have been used in economics.

As the future is incalculable and unknown; therefore, the uncertainty and risk of the future are less compared to the present-day environment. For such a scenario, this discounting principle of economics has been used, which predicted the sum of money could be earned in the intervening period as a return at the end of a certain time frame. The

principle also reveals the mathematical technique use for adjusting the time value of money in the future relating to the present day. For example, in postal and bank departments, 12% interest is provided for every year as per the deposit amount. Thus, if a person deposits $10,000, then he will get 12% interest on this amount in the next year. The way of calculating the interest over a certain deposited amount is based on this principle of economics.

Equi-marginal principle

The equi-marginal principle is identified as the widely used principle in economics, which is popularly known as the principle of maximum satisfaction by assigning available resources to obtain optimum advantages. This economic principle implies that an input requires to be allotted to keep value-added the same in all cases. However, this principle gives a basis for the maximum use of all inputs of the organization in order to increase profitability. It is possible to obtain improvement by reallocation of inputs in case the equi-marginal analysis gets violated.

In order to operate the equi-marginal principle of economics, it is essential to apply the law of diminishing returns. Besides this, the law indicates that the marginal product will reduce as more than one resource is complied with the fixed resource. Meanwhile, the equi-marginal principle can be significantly applied in diverse areas of management and utilized in budgeting.

The primary objective of this principle is to distribute resources and eradicate waste in useless activities. The principle can be applied in assigning research expenditure, multiple product pricing, and discussion of budgeting. The equi-marginal principle suggests that available resources must be assigned amongst diverse alternative options that are obtained by marginal productivity from different activities.

For a consumer, this principle of economics signifies that money can be distributed over different commodities in such a manner that marginal utility resultant from the utilization of each commodity is similar. In the same way, for the producer, the equi-marginal principle implies that resources can be assigned in such a way that the marginal product of an input is similar in all cases. Based on this principle of

economics, the customers consider the marginal utility of products and price of products while making purchasing decisions. It shows that the decisions balance both marginal utility and price of goods. One of the limitations of this principle is that it quantifies products as units, but many commodities cannot be divided into smaller units. The equation for the equi-marginal principle is given below:

$$\frac{\text{Marginal utility of good A}}{\text{Price of good A}} = \frac{\text{Marginal utility of good B}}{\text{Price of good B}}$$

This principle can also be applied in time allocation issues like studying for examinations. Suppose a student has three exams tomorrow and got only 6 hours to study. The objective of the student is to maximize the average of grades in all three subjects with limited study time. It means how the student will distribute 6 hours of study time in such a manner that the marginal grade from the last hour spent in one subject is equal to the marginal grade from the last hour pend in any other subjects.

Economics models depending on the market

The economic model is a theoretical construct that symbolizes economic processes utilizing a set of variables in a logical manner. Economic models are used for five primary reasons, which involve the following:

- To forecast economic activities in which decisions are drawn based on expectations
- To aid with trading as well as investment speculation
- To give a logical defense to rationalize economic policies at three levels such as political, household, and organizational
- To plan and assign resources and plan logistics along with business leadership
- To recommend new economic procedures to change future economic behavior

The basic purpose of economic models is to analyze prices along with quantities traded in a competitive market. Economic models are designed to illustrate the complicated procedures. An economic model usually seeks to explain the economic reality of the market and test an

assumption regarding economic behavior. Depending on the market, there are different economic models that exist to generate diverse outcomes and conclusions regarding economic reality.

Classical economic model

It is one of the important economic models that represent the law of demand and the law of supply. The law of demand states that when the price has decreased, the quantity for the demanded product or service also increases. On the other hand, the law of supply indicates that when the price increase, the quantity of the supplied product or service also increases.

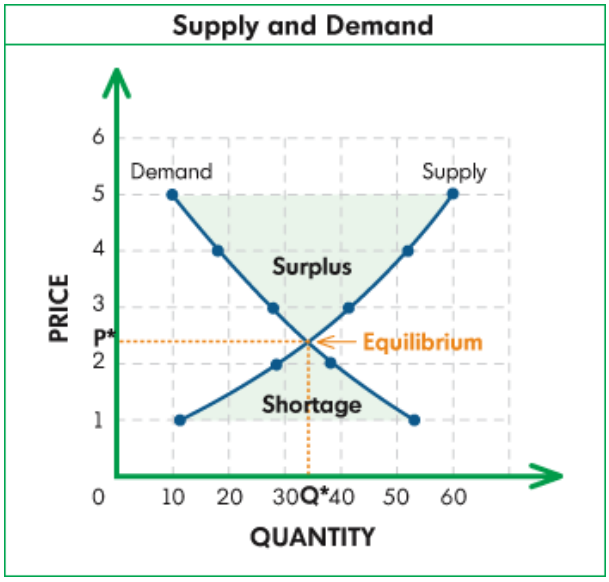


Figure: Classical economic model

(Source: Farias, Farias, Krysa & Harmon, 2020)

The above graphical representation of the classical economic model represents that the quantity demanded of the product changes from 18 to 28 with the change in price from $4 to $3. The graph also demonstrates that the quantity that the supplier wants to offer to the market increases from 10 to 60 with the increase in price from $1 to $5. However, equilibrium price and quantity occur when there is equality

between quantity demanded and quantity supplied to the market. The classical model is based on several assumptions, which are the following:

- All economic agents possess the same level of information regarding prices
- Economic agents have stable expectations
- Prices are perfectly flexible that allows adjusting with the market-clearing level
- All economic agents can make a decision about quantity to buy or sell for maximizing utility

The classical model implies the significance of limiting the intervention of government and endeavoring to keep markets free of possible barriers for conducting their effective operations. The model also assumes that the flexible rate of interest would always maintain equilibrium and prices are flexible for commodities and wages and money impact only price and level of wages. The basic principle of the classical economic model is that the economy is self-regulating as it has the capability to achieve the natural level of real GDP when all the resources of the economy are fully employed.

Theorists of the classical model claimed that the normal state of the economy is the one at full employment, and thus, unemployment occurs due to market rigidities such as minimum wage legislation and trade union pressure. Classical theorist like Say believed that the supply of product build its own demand and the production of good will produce an income to purchase all the produced output. In addition to this, capitalistic market developments and self-regulating democracies form the foundation for a classical economic model.

Keynesian economic model

Keynesian economic model refers to the model of total spending in the economy and its impact on output. The model argues that aggregate demand is the driving force of the economy means total spending for goods and services by the government and private sector. The total spending evaluates all economic outcomes from production to rate of employment according to the economic model. According to Keynesian theorists, a shift in aggregate demand highly impact production, inflation, and employment in the economy.

However, involuntary unemployment is the vital concept of this economic model, which reveals that lack of spending can cause businesses to cut back production and lead to a reduction in the number of employees employed and thereby create high unemployment. In addition to this, a reduction in employment opportunities leads families to cut spending and, as a consequence, worsen the original issue.

Moreover, the Keynesian economic model provides a solution to the issue of a lack of spending, which is fiscal policy and monetary policy. The national government has implemented a fiscal policy which comes in the form of increased government spending. According to the Keynesian economic model, fiscal policy works because the reduction in aggregate demand resulted in financial crises and spending of government is part of aggregate demand (Tarasov & Tarasova, 2019). Hence, an increase in administration deficit spending means an increase in aggregate demand, which lessens economic downturns in the short-run and promote economic development. Monetary policy refers to financial influence implemented by the central bank and comes in the form of a lowered rate

of interest. It is argued by the economic model that each dollar of government spending resulted in an increase in aggregate demand.

For example, if the administration spends $100 million on the project and $50 million was for costs of labor, the employees would take the spending to spend on businesses to have more money to generate more and employ additional staff, and thus, contribute more spending. Therefore, $100 million of the government would result in around $100 million of economic development, according to Keynesian economics. As per the economic model, changes in aggregate demand have a short-run impact on employment and output.

However, monetary policy can generate a real impact on output and employment only when the prices are rigid. The economic theorists believe that prices and wages usually respond slowly to demand and supply changes and resulted in periodic surpluses and shortage of labor. According to the Keynesian economic model, spending of government is crucial for maintaining full employment as spending on education, infrastructure, and unemployment benefits led to an increase in consumer demand.

Laissez Faire capitalism model

Laissez-faire capitalism is the economic model that restricts the intervention of government in the economy. It implies that the economy is strongest when all the government used to protect the rights of individuals. The basic role of administration in the laissez-faire capitalism model is to deter coercion against individuals. The fundamental purpose of the economic model is to promote a free as well as competitive market that demands a natural state of liberty.

However, the principles of this economic model involve people enjoys a natural right to freedom, the person is the primary unit in society, and the physical order of nature is a self-regulating system. It holds that the administration by leaving producers and customers alone in the market permits the forces of demand and supply to control the economy. Laissez-faire economic model reveals some benefits, which are as follows:

- This economy mainly evades inefficiency and probable corruption of administration intervention in the market

- It also assists in evading the alteration of tariffs and welfare loss. Free trade is the significant principle of increasing welfare and enables nations to gain profit from the business
- Help in developing market incentives as entrepreneurs and laborers obtain an incentive for working hard

Moreover, the three major elements of the laissez-faire economy model are capitalism, rational market theory, and a free-market economy.

Capitalism – It refers to the economic system where private enterprises own the aspects of production. In this economic model, the administration is required to let capitalism run its own course.

Free market economy – In the economic model, capitalism needs a market economy for distributing products and services and setting prices. Nonetheless, a market economy needs private ownership of products or services to make it a free economy. It shows that the owners can freely produce, purchase, and sell in a competitive market. This component of the model needs that all have equal access to information to improve profit.

Rational market theory – The model assumed that the free-market forces price for every investment and all investors form their decisions on logic. All consumers and sellers have equal access to the same information about commodities, bonds, or stocks.

Besides this, the laissez-faire economic model provides business autonomy and space from government rules along with regulations to make business operations difficult to move. This type of environment makes it more feasible for corporations to take the risk as well as invest in the economy. Laissez-faire capitalism is also known as free-market capitalism, which implies that the government in the economy should allow people to carry out their economic activities freely. It is a very common model during the 18th and 19th centuries of the industrial revolution.

Depending on the industrial revolution, laissez-faire capitalism is considered as the ideology primarily based on self-interest, self-reliance, competition, free trade, principles of supply and demand, and private ownership. Under this economic model, people and businesses must compete against each other, and their success along with growth is

required to be evaluated by the market forces of demand and supply. It shows that customers have the capability to decide the success of companies based on the purchase of goods or services. Laissez-faire capitalism claims that self-reliance force people to work hard and benefit the overall society.

The central principle of this economic model is private ownership, which states that people must have the capability to own property. This principle of laissez-faire capitalism transformed the economic decision-making from the administration to the individuals. Another key principle of the model is free trade, which signifies that corporations and people are allowed to carry out businesses without any interference from the government (Stahl, 2019).

In other words, the administration interferes in the economy through taxation to collect from businesses and individuals. Hence, the principle states that taxation must be abolished to permit the economy to operate without any arbitrates. Laissez-faire capitalism claims that free trade would generate more economic activity and, as a result, develop more wealth within the given nation. During the industrial revolution,

self-interest is deceptive in the process of decision-making of most business owners. It is argued by the model that self-interest was positive for society because it improves the economic standing of the overall business.

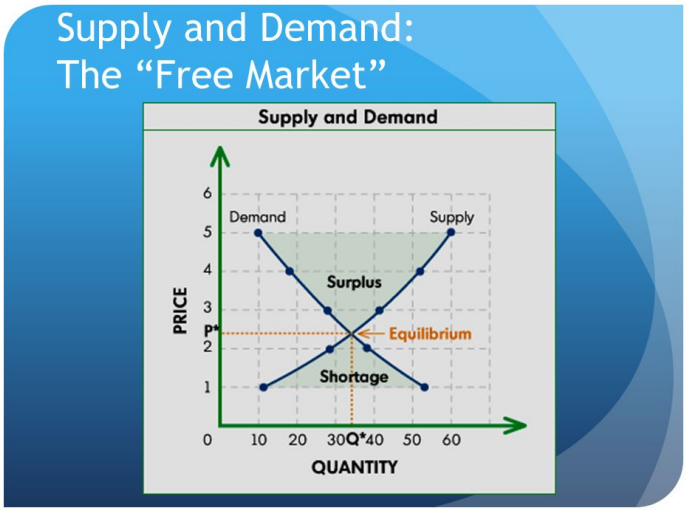


Figure: Laissez-faire capitalism "free trade" principle

(Source: Montoya Giraldo, 2017)

Market Socialism

Market socialism is a significant theoretical economic model of an economic system in which means of production are cooperatively owned,

and distribution of resources follows the market rules. In addition to this, market socialism refers to the economic system, including social ownership of the means of production and public of the market economy. Depending on a certain model of market socialism, profits are generated by socially owned firms and accrued to society as the source of public finance. It is also known as liberal socialism represents a compromise between socialist planning and free enterprise. This economic model is distinguished from the concept of a mixed economy because the model is a self-regulating system. Depend on the model of market socialism, revenue generated by socially owned companies can be utilized to directly remunerate workers.

Neoclassical economic model

The neoclassical economic model states that the goal of every consumer is to maximize utility or satisfaction, and the goal of the organization is to maximize profit as such a consumer is in control of market forces like price and demand. This economic model is primarily concerned with the effective assigning of limited productive resources. It

focuses on the demand as the primary driver of the value of a product or service. Apart from this, the neoclassical model is based on three main assumptions which involve the following:

- Individuals act independently on relevant information
- Individuals are rational in making selections between detectable and value-connected consequences
- The purpose of a person is to raise utility, and the purpose of the organization is to raise profit

Furthermore, the economic model mainly distresses the effective distribution of limited resources and recognizes the development of the resources in the long-term. Long-term growth permits the expansion of producing products or services. It focuses that market equilibrium is central to effective distribution of resources, and hence, market equilibrium must be the economic urgencies of administration. Besides this, the neoclassical economic model focuses on the demand of consumers, which is influenced by factors such as the distribution of resources, personal preferences, and many more.

Nonetheless, the neoclassical model is particularly criticized for its over-dependence on mathematical tactics as it could lead to normative bias. The model formed concepts about utility and marginalism in which utility measures consumer satisfaction obtained from the consumption of goods and services, and marginalism highlights the change in the value of the product with an extra amount. Therefore, the neoclassical economic model refers to the model emphasizing the evaluation of products, yields, and distribution of income in the market through demand and supply.

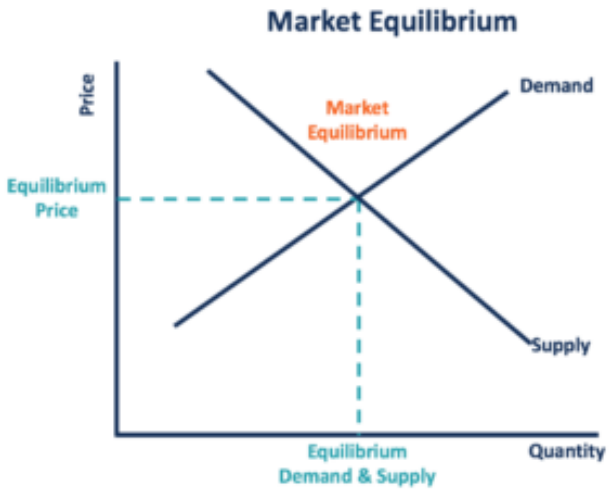


Figure: Neoclassical economic model

(Source: Farias, Farias, Krysa & Harmon, 2020)

Supply and Demand

The supply and demand model of economics is the model of determining price in the market. However, supply is regarded as the amount of product sold into the market by producers, whereas demand refers to the quantity of product that customers wish to purchase at diverse prices. It is considered that any change in demand and supply of the product would have an impact on the equilibrium quantity and price of the product sold. The key feature of the supply and demand model is to determine the price of a commodity or service.

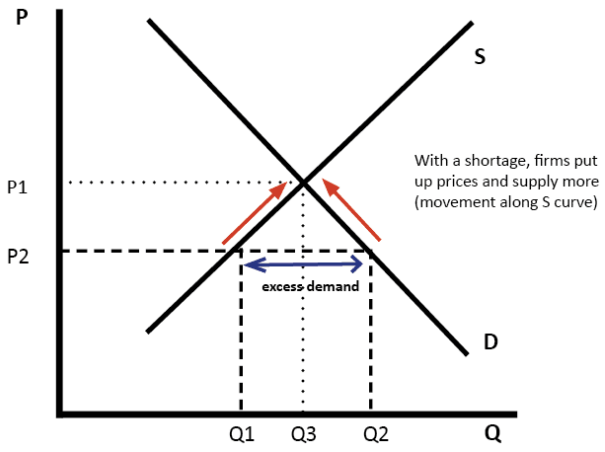


Figure: Supply and demand model

(Source: Anas, Ramli & Ilyas, 2020)

If the producer starts with the price of P2, then there will be the demand for Q2 but supply of the only Q1. There will be a shortage of goods and increase the possibility for individuals to purchase a limited quantity. In such a case, there is an incentive for companies to raise the price. Companies have significant reason to supply more with the price increase. In addition to this, the demand for products will increase, and the high price of the product will limit the demand for the product. This invisible hand discusses the reason that market equilibrium would occur where demand is equal to the supply.

Chapter II - Historical evolution of the economy vs. industrialization

The historical evolution of the economy started from rationalism, which used to be a vital point of discussion during classical times. After that, in the neo-classical period, the rational influence upon the economy got more strengthened. During the transition from classical, neoclassical, and the modern era, economic rationalism came into existence (Yu, Burke & Raad, 2019). It defines the concept of measuring economic success in terms of efficiency and productivity.

In a simpler sense, a nation where the maximum number of industries are contributing goods to the GDP growth should be considered as a high growth economic nation. On the other hand, a nation having limited competition in the marketplace or usually follows a monopoly market structure cannot enjoy economic rationalism. So, the historical evolution of economy defines how the understanding of the term has evolved that is from the classical to the modern era.

On the other hand, the historical evolution of industrialization is about how the functioning of industries has changed. In simpler words,

the term defines the transformation of an agriculture-based economy to a mass manufacturing economy (Morales & López, 2017). Therefore, the evolution of industrialization means the sources of the economy, like what people do tear their livelihood, constitutes the industry of a particular nation. Liker, in the classical period, people used to do farming, and hence the same constitute the major industry of that era.

However, economic evolution is not dependent upon the earning source types of people. In simpler words, economic evolution does not care about what people do to run their livelihood. It is simply the associated efficiency of integrated performance of industries. For example, the GDP of the US in 1960 was $ 543.30 billion, and the present GDP that is in 2020 is &22.32 trillion. The statistics signify that the US's economy has gained momentum over the years. However, such figures do not define how industrialization has evolved from the same period. So, here lies the major difference between the historical evolution of the economy and industrialization.

Industrialization and Economy

Industrialization has been the transformation period from an agricultural economy to a mass-producing urban economy that has to go together with each period of the constant growth of per capita gross domestic product (GDP) within the recorded history. The industrialization has transformed the economies of the countries on the basis of mechanized manufacturing, factory systems, along with large-scale industry (Sutikno & Suliswanto, 2017). New ways of doing work, new machines, and new power sources made the industries more efficient and productive. New industries also emerged, comprising the automobile industry. The first industrialization period occurred between 1760 and 1860 in Great Britain.

Historians do not agree on the exact causes as well as the nature of the first Industrial Revolution; however, it marked the primary period of overall economic development in the history of the world. Industrialization reached the USA in the 19th century and ultimately spread to most countries of Western Europe before the completion of the century (Nath, Apte & Karmarkar, 2020). Industrialization brought major

transformations in the economic environment of human civilization. Besides Britain and the USA, it rapidly spread to countries such as Belgium, France, and Germany. In the early 20th century, industrialization spread outside North America and Europe, specifically to Japan. By the completion of the 20th century, it reached nearly every corner of the world.

Industrialization has far-reaching outcomes since it not just drastically transformed work life; it also improved personal leisure and family life. It undoubtedly increased the powers of the state, specifically in military production. Industrialization even changed societies not directly involved in industrial developments. Industrial economies acquired new benefits over societies that continued to depend on agriculture, the difference that still impacts the economic relationships of the world. An economy could not only rely on the agricultural industry for achieving economic stability in the countries. Therefore, industrialization brought economic stability in the countries where they became a development in several industries and provided a balance between the contributions of all the industries.

There have been two extensively recognized factors of industrialization, a transformation in the forms of major labor activity from farming to manufacturing and the output level of economic productivity. This development consists of a tendency to urbanize for general people and to develop for new industries. Economic research has considerably demonstrated that industrialization has been connected with growing education, increasing national and individual income, better overall quality of life as well as longer lifespans.

For instance, when Britain has been industrializing, the overall national income grew by over 600% from 1801 to 1901. By 1850, workforces in Great Britain and the USA made earnings an average of eleven times more in comparison to workforces in the non-industrialized countries. These impacts have been confirmed to be increasing and permanent. By 2000, the per capita income in completely industrialized nations has been 52 times more in comparison to non-industrial nations.

Evolution of Economy with Industrialization

Industrialization brought economic transformations that marked the evolution from a steady commercial and agricultural society to a modern industrial society depending on complicated pieces of machinery instead of tools. Drastic transformations in the economic structure occurred as technological inventions and innovations developed the factory system of greater economic specialization and large-scale machine productions. The laborers, earlier working mostly in the agricultural sector, gradually joined the great urban factories. Industrialization transformed the face of the countries and increased the demands of urban centers necessary for huge municipal facilities. It developed an interdependent and specialized economic life and made the urban workers more dependent on employers than rural workers.

Since economic activities in several countries moved to manufacture from agriculture, the production also shifted to factories from its traditional locations within the small workshops and homes. Most of the people shifted from rural areas to cities where manufacturing hubs have been established. The total quantity of services and products

expanded radically, and the amount of capital spent on each employee also increased.

New investors, managers, and businesspersons started to take financial risks and gained unlimited rewards. The cotton industry turned out to be the largest single employer of industrial employment, and cotton clothes became the most valuable product for export business. Besides, various individuals employed, and technical innovations, the combination of steam, iron, and coal impacted more than the cotton industries. The impacts became visible in the 1830s and 40s when steam locomotion was introduced, and the railroad construction boomed.

The industrialization marked an era of growth in the 18th century that brought a transformation in mainly rural, agricultural European societies and America into urban and industrialized societies. Products that were once painstakingly made by hands began to be manufactured in large quantities by machines within the factories because of the introduction of innovative machines as well as methods in iron-making, textiles, and other industries. Industrialization has disrupted and displaced traditional labor, encouraged workforces for more productive

and valuable activities along with better capital products. All the rates of growth of the world's developing countries are higher in comparison to the developed nations. Since these nations have opportunities for industrializing, they can continue to develop like the developed nations.

Around 20% of the population of the world lives in industrialized countries; however, they still represent over 70% of the productivity of the world (Ross, 2020). The change from an agricultural to an industrial society has not been smooth, but it has been a crucial step for escaping the miserable poverty found within the less-developed countries (LDCs). Industrial growth has overall led to a period of economic development all over the world. Undoubtedly the first transformation involved the nature of manufacturing. The basis of industrialization has been the implementation of motorized powers to manufacturing.

Initially, these powers emerged from water wheels; however, the launch of the steam engines in 1770 in Britain developed huge mechanical powers. Productivity in metallurgy also increased by substituting with the cheaper coal for the traditional charcoal. Industrialization not only transformed manufacturing technically but however also introduced new

industries. These innovations followed from new pieces of machinery have their benefits, and altogether, these transformations have their economic effects.

The development of new technologies made jobs faster, better, and easier, leading to the growth of the industries' output and profits. Industrialization has several benefits which are also more influential. Industrialization increased the scale of production, reduced the costs of production, improved the products, and expand the market for services and goods for selling. These improvements have great impacts on the profit margin of services and products sold by the industries. It also became easier for expanding or reducing the product output or development as dictated by the markets. Several industries have improved significantly over the years because of industrialization.

In addition to this, technologies or improved industrial techniques also increased productivity. For example, the agricultural sector improved significantly over the years with improved equipment like harvesters and tractors and goods like pesticides and fertilizers. Transport industries allowed several companies to sell their goods to far distances. Internet, as

well as related technologies, increased the speed of the operations of several businesses. All the industrial growth led to more output, resulting in economic development. When a country saw growth due to industrialization, urbanization tended to follow.

The industrializing of a country motivated development in the transportation systems and communication leading to more individuals living in a smaller space and improving and increasing the workforces. Various other organizations established close to the industrial bases, comprising schools and educational institutions, health facilities, banking institutions, entertainment complexes, and restaurants. These organizations thrived because of the additional people from industrialized areas, leading to the emergence of more businesses. Industries invested in operating, so the growth in industrialization led to investments that supported other industries. Moreover, the industrialized businesses put out services and products, leading to other industries to improve their outputs. Growth in industrialization led to lower rates of poverty as well as unemployment in the countries.

Industrial developments led to more jobs in both small and large-scale industries allowing for more opportunities for those who were unemployed. It also brought employment from individuals near the industrialized areas, like the outskirts and suburbs. Industrialization also led to the growth of skilled workforces that included specialized workers skilled in particular tasks and trades (Baranova, Matyushok & Sorokin, 2018). This specialization attributed to more outputs and increased the incomes of the workforces. The increased incomes led to higher standards of living for the workforces as well as their family members.

Geographic differences also complicated the picture. Belgium and, from 1840, several states of Germany introduced industrialization that brought them close to the British levels. France, which was poor in coal, focused more on growing production in craft industries, transforming furniture-making from a creative effort to standardized productivity before outright the formation of the factories. Netherlands and Scandinavia also joined the industrialization after 1850. East and South Europe, while introducing some model factories and establishing some local rail-lines, operated in different economic areas. Urban development

and technological changes both have been uncertain till the 19th century, saved in pockets of Spain and Italy.

In eastern regions, the industrialization of Western Europe greatly impacted and encouraged increasing conversion to market agriculture, like Hungary, Russia, as well as Poland responded for grain import, specifically to the British Isles. Eastern Prussia has the temptation of imposing new duties on the peasants, working on large lands, and growing the work needs for meeting export opportunities with no fundamental technical changes and challenging the landlord class's reign.

Urbanization has been a crucial outcome of growing industrialization and commercialization (Khan, Su, Tao & Hao, 2019). Factory centers like Manchester developed from rural communities into cities of thousands of people within a few decades. The rate of the overall population situated in towns expanded gradually, and large towns tended to relocate more distribution centers in the urban map of Western Europe. Fast urban growth created new challenges for housing stocks as well as sanitary amenities, although innovation responded slowly. The conditions of the streets improved with the introduction of gas-lighting in

the better neighborhood from 1830 onwards, and sanitary activists forced for underground sewage systems. For wealthy people, fast housing developments allowed some relief from the worst urban problems.

Rural life also transformed but less dramatically. A complete technological revolution in rural areas happened only after 1850. However, tools made in factories spread extensively even before this period, since sickles were replaced by scythes to harvest, and allowed significant productivity improvements. Larger lands, specifically in commercially-minded Britain, started to launch new equipment, like seed drills for planting. Crop rotation, including the usage of nitrogen-fixing plants, replaced the old method of leaving some uncultivated lands, whereas, from 1830, better livestock, seeds, and chemical fertilizers have also improved production. Increasing market specialization and agricultural production have been crucial in the development of factories and cities.

Supporting the growth of modern Europe between 1780 and 1850 has been an exceptional economic change that involved the primary phases of the Industrial Revolution and the expansion of commercial

activities. Major economic changes were prompted by the incredible growth of the population in Western Europe during the 18th century and also in the 19th century. During 1750-1800, the populations of some of the leading nations grew 50% to 100%, mainly due to the large production of new crops as well as the temporary decline of epidemic diseases (Xu, David & Kim, 2018). The growth of the population forced changes. Increased commercialization showed various areas. The wealthy peasants grew their land-holdings, at the cost of their poor neighbors, who increased the growing ranks of the almost property-less lands. In turn, these peasants produced foods for selling them in developing urban markets.

Local manufacturing improved since several rural producers worked part or full-time for making threads and clothes, tools, and nails under the funding of urban traders. Craftwork in the towns started shifting towards production for distant marketplaces that motivated artisan-owners to treat their journeymen more as wage workers and less as fellow laborers. The social structure of Europe transformed towards a division, both urban and rural, between non-owners and owners. The

production also developed, leading to an initial wave of consumerism since rural wage-earners started to buy new types of commercially produced clothes. In contrast, urban middle-class families started to involve in new tastes, educational toys, and motivational books for the children.

Industrialization has played a vital role in promoting trade. The developed countries gained profits in comparison to nations that were industrially backward. The undeveloped nations exported primary goods and imported industrial goods. The agricultural goods were of lower prices, and their demands were also low, whereas the industrial goods were at higher prices and their demands were also high. It increased the material wealth of the Western world and ended the dominance of agriculture. Industrialization undermined the centuries-old European structure and rearranged the economic view of the world.

The reliance on technology and science, the query of traditional agricultural practices as well the centralization of production factors have established the stage for the beginning of industrialization. The quest for huge profits undermined the unity that existed between the two social

classes, and simultaneously the gradual acceptance of the market economy also started. Industrialization developed material wealth and restructured societies and also led to a productive revolution that highly determined the quality of life. An economy could not only rely on the agricultural industry for achieving economic stability in the countries. Therefore, industrialization brought economic stability in the countries where they became a development in several industries and provided a balance between the contributions of all the industries.

With the introduction of more industries, the countries also saw growth in foreign exchange earnings. The export also increased, and imports started to fall. There has been more inflow of cash and increased self-sufficiency of the countries. There have been various natural resources that were unused such as the minerals and the barren lands by the financial and agricultural industries of the countries. Hence, industrialization increased the use of those natural resources that has been totally wasted, and their financial contribution were also zero. With the growth of the industrial sector, other industries of the countries also benefitted. The industries provided machinery such as modern inputs as

well as tractors to the agricultural industry. It improved the life-style and working style of the farmers.

Industrialization also provided a secure base for fast development of income that showed the close relationship between industrial growth and high-income level. Developing nations could free themselves from the adverse impacts of fluctuations in prices of goods and the decline in trade due to industrialization. These nations used to export primary goods and import manufactured products. Industrialization shook off their reliance on the primary goods and made them adopt import substituted products. Industrialization provided more products that could be purchased at reasonable costs.

With the industrialization of the economy, products were available at high quality and quantity. It also led to the development of new modes of transportation systems and made export and import faster. Several businesses began on a global scale and helped the economies develop and expand. The world became a connected and smaller place, and several substitutes became available, and with that, people started to have better standards of living.

Eventually, industrialization created new job opportunities and reduced poverty in the world to a great extent by developing industries for the people. Industrial developments led to more jobs in both small and large-scale industries allowing for more opportunities for those who were unemployed. It also brought employment from individuals near the industrialized areas, like the outskirts and suburbs. Industrialization also led to the growth of skilled workforces that included specialized workers skilled in particular tasks and trades. This specialization attributed to more outputs and increased the incomes of the workforces.

Industrialization led to technological development that further resulted in a modern approach in the medical field. The emergence of diagnostic equipment like CT scans and MRI would not have been possible without industrialization. The development of factories made it easier to produce medical equipment. Industrialization also shifted the perspective of the people on their wants and needs. Before industrialization, people used to make goods for a particular purpose. They made products due to usefulness that restricted their innovation. The development of factories made it easier for them to make things faster

and allowed people to step outside of their homes and attempt something new. It ultimately led to the development of a market-free economy.

The development of a nation relied on industrialization since industries had brought economic changes in the countries of the world. If, at present, Britain and the USA have become wealthy nations, it is only because of industrialization. These countries make various products and export them to different countries of the world. However, some countries of the world are still dependent on agriculture, and even though industrialization has brought changes in these countries, they have some shortcomings. These countries still face a lack of jobs and depend on the agriculture industry. But, the introduction of manufacturing practices during industrialization has played a crucial role in the economic growth of some of the nations of the world, particularly the developing nations.

Manufacturing has added long-term transformations in the developing nations and provided opportunities to their industries. During industrialization, the manufacturing industry has added values and job, contributes to the GDP of the world, along with employment that has not changed till at present (Su & Yao, 2017). The reason for the strong

relationship between economic growth and industrialization has been the manufacturing industry, which was the leading driver of productivity development (Speering 2018). Moreover, the productivity development in other industries of the country was due to innovations in the manufacturing industry.

Hence, industrialization brought new practices of manufacturing and made the manufacturing industry the backbone of the country. It played a vital role in the economic growth of the countries of the world. The agriculture-based countries of the world that were solely dependent on the agriculture industry developed economically. The economy of both the developed and developing countries improved due to the shift to the manufacturing industry from the agriculture industry due to industrialization (Haraguchi, Cheng & Smeets, 2017).

Economic Changes with Industrialization

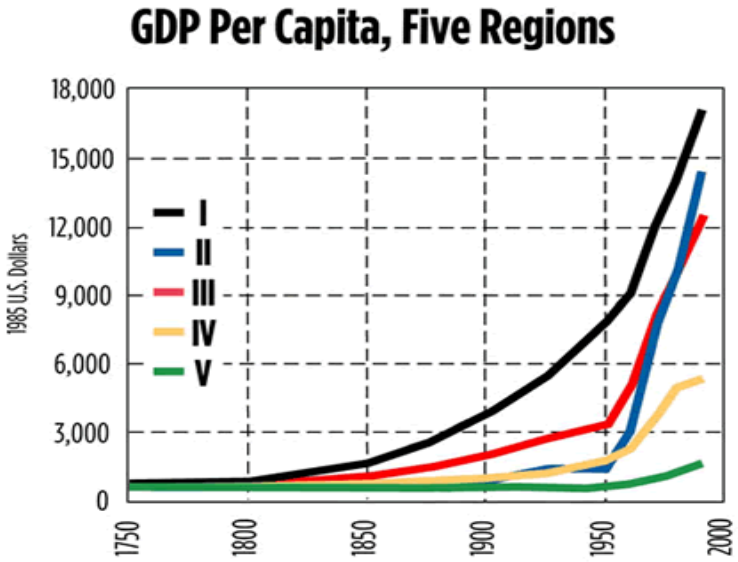


Figure: GDP per capita of the World from 1750 to 2000

(Source: The Industrial Revolution: Past and Future, 2020)

The societies were signified by the steady per capita income. The world is one of the growing income growth. It is evident that industrialization has not affected all parts of the world uniformly. The above figure is on the basis of the data of per capita income and illustrates the origin as well as diffusion of industrialization. The regions or the countries of the world have been categorized into five categories.

Group I represents the English-speaking nations and are those countries where the per capita income first demonstrated sustained development. Group II represents Japan and has been considered solely in the category for highlighting the notable economic history of the country. Group III includes Northwest Europe, the nations that started sustained development later than Group I. Group IV represents remaining European countries accompanied by European-dominated countries within Latin America. Group V represents the rest of Africa, along with Asia.

It is clear that there has been the emergence of economic inequality over the past two centuries. By 1850, there have been huge differences between the poor Asian and African nations and the English-speaking nations. During this time, the remaining European countries were also still far behind the English-speaking nations, and the income of Japan was hardly different from income in the rest of Asian countries. The English-speaking nations acquired more than North Europe, which is representing Group IV. It has also been noticed that the per capita income of Group V was constant from 1750 to 1860 and till further.

Before the industrialization era, there has been a colonial period that was an era of stagnation in the living standards of the individuals. European colonialism brought technological developments to colonized countries, and these developments increased production in those countries. However, the consequence of colonial economic development for huge populations was low living standards. The industrialization started to diffuse the non-European countries, and this, undoubtedly, was the leading cause that rates of growth for the whole world during industrialization have achieved exceptional levels (Odeleye & Olunkwa, 2019).

Hence, the economy of the world has been greatly impacted by industrialization by growing productivity more efficiently and enhancing the quality of life for the individuals within the industrialized countries. Since developing nations are not completely industrialized, they can continue to get benefits as they do so, resulting in strong development levels and overall better conditions for their people.

Hence, industrialization has been the method by which the economy shifted from agricultural production to technologically

developed and mass-produced services and products. This period was signified by the considerable shifts to urban from rural labor, leaps in productivity in addition to improved standards of living. By measurements, like GDP per capita, industrialization could be regarded as the most significant economic growth in history (Animitsa, Novikova & Klyuev, 2019). It was instrumental in the world's economic growth.

Industrialization decisively transformed the economy and wide rates of growth of productivity. GDP per capita started a sustained development in some favored economies almost 1820. It is one of the significant factors of economic growth for the countries of the world. Therefore, industrialization represents a single great event in the economic history of the world. It helped in the fast development of national as well as per capita income. The economic history of the developed nations showed that there had been a close relationship between industrial growth and per capita and national income.

Variation in the evolution of economy and industrialization concept

From the past decades, the concept of economic prospect defines the material condition of human history. The historical concept of the economy demonstrates that some problems of economic aspect have arisen from the inflation rate of war, and this has resulted in generating world crisis. Hence, it is analyzed as the main milestone of the global economy. According to the monetary theory, historical statistics evaluate the role of wages in relating to the economy, and this was the primary cause of generating the issues.

However, the presence of the analysis of cyclical fluctuations has helped in evolving the concept of industrialization so that the issues can be reduced effectively by proper means. The beginning of the concept of industrialization not only decreased the economic problems but also plays a vital role in changing society (Su & Yao, 2017). Besides this, it is analyzed that the generation of industrialization concept has brought both good as well as bad periods for the economic aspect of the past decades.

One of the good effects of industrialization that creates a positive impact on the historical evolution of the economy is the production of mass quantities of products by introducing new techniques and machinery in the business. However, one of the bad effects was the presence of unskilled workers, who do not have the idea of using new techniques and machinery in producing high-quality products. Hence it is evident that from the past historical decades, both the economic evolution and the concept of industrialization are directly linked with each other.

The evolutionary concept of the economy suggests that industrialization advances the society that overall improves the economic condition of the society as well as the surrounding environment. With the advancement of technology, the economic environment becomes highly volatile, and it creates a strong fluctuation in terms of both price as well as output level, respectively. In order to maintain such fluctuations, the concept of industrialization plays a big role. In such an aspect, the growth of this concept has dramatically accelerated the rise of large factories,

turning smaller towns into cities, and the transportation facilities have also improved for sustaining such fluctuation level.

Industrialization not only advances the business operations but also helps in improving the communication methods of people from the past ages. The generation of industrialization has influences society to communicate efficiently with other people over long distances (Khan, Su, Tao&Hao, 2019). The barrier of communication has reduced due to the historical evolution of the industrialization concept. The drastic improvement of communicating medium, on the other hand, influences the economic growth of the society in a positive manner.

Thus, it is evident that from the past ages to the recent period, industrialization indirectly helps in improving the living standard and the economic aspect of the society, respectively. From this fact, it is clear that a linkage bridge is present between both the concept, and this has been noticed from the past decades. The bridge suggested that industrialization improved the standard of living and increased the economic output of the society and surrounding.

Chapter III - Innovation in economic development

Role of innovation in economic development

In terms of the economic aspect, innovation is defined as the application and development of technologies as well as ideas that can improve the services and goods so that production can be done efficiently. Innovation is considered to be the most distinctive feature of the economy because it helps in developing the society and the position of the people in the world (Cinnirella & Streb, 2017).

Based on this fact, it is noted that innovation plays a vital role in driving the economic development of society and surrounding by benefitting consumers, the economy, and businesses as a whole. In the current trend, innovation is used excessively in improving the holistic performance of the world that overall develop the economic prosperity of the society. However, in today's environment, innovation is not so easy to develop, but the improvement of every social aspect leads to the economic development of each country in the nation.

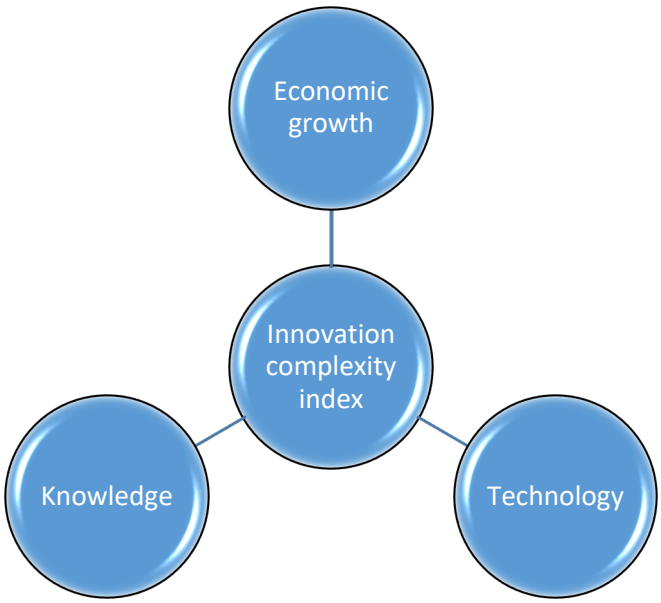
By leading to requisite transformation and thinking out of the box, people generally led to the economic development of their society. Preferably, the presence of technological innovation is considered to be one of the major sources of national economic development. From the past decades to the present day, environmental innovation leads to the shifting of hand-made to machine-made products, which directly improves the living standards and growth of economic prospects of the society. Many scholars suggested that innovation is not only considered as the decisive factor of growth but also helps in creating value and employment in society (Cinnirella & Streb, 2017).

Innovation also creates a positive impact on the businesses and motivates the companies to enhance their competitiveness in the market. Hence, it is considered as one of the ways by which innovation leads to the economic development of society. An example that describes the role of innovation in developing the economic aspect of the nation is the introduction of steam engine technology that helps in improving the transport facilities of the railways and increase mass production in factories.

In the macroeconomic environment, innovation helps in monitoring the development of social and economic pre-conditions of society. This helps in creating a positive impact in the environment that overall grow the economy of the countries in the world. On the other hand, innovation helps companies all around the world to create strong ties of leading centers of excellence in the scientific nation. In a broader sense, innovation tries to improve the processes, products, and ways of thinking of the people that generate a positive impact on the economic activities of the world. Hence, it is also considered as another way that defines the impact of innovation in enhancing the economic development of the nation.

Besides this, in the modern economy, innovation processes create value in terms of both national and regional levels (Casadella & Uzunidis, 2017). It is seen that by using these perspectives of innovation, the industries exploit technology as per their needs. In contrast, countries develop their necessary capabilities and grow their economic prospects in the world. Thus, from this aspect, it is clear that both directly and indirectly through macroeconomic features, innovation helps in

developing the economic growth of the people as well as the businesses of the world.



Graph 1: The figure represents the relationship between innovation and economic growth

(Source: Self-constructed)

The above graph describes that innovation and economic growth are directly proportional to each other. If a country properly develops its infrastructural facilities by means of using appropriate knowledge and technological improvement, then it can positively enhance the economic

prosperity in society. According to the innovation complexity index, every activity depends on the quality, impact of the individual market, and complexity that summarizes the proxies and patents of the economic growth.

In other words, the index demonstrates that for developing something new, both technological approaches and proper market knowledge are required that overall help the society to grow and develop their economic prosperity in the whole world. Hence, these aspects have properly depicted in the above graph and it also defines the relationship of innovation with that of economic development.

There are several ways by which innovation enhances the economic growth of the nation, and they are as follows:

Innovation leads to an increase in the production factor

Innovation generally accelerates the development of the market by making revolutionary changes in methods related to information technologies. The presence of these radical changes creates an impact in

corporative intangible assets and also on the transaction costs of the goods and services (Casadella & Uzunidis, 2017). Overall it improves the economic development of the industries.

Besides this, for developing the economic aspect of a nation, innovation helps the companies to expand the local business in international markets so that they improve the financial structures of their organizations as well as country respectively. It is noted that a bidirectional linkage has been present between economic growth and innovation, and this has been described properly by the theory of endogenous technical change. A feedback relationship is present between these procedures that indicate the strategic bond between economic growth and innovation.

According to this theory, innovation activity generally helps the entrepreneur produce an intermediate cost of their products, which is temporarily lower than his competitors (Feki & Mnif, 2016). Hence, it helps in selling the products more as compared to their rivalries. This extent of innovative activity is undertaken by the surroundings and

society, and it creates a positive impact on the rate of economic development.

Thus, the presence of this theoretical framework also suggested that innovation is directly related to the economic growth of the nation. By spreading the long-term advantages of innovation, there is a positive increase in the production rate of goods and services. Generally, production factors depend on three aspects, such as capital, labor, and land. Thus, by improving all these three approaches, an organization can grow its market base and economic prosperity, respectively.

By innovating the business requirements as per the changing consumer desires, the organizations reasonably and conveniently priced their goods and services so that it can sell at a higher rate. The presence of such ingenious solutions not only improves the standards of living but also promotes national economic development. For example, countries such as South Korea and China enhance their economic position by cultivating the capacity of absorbing technology and also by boosting the inflows related to overseas technology (Feki & Mnif, 2016). However, some empirical studies suggested that innovation performance creates a

mixed result that indicates a complex and subtle relationship with economic development.

The primary fact is that sometimes companies failed to create newness in their services and products properly as per the market and consumer needs. In such a scenario, the economic growth of the country is negatively impacted by the cause of innovation. Thus, in order to reduce the adverse impact of innovation, the scholars suggested that before introducing something new, the people and the industries should do proper research and use an effective strategy that is beneficial for the customers and nation (Korableva, Kalimullina, Zaitseva & Larionov, 2018).

Another major contribution of this factor is that it can lead to higher productivity by generating greater outputs in both national and international markets. Innovation helps a company to improve their services and products as per the markets and consumer needs so that it can be profitable in respect to their business activities (Korableva, Kalimullina, Zaitseva & Larionov, 2018). Thus, when the production

increases, the selling rate also increases that automatically develops the economic growth of the countries in the society.

Innovation addressing socio-economic challenges and increases the competitive nature of countries

The major socio-economic challenges in today's world environment are health and poverty, and if these issues are recognized and sorted properly, then it indirectly improves the national economic condition. According to the Theory of Economic Development, an idea has been generated regarding the role of innovative approaches in reducing the socio-economic problems that indirectly enhances the economic growth of the society (Krammer, 2017). As per the theoretical view, the economy is generally operated in a circular flow, and in order to achieve that, innovations play a major role in generating the dynamics of the circular flow properly.

Based on this fact, it is analyzed that innovation influences the opportunities of the people to engage in several entrepreneurial activities that overall encourages their growth in society. If the people use the

proper strategy of innovating something new, then it positively improves the economic growth of the society as well as increases the grain production, respectively. Thus, the presence of several strategies helps society and people to reduce the impact of the socio-economic challenges in the world.

By considering the scale of socio-economic challenges, it is noticed that every country of the world has strategically established the innovation approaches and sustain a competitive position in the global environment. It is analyzed that most of the developing countries of the world innovate several new digital technologies, which creates solutions for fighting with the major socio-economic challenges. Thus, the introduction of various innovative approaches not only increases the economic development of the countries but also people are habituated to stay fit and healthy.

Another way by which innovation enables the economic growth of individual countries is that it develops the technology and science-related actions of the organizations of several countries (Krammer, 2017). The fact demonstrates that by using scientific research, both the developing

and developed countries improve their innovative approaches that positively bring economic growth in the national field. It is noticed that several global issues are present in today's world environment that reduces both the scope and opportunities of countries in terms of their economic prospect. Thus, in order to stabilize the economic growth of individual countries, innovation helps in creating a competitive approach. It helps in generating wider opportunities that sustain the research co-operation and capacity-building perspective of both the developing and developed countries, respectively.

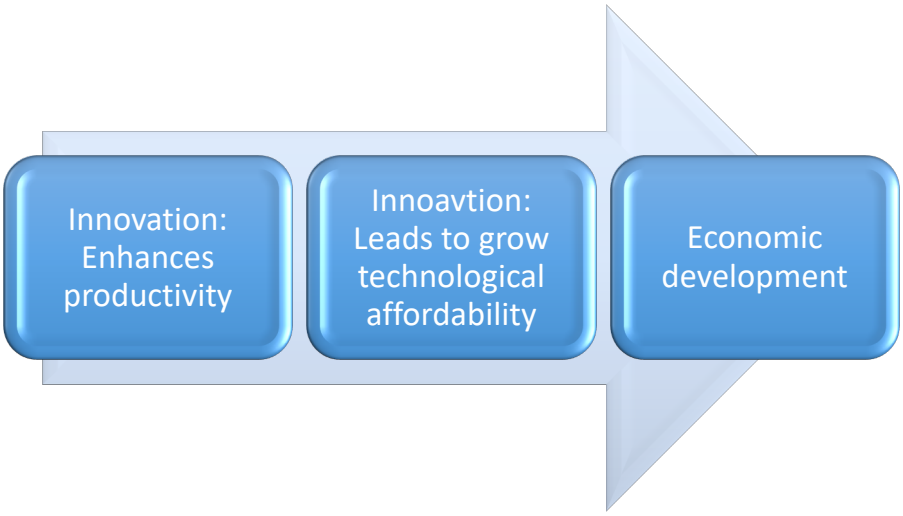
Apart from this, by strategizing effective governance mechanisms in terms of the international level, each country develops some new approaches that improve their competitive position in the market. Hence it overall enhances the economic growth of the individual country worldwide. Another factor by which innovation drives the competitive nature of organizations, peoples, and countries is that it helps in setting the institutional framework by tailoring and also by sharing knowledge that gives fruitful results in favor of the world economic development (Korableva, Kalimullina, Zaitseva & Larionov, 2018).

It is analyzed that in current trends, organizations are trying to increase their competitive advantage so that they can obtain and a stable and better position in the market. Thus in order to do that, innovation is the best way by which they can follow the effective path that is suitable for their business. Thus, it is quite evident that when a company develops its financial and sustainable growth in the market, then it indirectly develops the economic prospect of society.

Technological affordability increases economic growth

Innovation plays a vital role in improving the technological aspects of every industry and the peoples of the nation. The enhancement of technological affordability allows people to make new approaches that can help them to maintain their economic stability in the world. In other words, it is noticed that in both emerging markets and industrialized nations, technology helps in revolutionizing business as well as improve the market growth.

The presence of such technological discoveries makes the business environment more efficient and productive (Krammer, 2017). From several researchers, it is found that technological discoveries can be made by introducing the former with the newer one. Hence, from this view, it is also clear that technological affordability takes place through innovation that indirectly leads to the economic development of the country.



Graph 2: Ways by which innovation enables economic development

(Source: Self-constructed)

The graph demonstrates the various features of innovation that help in enhancing the economic development of society and the

surrounding. From the above figure, it has been evaluated that innovation helps in increasing productivity as well as enhances the technological affordability of businesses and countries, respectively. If innovation approaches are followed strategically through proper research and knowledge, then it can result in the positive growth of economic prospects in the market. Both these factors of innovation have created a direct linkage with the economic development of the nation, and this has been properly illustrated in the above graph.

Models of innovation

Innovation models are meant to shape an economy's industrial practices and trends. The significance of innovation models lies in the fact that they give an idea about the kind of revolutionary practices being followed among industries within an economy (Xavier, Naveiro, Aoussat & Reyes, 2017). The innovation also triggers economic development by creating job opportunities and building new sectors. Different organizations innovate in multiple ways, which defines their patterns of contribution to the economic development of a nation. Incremental

innovation is about utilizing the existing technology and increasing the value of the same towards consumers.

Radical innovation involves the creation of new industries, disruptive innovation replaces the existing technology, and architectural innovation is about acquiring skills, knowledge, and lessons from one innovation and applying them in another market (Flor, Cooper & Oltra, 2018). Now, each pattern of innovation goes with certain models that shape the innovation style. The models also carry significance to understand the operations of a firm. The innovation models are evolving, starting from simple linear and sequential models to complex ones. In the previous generations of industrial revolutions, the model used to be linear, but with the progress of the revolution, the models started being complex involving diverse categories and inter and intra-stakeholders.

The fourth industrial revolution has more complicated types of models, as systems are made more reliable in this generation (Xu, David & Kim, 2018). Due to the growth of digital technology, a steady increase of open-source knowledge sharing platforms is noted. The open-source platforms have less number of security bug fixes, which require a

contingent system to support system failures. There lies the growing importance of complex, innovative models in the fourth generation of the industrial revolution and the future generation. The interactive model of innovation and the machine learning model (ML) are the important innovation model categories in the fourth generation of the industrial revolution (Morrar, Arman & Mousa, 2017). Under the interactive innovation models, there lies a sense of growing interaction through integration, push and pull models, and establishing external linkages.

The machine learning model fosters expecting automation from machines by configuring them with pre-programmed code (Grisafi, 2018). Well, that ML model serves the purpose of automating machines, such that they can run without human instructions. Both of the innovation models are meant to satisfy the complex reliability requirement of the fourth industrial revolution. For example, interaction through multiple integrations ensures the safety of systems, as they get the contingency support of multiple enterprises' security systems. The types of innovation models also specify the kind of innovation patterns that are required by each of the organizations.

For example, the requirement of enterprises in the fourth industrial generation is quite different from that of the first generation ones. The differences are due to the nature of the systems that people used to deploy before and now. For instance, in the first and second generation, motors are used to run through the combustion of conventional energy sources like coal and petroleum (Lešnik, Kegl, Torres-Jiménez & Cruz-Peragón, 2020). Later in the fourth and upcoming generation, there will be replacement of that with a green energy system that is run through electric power and does not consume any conventional sources of energy. So, in this way, through evolving necessities, the need for innovation models change as the generation of industrial revolutions proceed.

Since the middle of the last century, the fourth industrial has come into existence where the digital revolution is taking place, causing a fusion of technologies dissolving physical, biological, and digital spheres (Rindfleisch, O'Hern & Sachdev, 2017). The mobile devices in the present world help connecting with multiple people throughout the world. Therefore, they retain the power of storing billions of information that are

shared through the interaction. So. Such extended capabilities of devices coupled with artificial intelligence, robotics, the internet of things, and 3D printing has given rise to the fourth industrial revolution (Gabor & Brooks, 2017).

All of the aspects described above are related to automation, which in turn has increased economic development, as with minimum labor input, great productivity is attained. The fourth industrial revolution does have the potential to increase the standards of living for people by bringing innovation into the marketplace. For example, starting from ordering a cab online, booking a ticket for travel, listening to online music, and playing games online all has jointly enhanced the quality of life and personal entertainment opportunities. However, the models of innovation operation are different in this fourth industrial revolution, which is discussed below:

Interactive model of innovation

The interactive innovation model believes that innovation does not have a strict format of the procession. It proceeds in a non-linear

sequence in a complex manner (Tai & Wu, 2017). According to this model of innovation, innovation can take place at any stage like conception, new product development, development, manufacturing, and promotion of the same.

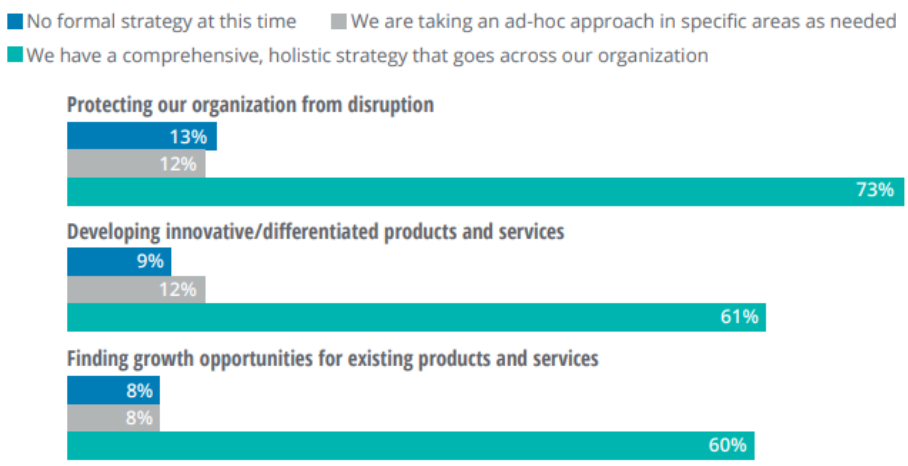


Figure 1: Deloitte survey statistics regarding Industry 4.0

Source: (Deloitte, 2020)

The survey results show that the tendency of developing new products among the organization in Industry 4.0 is far more. On the other hand, finding growth opportunities by retaining the existing portfolio of products is quite low (Deloitte, 2020). Considering the interactive

innovation model, the highest tendency of innovation in the fourth industrial revolution lies in developing new products. The interactive model brings to the discussion that the interactions among different organizational processes such as inventing or producing analytical design, detailed designing, and testing, distributing, and marketing. The interactive innovation model builds a chain system that links all of the processes occurring within an organization, which is much needed for successful innovation.

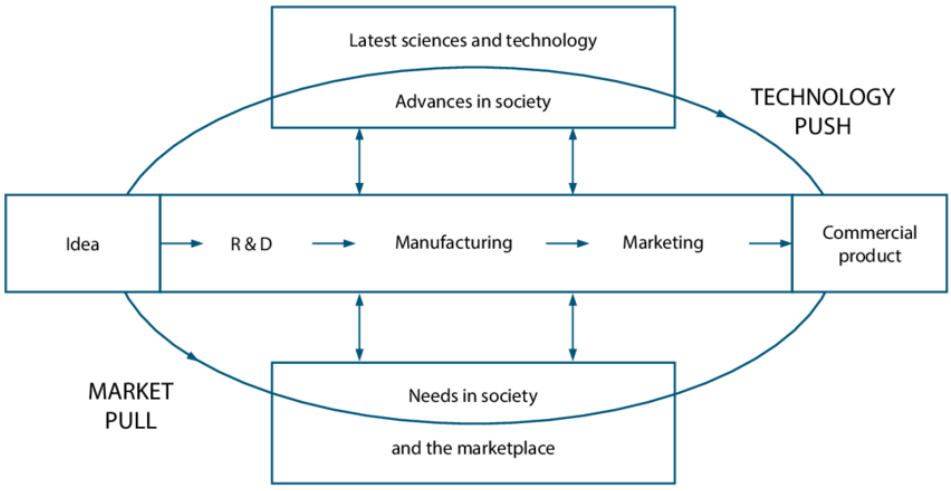


Figure 2: Interactive innovation model

Source: (Tai & Wu, 2017)

The aforesaid chart visualizes how interrelated activities take place within an entity. The development of a commercial product passes through the stages of product idea development, running research, and development on the same, manufacturing products and marketing (Tai & Wu, 2017). In the interactive model, as the name suggests, there has to be sufficient interaction among all of the organizational processes. For example, if the R&D department works without considering the product idea, then it will normally end up in faulty production, which is manufacturing and marketing the wrong product.

The entire innovation process also constitutes interaction with external factors such as technology trends, societal advancements, societal needs, and the marketplace (Wenchao, Rongdi & Lixin, 2019). The idea for an innovative product is through by consulting the latest trends that are running in the marketplace. For example, the rising concerns for the depletion of conventional energy sources have raised a sense of urgency to switch alternative energy sources. Keeping that in mind, Tesla started inventing electric cars, which can be run by charging

batteries without any combustion of fuel (Habib, Kristiansen, Rana & Ritala, 2020).

So, in the situation of Tesla, the technology trend of transforming into sustainable technology has created a push within Tesla to bring the electric vehicle into the market place. The interactive model of innovation also supplies a push-pull concept, which shows that market trends such as technology serve as a push, and the innovative goods are pulled into the market due to high customer demand. Again, needs in the society and the market place pull that innovation and become responsible for successful acceptance of that innovative goods in the marketplace.

The interactive model for triggering successful innovation also requires a skilled workforce, especially those who could think unique (Wenchao, Rongdi & Lixin, 2019). There lies a huge difference between the working patterns of a creative organization and a highly productive entity. For example, a steel manufacturing unit esquires laborers who could produce huge amounts of steel within a certain period. So, in such steel factories, there lies the need for fast workers who know running mechanical equipment.

On the other hand, in the case of software development firms like Globant, there lies the need for software engineers having the critical thinking ability which would serve the rising needs of clients. The developer remains responsible for designing apps, software, and websites that match the unique requirement of the client. Salesforce is such a company that has prepared the Salesforce software, which brings sales insights by generating customer leads. So, the engineers in that company are always applying their critical thinking capability to develop new software that would facilitate the generation of leads and help other organizations to get access to a wide range of customer databases.

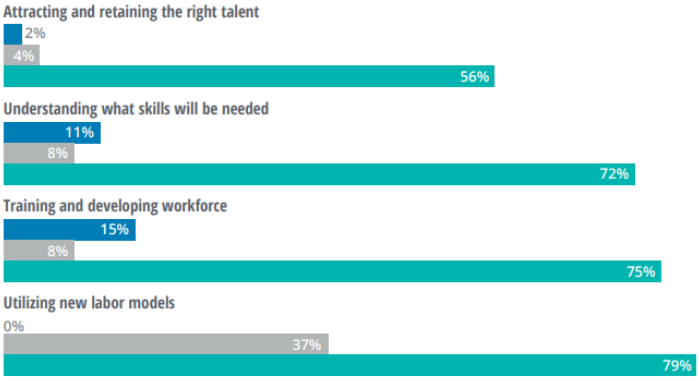


Figure 3: Deloitte survey statistics for retaining skilled staffs

Source: (Deloitte, 2020)

The proportion of attracting and retaining the right set of talents in the workplace is quite high in Industry 4.0 (Deloitte, 2020). Considering the interactive model of innovation, it is justified to engage the right group of skilled laborers and employees for fostering successful innovation. Following the model, the maximum number of organizations have put effort into upgrading the skill standard of employees. They are also focused on training and development programs to increase the skill level of staff such that they can think of innovative things to be brought into the marketplace.

Therefore, considering the interactive model of innovation, there have to be sufficient interactions with people at all levels of organizational processes. In a simpler sense, the officials in the innovation planning department should fetch the right information to the manufacturing unit supervisor, and the same information needs to be transferred to the marketing department, which ends up in suitable commercialization of products.

Machine learning model

Machine learning (ML) has attained high priority in the innovations of Industry 4.0, as most of the innovations are relied upon inducing automation (Rindfleisch, O'Hern & Sachdev, 2017). The ML models are meant for constructing algorithms and programs as well, based on which the machine will work. The algorithms frame the entire process starting from input to be given inside a system and the expected output. Based on the provided algorithm, the codes are designed to make the system work expectedly. In Industry 4.0, there has been a growing need for automation as people expect to give less effort to systems.

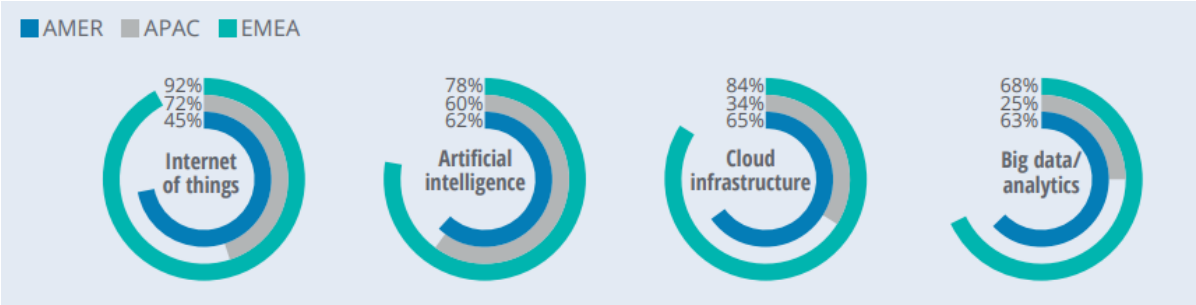


Figure 4: Expected impact of Industry 4.0 technologies by region

Source: (Deloitte, 2020)

The internet of things, artificial intelligence, cloud infrastructure, and big data have the highest persistence in the EMEA region. The EMEA region comprises Europe, Middle-East, and Africa. Now, all of the aforesaid aspects are directly related to machine learning, which has laid the basis of Industry 4.0. The internet of things is the network of objects that are connected via the internet medium. For example, routers, digital sensors, and software are connected to the internet of things. The fourth industrial revolution is majorly associated with digital technologies, and the internet of things is the baseline of going digital, where objects are connected in the internet medium.

Second is artificial intelligence, which involves running machines automatically based on a set of codes. 78 % of artificial intelligence has a profound impact in the EMEA region (Deloitte, 2020). The cloud infrastructure is the virtual storage space that does not require disk space within electronic devices. The cloud-based storage systems have remained useful for small, medium, and large scale enterprises. Especially in the EMEA region, the enterprises, along with the individual users, find

enough space to store files and confidential information with the advent of cloud infrastructure.

The ML models also find application in cloud infrastructure, as they provide smart solutions like transforming file formats, uploading, downloading, and sharing (Habib, Kristiansen, Rana & Ritala, 2020). Now, in Industry 4.0, the organizations have also started relying on data, and hence data sharing has acquired the big data pattern. Big data describes the association of structured and unstructured data available in open source platforms such as Google and social media sites.

With the advent of digital technologies, huge chunks of data are available on social media sites as multiple people interact over there, leading to profuse data sharing. Not only in social media, but the spreading of data has also been there in other sites like stock exchanges, jet engines, and other networking sites. The machine learning models foster on supplying the configuration with the set of codes with which the software or the technology tools work.

Different organizations do use different machine learning models, depending on their necessities. For example, Amazon uses three types of

ML models such as binary classification, multiclass classification, and regression model (Amazon, 2020). Amazon's machine learning model is used to predict responses from consumers to a marketing offer made to them. The binary classification model helps amazon to choose one possible outcome from two given classes. For example, "Will the user purchase the product?" Here, the ML model of Amazon makes one choice between the two available choices that are user buys the product, and the user does not buy the product. So, the entire ML algorithm of amazon is focused upon predicting consumer responses.

The multiclass classification model helps in making choices among multiple things. The regression models are used for predicting a numeric value for a generated problem. Moreover, Amazon deploys the ML models to identify potential customers for a designated marketing campaign. Similarly, the ML models do serve certain purposes apart from predicting potential customer responses, such as automated billing, employee attendance record updating through biometric, and integrated corporate functioning through software (Habib, Kristiansen, Rana & Ritala, 2020).

In Industry 4.0, the ML models are capable of drafting the framework for the automatic system of machines. Thus the fourth industrial revolution has transformed the traditional way of operating businesses to modern-day digital technology. Advanced technologies like robotics, quantum computing, nanotechnologies, and AI has allowed the existing business models to get transformed into the marketplace. The transformation has helped businesses to manage things better and increase productivity. Here lies the importance of ML models, which helps in one term training of the machines and can generate millions of production units based on the configured algorithm. The ML models have therefore cut the cost of labor, as machines are trained in a way that they can accomplish tasks of multiple staffs all alone.

The interactive innovation model thus speaks about connectivity needed across different operational processes of an organization, which is required to launch a newly innovated commercial product. Especially in Industry 4.0, which is the hub of new product development, there lies the importance of the interactive innovation model. Again as running digital technologies lies in the core framework of Industry 4.0, the ML models

define appropriate training gives to the systems to work without manual effort.

Chapter IV - Orange economy

The Orange Economy is also called the Creative Economy, which brings together different sectors of the economy. According to UNESCO, its major aim is the marketing of activities, services, and products, dissemination, promotion, reproduction, or production which possess patrimonial, artistic, or cultural content. Its products or services are associated with intellectual property such as videogames, radio, TV, software, advertising, music, fashion, toys, games, research and development, publishing, design, film, crafts, visual as well as performing arts, and architecture.

As per the United Nations Conference on Trade and Development (UNCTAD), the trade within creative goods and services has experienced a suitable period from 2002 and 2011 where exports increased by 134% (Díaz & Neira-Tovar, 2019). They would be considered to be the fifth most traded commodity across the world if they were involved within the classification system of the International Trade Center (ITC). During 2011, exports of creative products and services reached up to 646 billion

dollars; but services raised 70% faster as compared to products as these contacts are highly being made over the internet.

The orange economy provides an infinite opportunity as Creative trade is less explosive in comparison with trade within raw materials or commodities. For example, it weathered the global financial crisis efficiently as compared to sectors such as oil. Although sales from the Organization of the Petroleum Exporting Countries (OPEC) recorded a 40% drop in 2009, exports of creative goods and services only contracted 12%.

Restrained in trillions of dollars, if the Orange Economy were considered to be a nation, it would be the fourth largest frugality in the domain after Japan, China, and United States; and the fourth-largest, the ninth-largest exporter; labor force with 144 million employees. The Americas are evidently enhancing the Orange Economy trade across the world because of the imposing performance of the United States. The trade shortfall within the Caribbean and Latin America is huge in linking with the exports of its creative products and services. Based on the major

concern, it is seen that the net payments for intellectual property licenses as well as royalties, the discrepancy nearly increases.

Almost 1.77% of the exports of creative products across the world created in the Caribbean and Latin America. Less than a third of these exports move to other nations within the region, where more than 64% are engaged to industrialized economies, and less than 3% move to other emerging markets. The workforce of the orange economy across the world extends as compared to the automotive industry within Japan, U.S., and European Union, with 29.5 million employees.

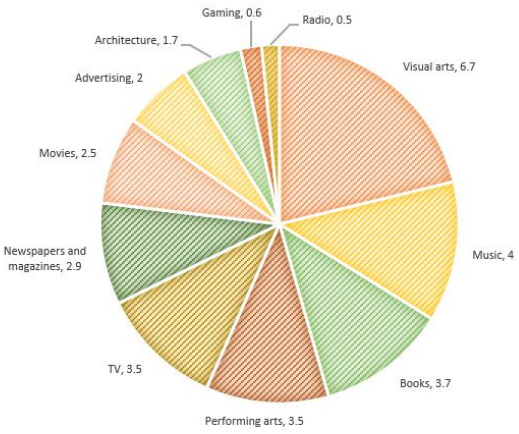


Figure: Global map of culture and creative industries

(Source: Díaz *et al.*, 2019)

Orange Economy as a development target

Current drifts within creative trade are skewed in support of services and economies with a “mindfactures” where a rigorous digital approach will take the lead and crack the Orange Economy into a major improvement target for producing wealth as well as employment. “Mindfactures” like crafts, film, videogames, design, and art carry with them an incorporeal representative value that surpasses their cost of utilization.

Another option includes convincing the aptitude of the 107 million minority (between the ages of 14 and 24 years staying in the Caribbean and Latin America) to determine the early acceptance of business models related to “mindfactures” (the center of an Orange Revolution) and to construct an empire based on this creativity (Castro, Lizi, Chagas, Carvalho & Vanin, 2020). Access, whether physical or virtual, is considered to be significant, as is the interaction among technologies, entrepreneurs, creative, content, and audiences. Contact and access are regarded as the vital catalyzers for producing innovation, related to the cross conception of habits, interpretations, uses along with concepts.

Organization of the Orange economy

The Orange or Creative economy is classified into two major categories, which are composed as follows:

Category 1

The visual arts such as video art, installations, sculpture and painting, art in movement, photography, the performing shows and arts like puppetry, dance, and theatre, music like concerts, operas and orchestras, ecotourism and tourism, traditional goods and handicrafts, gastronomy, archaeological sites, historical centers, cultural traditions and expressions, for example, festivals and carnivals, culture and the creative economy and education in the arts are among others.

Category 2

Cultural trades facilitates services and/or products that can be mass replicated and dispersed. This involves the broadcasting trade like magazines, newspapers and books, recorded music, radio, and the audiovisual industry, literature, television, and film. Furthermore, news agencies, along with other information services, are also considered to be a major portion of this category.

Category 3

The following services and/ or goods belong within this category, are regarded as content software and new media: advertising, fashion, architecture, interactive audiovisual content, jewelry, illustration, graphic arts, animation, software creation and applications, digital platforms as well as video games.

Characteristics of the orange economy

One major characteristic of an Orange Economy good is that it possesses a separate intellectual property entitlement. This indicates that however far the part of work is exported or travels, its maker recalls a certain form of possession. It is seen that such businesses collaborate their activities amongst themselves by altering concepts into creative and/ or cultural services and products (Reznik, 2016). Additionally, the worth of these possessions is considered through their range of innovation, which is reflected within the intellectual property. The creative actions are understated within the official data gathered by

national statistical agencies, along with other entities proficient in data collection.

Benefits of the orange economy

With the help of this policy, small-scale organizations, entrepreneurs, along with investors, are able to find a vigorous structure in order to upkeep their formation and profitable success within the market. The benefits offered by the orange economy are as follows:

Protection of intellectual property

The major factor which makes the orange economy exclusive is the fact that intellectual property (IP) is being placed in the form of product in order to enhance economic development. Individuals functioning commercially within creative industries require a robust intellectual property fortification to make sure that their work remains lucrative. Backing organizations, along with individual's IP rights, offer a twofold advantage that not only helps in building profitable confidence and safety within creative industries but an achievement for businesses within these

areas. Therefore, it indicates means growth in national income via taxes. Local organizations like the Colciencias and Superintendence of Industry and the Ministry of Commerce Industry and Commerce, are armed to assist organizations to build their business models, and also defend their creations with legal resources, trademarks as well as patents.

Commercial incentives for businesses under the orange industry

The particulars of the orange economy creativity involve numerous treasured incentives for businesses operating within one or more industries recognized as 'creative'. However, in order to enjoy these superior circumstances, foreign entrepreneurs, as well as investors, should first integrate or build an organization within the market and make sure it is recorded with pertinent local establishments (Żelazny & Pietrucha, 2017). The business should encounter steady agreement necessities local legal support.

Tax exclusions

Under the orange economy, the government provides a tax exclusion for the first seven years of trade, where the exclusion offers a helping hand to investors. Functioning over seven years without taxes facilitates an organization with the opportunity to establish themselves based on responsibility along with other lawful agreements before full tax necessities are instigated.

New job opportunities

One of the major objectives of the orange economy is to bring new job opportunities to individuals without financial freedom that is regarded as significant for the emerging country. With the help of Orange Economy, businesses should now appoint and pay seven workers. This policy also aims to facilitate enormous opportunities for native employees as well as minimize overall unemployment.

Registering with the orange economy

The orange economy provides an opportunity for the investors to register within a creative industry in order to acquire the benefits associated with the orange economy (Boccella & Salerno, 2016). It also

helps them in registering their business on the Ministry of Culture's website page and generate user profiles devoted to the organizations related to the orange economy.

In order to register on this particular site, the investor is required to serve the following basic information regarding their organization:

- Organization's date of establishment
- Certificate of Presence
- Form of business structure
- Information based on legal representation, physical location, and contacts
- Explanation of the appropriate economic action recognized in the orange economy agenda
- Local code recognizing the type of economic action
- Tax Identification Number

Creating opportunities for regional development by the orange economy

The significant aim of the orange economy is to stimulate the interchange of international and regional effective practices within the application of actions that uphold joint work among the private and public sectors along with the academia for the advantage of orange accomplishments. In 2015, orange activities estimated for 6.1% of world GDP, and their drive had strengthened exponentially with the help of and information and communications technologies (ICTs) along with digitization (Kemeny, Nathan & O'Brien, 2020). Moreover, these segments have been categorized by their ability for flexibility at the time of hostile exogenous occasions that allowed them to boom a quicker recovery after the international financial crisis in 2016 and have appeared as a substitute in the processes of economic diversification.

Moreover, these creative and cultural industries possess an interconnected offer that works within changing aspects of groups with robust creative deliveries and able to stimulate actions, like trade, transport, manufacturing, and tourism. They also facilitate great opportunities for the embodiment and strengthening of regional

incorporation by increasing trade as well as cultural links through the interchange of creative substances.

However, to make sure the full manipulation of their perspective, it becomes significant to develop within numerous features of public activities, to develop a robust network of concentrated support and stimulate citizen awareness for enhanced performance. Therefore, the development of a consistent and numerical information system will prove significant, via plotting, satellite interpretations, and observing pointers, to acquire knowledge regarding its arrangement, position, and real involvement to employment and economy.

Furthermore, at the institutional level, the development of regional and national instruments and units are needed to inspire and prevent the productive activity of the sectors. Hence, with the help of laws, it becomes possible to assure intellectual property rights, improve the development of the cultural organization, and stimulate the insertion of employees in social protection systems and pension.

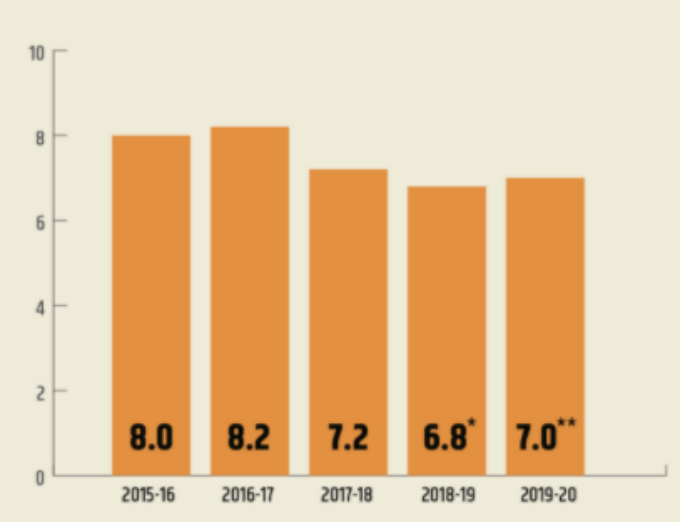


Figure: Real GDP of orange economy

(Source: Kemeny *et al.*, 2020)

Capturing the value of output in orange economy

As per the report, creative and cultural production are enhancing the rapid growth of the online economy. Sales of games, videos, music, and e-books created $66 billion in 2018. On the other hand, content sales increased sales of digital subscriptions as well as devices to online streaming platforms and media along with advertising on them. It has been estimated that creative content produced $22 billion in advertising

revenues in 2018 for free streaming websites like YouTube as well as online media (Popiel, 2017). These statistics have possibly maximized exponentially in succeeding years. Customer craving for faster networks along with superior bandwidth accessible on portable and smart devices seems voracious.

At the same time, the statistics do not involve billions within online ticket sales for enactments or all the added jobs and revenue accumulating to creative professional service earners like media agencies and digital advertising. Beyond the numbers, fostering talent within the creative and cultural subdivision is crucial to economic growth as well as development. Creative and cultural industries seek to employ more women and youth by offering them more flexible work surroundings. For instance, American artists are 3.5 times more expected to be self-employed as compared to U.S. employees overall.

On the downside, most of the related jobs are performances or provisional work and payment, which may depend highly on obtaining as well as proclaiming intellectual property rights. Without constant work that is well remunerated, cultural, and creative work might fail to deliver

a basis of adequate and consistent income. The Asia-Pacific region consists of more than one-third of international sales along with 43 % of jobs related to creative and cultural industries. Furthermore, television broadcasts and visual arts possess about 40 % of the value produced by the industry and 35 % of jobs. Other portions of the industry, like book and newspaper publishing, employ more individuals but produce less revenue.

Culture of trading

The beauty of trade in the orange economy or creative services and goods is the capability to enjoy incredible cultural ingenuity as well as diversity, along with shared experiences as an international community. The UK is well-known for its world-famous video games. One of its most prominent exports is Grand Theft Auto 5, which is considered to be the fastest-selling video game of all time that received $1 billion across the world within its first three days. The UK government declared a $6.2 million Prototype Fund to support video game start-ups and guaranteed another $6 million to fund a Skills Investment Fund for training within this along with other creative segments (Munro, 2017).

Canada has long provided tax credits in order to attract video and film production. An Ontario Music Fund offers allowances to address asset gaps in its live and logged music industry. Latin music and telenovelas attract international audiences. Most of the World Heritage sites within Latin America were constructed upon prehistoric Aztec, Maya, or Inca civilizations, which are considered to be the magnets for tourism exports by supporting both national and local economic development while sharing the rich cultural history of the region.

Getting Paid for Creativity in the Orange Economy

In order to enable such industries to flourish, governments should enhance their legal frameworks to prevent creative and cultural intellectual property from theft. Usually, the services and products within the creative economy consist of separate intellectual property entitlement so that when a creator or an author exports it, they recall the certain form of possession on which to recompense them for enjoyment or utilization of the work. For example, a developer within Colombia or Ukraine would be permitted to obtain a payment every time their licensed software is downloaded and copyright-protected anywhere throughout the world.

Having suitable intellectual property laws on the books will not prove to be helpful in protecting the majority of the creative works. According to reports by Inter-American Bank, only 34.8 % of creative industrialists within the Caribbean and Latin America had put some effort to obtain a copyright or record their rights to intellectual property (Thiel, 2017). Among the entrepreneurs, around 17.4 % stated that they had not done so as they determined it highly expensive, and the other 16.4% stated that they did not have much information regarding the procedures for receiving the recording.

The creators within the United States determined that they are familiar with the rights accessible to receive but acknowledged that it is expensive to acquire complex intellectual property laws along with representation. In most of the trades, creator organizations like collective management organizations (CMOs) within the music industry help in overcoming certain challenges by managing the distribution as well as licensing of payments along with compensation to its member performers. However, governments could do more in order to assist their creators in gaining themselves protections of intellectual property.

Digitalization and entrepreneurship in the orange economy

The orange economy has also imposed a strong response to the growing momentum of digitalization. The creative people and businesses dealing with creativity found a feasible platform to showcase their talent. For example, Crystal Lagoons, a US-based organization, has developed innovative technology allowing the creation of crystal lagoons, offering an ideal beach lifestyle. So, the company focuses on how far their engineers are able to produce realistic crystal lagoons that would satisfy the aesthetic needs of visitors. Digital technology has facilitated that creativity, as engineers can use software for sketching the layouts of lagoons, or the area it will cover, needed visual intensity, and other factors. So, apart from showcasing talent by posting on the internet, the digitalization in the orange economy facilitates the creation of creative products or services.

Impact of encouraging creativity in the economy on production efficiency of organizations

The impact of creativity in the orange economy leverages production efficiency, as people get introduced to innovative products and also creates new jobs. When there lie multiple numbers of new product launches in an economy, then that automatically creates multiple jobs and new sectors as well. However, increased spending on creativity can obstruct production efficiency. In simpler words, when effort and investments jointly get imposed towards research and development (R&D), the main production frequency decreases. So, the increased focus on creativity in the orange economy does have the chance to deteriorate the number of units of products produced in a given period of time.

Creativity improves the quality of life, engage customers, and also enhance the attractiveness of towns and cities. However, creative industries face difficulty in financing, insufficient access to infrastructure, and preservation of intellectual property. For example, Globant, a UK-based software development company, developed “Augmented collaboration” named technology tool to engage dispersed workforce at times of COVID-19 pandemic. The majority of employees are working

from home. So, it is a brand new technology, easing the way of working and enhancing communication. Besides being a realistic solution provider, augmented collaboration may receive distrust from financers, that whether the innovation will work properly or not.

In the orange economy, the creative investments for boosting communication in the remote workforce have been found with high economic returns. The competitiveness in an economy also serves as a factor for generating demand for production, which in turn also determines the production efficiency. The efficiency of production lies in the situation when the produced goods do have sufficient demand in the marketplace. The Caribbean and Latin America are found as such competitive places for creativity, where each of the creative elements is unique to each other. In simpler words, the unmatched creative talent pool in the two areas has leveraged the efficiency of the regions to compete in the global economy.

Therefore, the creativity encouragement principle of the orange economy has increased production efficiency only when the creativity applies to the contemporary needs of consumers.

Gender discrimination in the economy

However, the orange economy is not yet successful in dissolving gender disparity in creative entrepreneurship. Considering statistics in the Caribbean and Latin America, the women creative entrepreneurs are quite less than that of male entrepreneurs. Where the proportion of male persons becoming a creative entrepreneur in the region lies 61. 8 %, the proportion of women lies 38.2 %.

Critical analysis of creative entrepreneurship in the economy

Innovation or thinking creatively starts from childhood, which then continues and gets developed in creative entrepreneurship. Instances of such successful creative entrepreneurs are Steve Jobs and Bill Gates. In the case of Latin America and the Caribbean, which bear dominating instances of the orange economy, the median age seems suitable for the exploration of creativity. However, successful creativity requires prior experience in the same. For example, a person for developing innovative software must have related IT knowledge.

Otherwise, innovation will not work. The mind-set of people attains high priority in determining the existence of creative entrepreneurship within a nation. As seen in the regions of the Caribbean and Latin America, the people over there do prefer mostly freelance works, self-dependent jobs, and steady contractual works. However, in the present condition of the COVID-19 pandemic, there has been noted a growing tendency among the creative entrepreneurs to show their creativity from home. In simpler words, working from home has become the new normal in the present society.

However, the creative entrepreneurship in the orange economy mostly consists of micro-enterprises. The average number of employees in creative organizations is about 1.9. About 87.1 % of organizations are microenterprises (McRobbie, 2016). In the orange economy, thus, the critical aspect is the shortage of large scale organizations. The large scale organizations do help to increase the nation's GDP by producing a large number of items in a limited time. On the other hand, the lack of large scale enterprises in orange economies like Latin America and the Caribbean has depreciated the production efficiencies of the

organizations present in those regions. Again, the average age of creative enterprises is about two years and five months. Therefore, the orange economy also lacks long term employment opportunities.

Future landscapes for orange economy

Social media sites provide content creators with revenue-sharing models by offering a new trail for digital creative to make money through their work. The ten zones of innovation determine the way through which the altered creative and cultural country could be leveraged to attain accurately sustainable development in the Caribbean and Latin America in the next ten years and beyond.

Platform Coopertivism

Employment and business cooperatives facilitate the career services, administrative support, and management that independent creative need in order to make a living. Devoted spaces for events, entrepreneurs, and innovators like hackathons have cracked up within built-up centers throughout the Caribbean and Latin America. These forward-looking creative centers house a growing and new form of business and employment collectives, which are facilitating career

services, administrative support as well as management along with other resources significant for creative to make a living. Therefore, the digital economy will guide in more entrepreneurial alliances among independent employees within the cultural and creative industries in order to support risk- innovation and taking. With augmented declarations of stable income along with access to training and capital, more individuals will view a profession within the creative arts as productive as well as feasible.

Artists as first responders

Communities and countries turn towards the arts as a vital accumulation to multidisciplinary emergency response plans during the initial stage of natural disasters. In the future, the Creative Recovery Network will focus on facilitating training for artists along with other cultural employees who are interested in captivating the lead in serving their communities to help them recover from the influence of natural disasters. It will also facilitate them with a digital platform where they will be able to share the work that they have done at the time of post-disaster situations in order to serve as motivation for others. The stage involves tools for generating digital postcards, Vimeo video, and SoundCloud

audio tracks to intensify and communicate stories based on creative recovery.

Empowering women in tech

Girls and women are motivated to view video game development and design as a welcoming industry and are reinforced in generating female-run studios. In the future, empowering Latin American women will help in making up a comparatively high share (49%) of those who play video games in comparison to other areas, but Latinas are seldom documented by the gaming community. Even more, determining is the scarcity of women-run studios and female game developers.

Amplified landscapes and cultures

Emerging technologies apprehend traditional knowledge and involve a new generation in leading-edge cultural and creative production. As augmented and virtual realism technologies endure to storm their path within the conventional, it will help people to turn to these to experience culture. In the future, the groups would look towards these tools from communicating holograms to immersive regenerations of the real world, from ramified knowledge of outdated skills to

augmented-reality history lessons to immerse, share and capture others within their landscapes, knowledge, and traditions. As the technology develops, individuals will no longer see themselves as inert spectators of additional place and other culture which they will be capable of cooperating with, experience, taste as well as smell a place in ways never before conceivable.

With the right investments, nations within the Caribbean and Latin America possess an opportunity to not only grab their cultural inheritance before much of it expires out but also involve groups in operating it themselves. Within the process, groups will be able to acquire new skill groups in progressive technologies, which in turn would support them in the future learn to monetize as well as value their traditional landscape and skills and pervade their deep tradition and history into the next generation of creative construction. Apart from this, augmented creative production within these media could efficiently assist as a commercial for the province throughout the globe.

Regional creative markets and clouds

New provincial marketplaces for cultural goods support creative shape the employments and nations shape products, assimilating economies as well as generating cultural exchange. In the future, new provincial marketplaces for cultural goods would emerge, particularly within the emerging world, in order to enhance creative enlarge outside the bounds of their national boundaries. They will assemble entire trades of creativity, such as from fashion to film, forging new partnerships, spreading ideas, and glimmering cultural exchange.

As work becomes more task-focused, provincial markets will provide an enormous global opportunity for individual creativity. Moreover, for nations that want to enhance trade, these exchanges would open up new markets, as they assist in constructing a more unified regional brand as well as identity. The accumulation of new management platforms along with technologies, would also help in supercharging these influences by matching sellers and buyers, recommending regional agents, and allowing for cross-border digital manufacturing and formation.

Over the next era, the orange economy would multiply, gauge, and mechanize within the market as they move towards the cloud. Peer-to-peer algorithmic matchmaking along with platforms will also assist creative trades flawlessly join with the adequate partners, buyers as well as suppliers throughout the province. Furthermore, on-demand fabrication and virtual reality will help buyer's interpret, practice, and even print out CAD files based on cultural goods intended elsewhere within the region. Meanwhile, digital contact with native cultures will help in increasing drive demand for ground tourism. However, in the future, the actual influence of these provincial marketplaces will go outside employment.

It has been evaluated that cultural markets will help in the development of new spaces for global creative exchange and collision, infuriating provincial exchanges and offering a stage to facilitate those exchanges to the domain. Hence, over time, they will falsify the way for a sturdier Caribbean and Latin American identity along with provincial financial asset which no single nation could attain on its own. Constructing these markets will not be easier, and there will be a need to

have shared provincial rules in order to initiate them. However, certain factors that will provide businesses and creative within a number of benefits are a shared language, enormous cultural diversity, and province's distinct strengths.

References

Amazon. (2020). Types of ML Models. Retrieved 30th November 2020, from https://docs.aws.amazon.com/machine-learning/latest/dg/tutorial.html

Anas, V. A., Ramli, M., & Ilyas, A. (2020). Supply and Demand Model of Construction Materials in Mamminasata Metropolitan Area, South Sulawesi. *International Journal of Engineering and Science Applications*, *7*(1), 35-41.

Animitsa, Y., Novikova, N., & Klyuev, Y. (2019). Leadership, Economic Growth, and the New Industrialization. In *Sustainable Leadership for Entrepreneurs and Academics*, 473-480.

Attema, A. E., Brouwer, W. B., & Claxton, K. (2018). Discounting in economic evaluations. *Pharmacoeconomics*, *36*(7), 745-758.

Baranova, N., Matyushok, V., & Sorokin, L. (2018). An Impact of Growing Industrialization and Human Capital on the Sustainable Economic Development. In *New Trends, Strategies and Structural Changes in Emerging Markets*, 27-28.

Ben-Ami, D. (2015). Technology: The Third Industrial Revolution. IPE. Retrieved 13 December 2020, from https://www.ipe.com/technology-the-third-industrial-revolution/10007759.article.

Boccella, N., & Salerno, I. (2016). Creative economy, cultural industries and local development. *Procedia-Social and Behavioral Sciences*, *223*, 291-296.

Casadella, V., & Uzunidis, D. (2017). National innovation systems of the south, innovation and economic development policies: A

multidimensional approach. *Journal of Innovation Economics Management*, (2), 137-157.

Castro, L. A. D., Lizi, J. M., Chagas, E. G. L. D., Carvalho, R. A. D., & Vanin, F. M. (2020). From Orange Juice By-Product in the Food Industry to a Functional Ingredient: Application in the Circular Economy. *Foods*, *9*(5), 593.

Chen, C., Bao, Y. Q., Wu, X. H., & Wang, B. (2020). Incremental Cost Consensus Algorithm for On/Off Loads to Enhance the Frequency Response of the Power System. *IEEE Access*, *8*, 67687-67697.

Cinnirella, F., & Streb, J. (2017). The role of human capital and innovation in economic development: evidence from post-Malthusian Prussia. *Journal of economic growth*, *22*(2), 193-227.

Deloitte. (2020). The Fourth Industrial Revolution. Retrieved 30th November 2020, from https://www2.deloitte.com/content/dam/Deloitte/de/Documents/human-capital/Deloitte_Review_26_Fourth_Industrial_Revolution.pdf

Díaz, V. Á., & Neira-Tovar, L. (2019). LA ECONOMÍA NARANJA Y SU RELEVANCIA EN EL MARCO DE UNA CIUDAD INTELIGENTE. THE ORANGE ECONOMY AND ITS RELEVANCE IN THE FRAMEWORK OF A SMART CITY. *Daena: International Journal of Good Conscience*, *14*(2), 75-86.

Economic Growth and the Early Industrial Revolution [ushistory.org]. Ushistory.org. (2020). Retrieved 13 December 2020, from https://www.ushistory.org/us/22a.asp.

Farias, G., Farias, C., Krysa, I., & Harmon, J. (2020). Sustainability Mindsets for Strategic Management: Lifting the Yoke of the Neo-Classical Economic Perspective. *Sustainability*, *12*(17), 6977.

Feki, C., & Mnif, S. (2016). Entrepreneurship, technological innovation, and economic growth: empirical analysis of panel data. *Journal of the Knowledge Economy*, *7*(4), 984-999.

Flor, M. L., Cooper, S. Y., & Oltra, M. J. (2018). External knowledge search, absorptive capacity and radical innovation in high-technology firms. *European Management Journal*, *36*(2), 183-194.

Gabor, D., & Brooks, S. (2017). The digital revolution in financial inclusion: international development in the fintech era. *New Political Economy*, *22*(4), 423-436.

Grisafi, A., Fabrizio, A., Meyer, B., Wilkins, D. M., Corminboeuf, C., & Ceriotti, M. (2018). Transferable machine-learning model of the electron density. *ACS central science*, *5*(1), 57-64.

Habib, T., Kristiansen, J. N., Rana, M. B., & Ritala, P. (2020). Revisiting the role of modular innovation in technological radicalness and architectural change of products: The case of tesla X and Roomba. *Technovation*, *98*, 102163.

Haradhan, M. (2019). The Second Industrial Revolution has Brought Modern Social and Economic Developments [Ebook]. Munich Personal RePEc Archive. Retrieved 13 December 2020, from: https://mpra.ub.unimuenchen.de/98209/1/MPRA_paper_98209.pdf.

Haraguchi, N., Cheng, C. F. C., & Smeets, E. (2017). The importance of manufacturing in economic development: Has this changed? *World Development*, *93*, 293-315.

Kemeny, T., Nathan, M., & O'Brien, D. (2020). Creative differences? Measuring creative economy employment in the United States and the UK. *Regional Studies*, *54*(3), 377-387.

Khan, K., Su, C. W., Tao, R., & Hao, L. N. (2019). Urbanization and carbon emission: causality evidence from the new industrialized economies. *Environment, Development and Sustainability*, 1-21.

Korableva, O. N., Kalimullina, O. V., Zaitseva, A. A., & Larionov, A. I. (2018). Elaboration of database for the subject domain of innovation and economic growth potential. In *Innovation Management and Education Excellence through Vision 2020* (pp. 6065-6073).

Krammer, S. M. (2017). Science, technology, and innovation for economic competitiveness: The role of smart specialization in less-developed countries. *Technological Forecasting and Social Change*, *123*, 95-107.

Lešnik, L., Kegl, B., Torres-Jiménez, E., & Cruz-Peragón, F. (2020). Why we should invest further in the development of internal combustion engines for road applications. *Oil & Gas Science and Technology–Revue d'IFP Energies nouvelles*, *75*, 56.

Liao, Y., Loures, E., Deschamps, F., Brezinski, G., & Venâncio, A. (2018). The impact of the fourth industrial revolution: a cross-country/region comparison. Production, 28(0). https://doi.org/10.1590/0103-6513.20180061

McRobbie, A. (2016). Towards a sociology of fashion micro-enterprises: Methods for creative economy research. *Sociology*, *50*(5), 934-948.

Mohajan, H. (2019). The First Industrial Revolution: Creation of a New Global Human Era [Ebook] (5th ed., pp. 377-387). Department of Mathematics, Premier University. Retrieved 13 December 2020, from https://www.researchgate.net/publication/336675822_The_First_Industrial_Revolution_Creation_of_a_New_Global_Human_Era.

Montoya Giraldo, O. D. (2017). Solving a classical optimization problem using GAMS optimizer package: economic dispatch problem implementation. *Ingenieria y ciencia*, *13*(26), 39-63.

Morales, J. E. R., & López, F. R. (2017). The political economy of bioenergy in the United States: A historical perspective based on scenarios of conflict and convergence. *Energy research & social science*, *27*, 141-150.

Morrar, R., Arman, H., & Mousa, S. (2017). The fourth industrial revolution (Industry 4.0): A social innovation perspective. *Technology Innovation Management Review*, *7*(11), 12-20.

Munro, E. (2017). Building soft skills in the creative economy: Creative intermediaries, business support and the 'soft skills gap". *Poetics*, *64*, 14-25.

Nardinelli, C. (2020). Industrial Revolution and the Standard of Living - Econlib. Econlib. Retrieved 13 December 2020, from https://www.econlib.org/library/Enc/IndustrialRevolutionandtheStandardofLiving.html.

Nath, H., Apte, U., & Karmarkar, U. (2020). Service Industrialization, Employment and Wages in the US Information Economy. *Foundations and Trends® in Technology, Information and Operations Management*, *13*(4), 250-343.

Obijole, E. (2020). The Fourth Industrial Revolution: Economic Impact and Possible Disruptions | Exploring Economics. Exploring-economics.org. Retrieved 13 December 2020, from https://www.exploring-economics.org/en/discover/nigeria-fourth-industrial-revolution/.

Odeleye, A. T., & Olunkwa, N. C. (2019). Industrialization: Panacea for Economic Growth. *Academic Journal of Economic Studies*, *5*(2), 45-51.

Popiel, P. (2017). “Boundaryless” in the creative economy: assessing freelancing on Upwork. *Critical Studies in Media Communication*, *34*(3), 220-233.

Reznik, O. (2016). From the Orange revolution to the revolution of dignity: Dynamics of the protest actions in Ukraine. *East European Politics and Societies*, *30*(4), 750-765.

Rindfleisch, A., O'Hern, M., & Sachdev, V. (2017). The digital revolution, 3D printing, and innovation as data. *Journal of Product Innovation Management*, *34*(5), 681-690.

Roberts, B. (2015). The Third Industrial Revolution: Implications for Planning Cities and Regions [Ebook]. University of Canberra. Retrieved 13 December 2020, from https://www.researchgate.net/publication/278671121_The_Third_Industrial_Revolution_Implications_for_Planning_Cities_and_Regions.

Ross, S. 2020). How Can Industrialization Affect National Economies of Less Developed Countries (LDCs)? Retrieved from https://www.investopedia.com/ask/answers/042015/how-can-industrialization-affect-national-economy-less-developed-countries-ldcs.asp

Speering J. (2018). Why Manufacturing Is Essential For Economic Growth? Retrieved from https://aspioneer.com/why-manufacturing-is-essential-for-economic-growth/

Stahl, R. M. (2019). Economic liberalism and the state: dismantling the myth of naïve laissez-faire. *New political economy*, *24*(4), 473-486.

Su, D., & Yao, Y. (2017). Manufacturing as the key engine of economic growth for middle-income economies. *Journal of the Asia Pacific Economy*, *22*(1), 47-70.

Sutikno, S., & Suliswanto, M. S. W. (2017). The Impact of Industrialization on the Regional Economic Development and Community Welfare. *Significant-Journal of Economics*, *6*(2), 231-246.

TAI, C. L., & WU, Z. F. (2017). “The Construction of Internet Plus" Era of Ideological and Political Education Subject Interactive Model. *Journal of Hubei Correspondence University*, *2017*(14), 35.

Tarasov, V. E., & Tarasova, V. V. (2019). Dynamic Keynesian model of economic growth with memory and lag. *Mathematics*, *7*(2), 178.

The Industrial Revolution: Past and Future. (2020). Federal Reserve Bank of Minneapolis. Retrieved from https://www.minneapolisfed.org/article/2004/the-industrial-revolution-past-and-future

The Second Industrial Revolution: Timeline & Inventions. Study.com. (2020). Retrieved 13 December 2020, from https://study.com/academy/lesson/the-second-industrial-revolution-timeline-inventions.html.

Thiel, J. (2017). Creative cities and the reflexivity of the urban creative economy. *European Urban and Regional Studies*, *24*(1), 21-34.

UNESCO. (2020). Launching an orange future. Retrieved 30th November 2020 from https://en.unesco.org/creativity/sites/creativity/files/launching-an-orange-future_idb.pdf

Vega-Muñoz, A., Bustamante-Pavez, G., & Salazar-Sepúlveda, G. (2019). Orange Economy and Digital Entrepreneurship in Latin America: Creative Sparkles Among Raw Materials. In *Handbook of Research on Digital Marketing Innovations in Social Entrepreneurship and Solidarity Economics* (pp. 182-203). IGI Global.

Wenchao, L., Rongdi, G., & Lixin, T. (2019). Can interactive innovation make energy-saving transformation of manufacturing enterprises?. *Energy Procedia*, *158*, 3228-3233.

Xavier, A. F., Naveiro, R. M., Aoussat, A., & Reyes, T. (2017). Systematic literature review of eco-innovation models: Opportunities and recommendations for future research. *Journal of cleaner production*, *149*, 1278-1302.

Xu, M., David, J. M., & Kim, S. H. (2018). The fourth industrial revolution: Opportunities and challenges. *International journal of financial research*, *9*(2), 90-95.

Yu, R., Burke, M., & Raad, N. (2019). Exploring impact of future flexible working model evolution on urban environment, economy and planning. *Journal of Urban Management*, *8*(3), 447-457.

Żelazny, R., & Pietrucha, J. (2017). Measuring innovation and institution: the creative economy index. *Equilibrium. Quarterly Journal of Economics and Economic Policy*, *12*(1), 43-62.

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