The Fourth Industrial Revolution And Workers' Emancipation: A Sociological Critique

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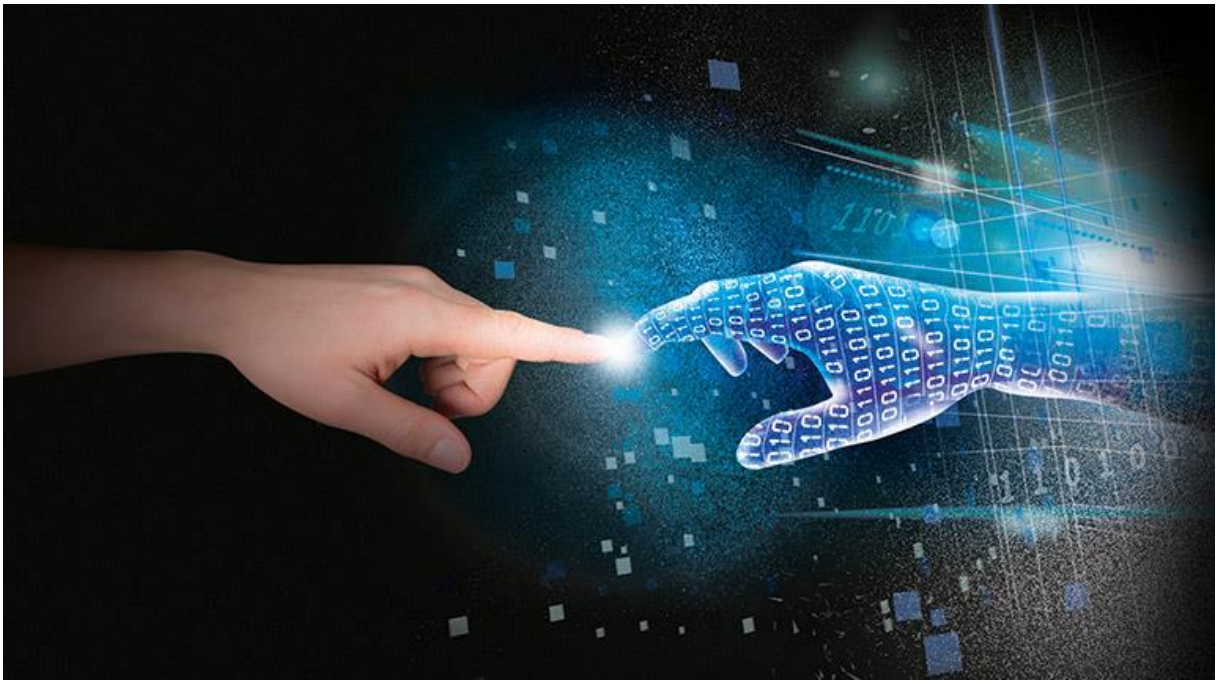

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Introduction

The industrial world is at a turning point. Technological advances in the realm of automation, have come to challenge the current forms of industrialization. Technology transpires through every layer of society, for better or worse. This thesis will attempt to analyze the efficiency and impacts of governmental initiatives in promoting technology within the frame of the Fourth Industrial Revolution. It will do so by considering the following research question: How impactful is the Fourth Industrial Revolution on Workers' emancipation and how effective are current public policies in addressing issues caused by the Fourth Industrial Revolution such as Technological Unemployment? The thesis will work under the assumption of the following hypothesis: a lack of adequate public policy regarding the changes brought forth by the Fourth Industrial Revolution would result in a lessening of freedom, and equality in societies, as well as being a threat to workers' emancipation.

The Instrumental and Substantive theory have fueled the academic debate concerning the impact of technology in societies during the 20th century, however both theories lack the insight needed and have left a blatant gap in the academic debate at the dawn of the Fourth Industrial Revolution. This major gap being, human impact and their actions. In addition to those theories, Marxist insight will be addressed in order to provide a sociological understanding of technology. *Technological determinism* will be problematized to create a theoretical debate regarding the neutrality and emancipatory impact of technology. In order to address the emancipatory powers of technology, alienation in the era of Digital Capitalism will be addressed. With a Marxist understanding there comes two sides each arguing as to which factor is most important in leading to an Industrial Revolution, the human factor or the technological factor. It has been found that most interpretations and debate surrounding technologies lack sociological considerations, this thesis will offer the reader with a comprehensive sociology of technology. This thesis anchors itself in this debate while focusing on the relevance of technology as a driving factor of change.

From the first Industrial Revolution during 18th century in Britain, there have been several angles from which one can contextualize such revolutions. No country has managed to industrialize without massive social dislocation (Stearns 2007, 69). To understand the differences in outcomes contextualization is key, especially since most countries have been through certain stages of industrialization but not all have had the same outcomes. Past Industrial Revolutions still are a topic of research nowadays, especially in order to conduct comparative studies with the Industrial Revolution that is currently shaping up. These studies have been especially crucial in drawing up parallels between impacts of Industrial Revolutions in different nations (Ibid, 1). Industrial Revolutions extend from the microcosm of the worker's family, to society, to the environment and are therefore ever so encompassing. While these changes are

understood to be ever so encompassing, the extent of technologies' reaches are a new factor in the Fourth Industrial Revolution which were not as impactful in the previous ones. The main concern with Industrial Revolutions is the consensus among historians that they bring rapid changes, which *revolutionize* the core of our societies as well as relations between population and state (O'Brien 1993,2). This is especially concerning considering the phenomenon of Digital Inequality, which could augment drastically with a wider use of technology among non-educated populations. Digital Inequality stems from an unequal access to technology among different tiers of a society. This sudden technological revolution needs to be studied in order to determine the opportunities it's actually creating. The Fourth Industrial Revolution is unlike any previous Industrial Revolutions for it reaches further into society than the first three Industrial Revolutions (Ibid).

The debate regarding technology is not a mere invention of our day, yet it remains as crucial if not the most crucial debate we must be having in order to understand our contemporary societies which have become ever so connected and technologically dependent. Therefore, this thesis will anchor itself in a broader debate, hence proving to be an integrated piece of the renewed debates around technology and its place in our societies. One of the main concepts in order to give a comprehensible sociology of technology is, *technological determinism. Technological Determinism* can be understood as an extension of Marxist critical thought since it understands technology to be the primary factor of social changes/ re-organization rather than class struggle during times of Industrial Revolutions. *Technological Determinism* has seen its fair share of detractors in the past few decades. The emergence of the Fourth Industrial Revolution is an ideal time to bring back Marxist critique of *technological determinism* at the front of academic debate. By doing so we would advance our understanding of the impacts of technology on our societies, which is an extremely relevant issue at the dawn of Artificial Intelligence, Big Data and the Internet of Things. However the current literature regarding the matter seems to be too often disassociating humans, society and technology, while both must be understood as factors in the broader context of society. This thesis will offer a critique of the current literature concerning the concepts that were aforementioned.

The following thesis will be divided into three distinct chapters. The first one will address the theory, literature and key concepts needed in order to analyze the different impacts technology has on our societies. The current definition and what is feared to happen with the development of the Fourth Industrial Revolution will also be addressed as well as a critique of the current literature. The second chapter will focus on presenting case studies that have been selected for this research. The cases of Germany's initiative *Industrie 4.0* which anchors itself within the broader European Digital Market Initiative, as well as India's and Thailand's *Industrie 4.0* initiatives which offer alternative cases compared to western European societies. A comparison between each of those case studies, is necessary to understand all the impacts of the Fourth Industrial Revolution on workers' emancipation and the

effectiveness of public policies. The cases will be presented with a collection of Primary sources, Tertiary sources and data. Finally, the last and perhaps the most important chapter of this thesis will present an argument based on the following hypothesis: a lack of adequate public policy regarding the changes brought forth by the Fourth Industrial Revolution would result in a lessening of freedom, and equality in societies. This hypothesis will be tested with data collected during interviews, policy brief reviewing as well as data collecting concerning technological indicators, emancipatory indicators and democratic indicators.

Chapter I –Theoretical Chapter and Literature Review

"*We must develop a comprehensive and globally shared view of how technology is affecting our lives and reshaping our economic, social, cultural, and human environments. There has never been a time of greater promise, or greater peril."* – Klaus Schwab, Founder and Executive Chairman of the World Economic Forum.

The following chapter will shine a light upon the theories and key concepts that are addressed in this thesis. A critique of each will be provided in order to understand the missing elements which make this thesis so relevant. Several theories will be addressed in the following chapter, each are a key component in creating a theoretical debate surrounding the importance of technology in our societies and its changes. Each theory has a different way of understanding technological innovation. All have their merits and sphere of influence within academia, the core argument of each will be addressed in order to theorize the research of this thesis. The emergence of *technological determinism* during the late 20th century has played an important role in understanding technology as a mean and end of social reorganization. Its emergence also provided a new ground for Marxist critique to flourish in academia.

This chapter will also help conceptualize the key terms needed to understand the research presented in the following Chapters. The Fourth Industrial Revolution will be conceptualized through the contemporary writings as well as our academic understanding of changes brought by such revolutions. Klaus Schwabb's book entitled *The Fourth Industrial Revolution* will be used as a centrepiece in the conceptualization of the terms. Within that debate, the concept of Technological Unemployment will be addressed, since it often is characterized as a key result of rapid technological advances in industries. Further, the concepts of Megatrends and Tipping points will be address since they are crucial indicators in determining the reach of technology within society as well as calculating the changes in Digital Inequality over years within a country. This will lead to the second part of the chapter which will address the ever so important concept of Digital Inequality, what it stands for and what are the risks of letting it unchecked by policies. Hence this Chapter will conceptualize all that is needed in order to analyse later the case studies presented in this thesis, it also allows the reader to form its own critical understanding of the current academic debate concerning the discussed concepts. This Chapter sets out to comprehensively write a sociology of technology for the context of the Fourth Industrial Revolution. Since it will also help us establish, what the Fourth Industrial Revolution clearly is, and hence anchor this thesis within the current academic debate.

1.1 Instrumental Theory of Technology versus Substantive Theory

The Instrumental Theory of Technology and the Substantive Theory both have been dominant theories concerning technology in societies. The two theories also have speculatively addressed the impact of technology on democracies. Both have helped further the research in the field of technology within the political and societal realm. They remain both very distinct in their argumentation. However, both theories have deep rooted shortcomings, and certain factors that they do not take into account. Both theories have reached their expiry date when it comes to understanding neutrality, use, and emancipation provided by technology. This thesis aims to engage those divergences and address them.

The Instrumental Theory argues that technology is neutral, and does not sway any power in the socio-political sphere. A tool is a tool regardless of its use and the end product it creates (Feenberg 2002, 6). Hence one can understand the lack of agency from technology, and that the user dictates the use and outcome through his experience. The Instrumental Theory could be considered as the 'rationalist' theory concerning technology, which would explain its neutral stance towards technology. This argument based on rationality comes from the extensive use of Instrumental Theory in studying Public Administration. It has been through the work of Weber that the Instrumental Theory has come to prominence in that field, and the basis of it is: expectations of external factors and other people's behaviour is far more crucial than the tool itself (Dong 2015, 35). Hence technology is neutral, and has no agency, while the agent using it holds all the power over the outcome. With this notion of agent wielding power over technology one can understand the importance of such theory, to analyse the impact of technologies in power relations, labour relations and democracy for example.

There is also the expectation of technology to function in the exact same manner over the world regardless of different political contexts. Hence the norm of efficiency being the same under one and every context makes technology neutral (Feenberg 2002, 8). As pointed further by the author, Instrumental Theory is widely used in social sciences and is seen by many as the forefather of the Modernization Theory. Modernization Theory, has seen a lot of development through the 20th century as the theory to explain the impact of modernity on nation states, and their relations to new technologies (Badie et al 2011). By doing so, the Instrumental Theory as an optimistic point of view considering technological innovations. As a theory, it does consider technological innovations to be an asset to further social inclusion, freedom and human knowledge.

However, Instrumental theory does not take into account the possibility of good and bad in human use of technology. One could definitely point how unrealistic it is to trust human action to always be 'good' which in itself remains a very subjective term. In addition to that the Instrumental Theory does not take into account, who has access to said technology. It takes for granted that all humans having access to the same technology will use it for good, which is unrealistic. The disregard of geopolitical, and geo-economic realities of the world make the Instrumental Theory of Technology intrinsically not

sociological. The Instrumental Theory of Technology is also only relevant to a certain kind of technology in the second half of the 20th century. Hence cannot be used to historically understand technology in our current societies. Instrumental Theory of Technology hence stands in huge contrast to *technological determinism* since it does not try and understand technology as a sociological factor/input. This also makes it challenging to use Instrumental Theory of Technology in the age of Surveillance Capitalism[1]. Instrumental Theory also lacks the understanding of sociological and institutional impacts of technology, which are sadly needed in order to comprehend the unfolding events of the Fourth Industrial Revolution. This is why a new discussion surrounding the use of technology is needed in order to understand our current societies. Considering the shortcomings of the Instrumental Theory of technology, academics in the past have tried to promote the understanding of technology through the Substantive theory of technology.

Authors such as Thomas Murton and Jacques Ellul have been considered champions of the Substantive Technology since they saw technology as an impediment to freedom and a severe hindrance to the furthering of human knowledge. While their views are from the 20th Century and based on a theological rhetoric, there have been more contemporary authors such as Nicholas Carr who have provided a rebuttal to the optimism of the Instrumental Theory. Carr's research points towards the often harmful impacts technological innovations have on human interaction and rather they seem to enslave users rather than liberate them (Carr 2018, 151). Hence from this argument, one can understand that the Substantive Theory's main argument is that technological innovations do not provide more freedom nor do they further the human race. Therefore, one can understand the Substantive Theory to have been the most critical theory out of the two concerning technology so far. The most fervent defender of this theory Jacques Ellul based his thoughts on his assumption that once technology had reached a certain level it would stabilize and further advances would be minimal (Ellul 1990, 2). However, his assumption turned out to be wrong, as technology forever advances, he rectified himself in his book, *Le Bluff Technologique* and developed a critical perspective to technology, freedom, and democracy. The proponents of Substantivism argue that infact technology and tools we used shape our individual, social and cultural life. And that in addition to that technology is the biggest factor for social change since the dawn of times (Hansen 2003,12). The Substantivist firmly believed that technology is the most important factor in social change, hence there is a parallel to be made between the Substantive theory and Marxist Thought. This parallel will be explored later in the literature review.

It ought to be noted that Elluls's work has often been associated to *technological determinism.* However his theological basis of argumentation has always led him to not approve of this association. Hence one could argue that the main divergence between Substantive theory of technology and technological determinism, is the ideology/theology behind the wrong doings of technology. Based on the fact that

[1] Surveillance Capitalism is a term coined by academic Shoshana Zuboff to describe societies in which technology is used to control the masses.

Ellul was driven by Christianity to make his argumentation, makes his insight ever so fruitless in modern society especially considering the vast emergence of Atheism in the Western World. This thesis will not align with this theory, but presenting the divergence between the theological and ideological side of *technological determinism* though was necessary. In addition to that, Substantive Theory fails to draw a line between good and bad, by only associating negative outcomes to technological development. If it was up to Ellul technological development would have stopped a few decades ago. Mainly due to the fact that Substantive theory fails to understand the role of humans, but rather qualifies them as victim of their own modernity.

Both theories are crucial in order to provide a critical understanding of the Fourth Industrial Revolution as well as past Industrial Revoluions. The Instrumental Theory and the Substantive Theory are raising points which must be considered in order to create a new critical approach to technological innovations. Whether we understand innovation, as a tool to the service of humans which fosters creativity or on the contrary a tool which is threatening to our societies by diminishing freedoms. Studying new technologies is crucial to understand contemporary societies. That is why these theories were discussed, since they so brutally lack any sociological insight, and have treated technology as a separate entity from society. Discussing both theories, and starting to draw a comparison to *technological determinism* will allow this thesis to draw up a sociology of technology.

1.2 Marxist Critical Thinking and Technological Determinism

> *''[…]the reason such an evolution occurs lies somewhere deeper: evolution occurs because the level of development of the technology outgrows the particular form of the social organization, which comes to constrain and fetter it*." – John Roemer, Free to Lose, p126

While one should take into account the importance of understanding class struggle as the key factor in Marxist Theory of History, contemporary scholars such as John Roemer established the ownership of labor[2] as a key factor in transition periods. In our current transition period, access and ownership of technology is the most important property to have. Governments, private owners and citizens stand at a crossroad in order to decide how this property ought to be used. Marxist scholars and thought will help this thesis shine a light on the crucial need to have sociology of technology when studying the Fourth Industrial Revolution. With new technology there often comes new ways of production, and an emergence of new labor relations (Wood 1995, 111). This can be identified in the development of technology which comes to challenge current organizations and brings a new development in production and power relations. Since the access, ownership and privatization of technology has been identified as

[2] The term 'ownership of labour' stems from Locke's argument that the fruit of one's labour are one's own since they produced it. John Roemer argues that the changes in ownership during transition period is what makes, this factor crucial. Technology alienates the worker from the produce and takes away the Locke's fundamental right to ownership of labour.

a crucial factor in times of transition, one can understand how those in control of the technology get to reshuffle the current structure of power relations at work and in society.

As described by Ellen Meiksins Wood there are three perspectives that can be identified in transition periods such as the Fourth Industrial Revolution in order to explain the social changes. The three perspectives that have been identified are (i) the deep cause which is technology (technological determinism), (ii) the historical process (the eliminations of certain forms of exploitation or the gradual socialization of property, and (iii) the facilitator (class struggle). Those three perspectives are used by capitalist forces to retain control over the means of production, and elaborating controlled spaces to retain control. Yet the one that tops them all is the understanding of technology as the driving factor which is used in transition periods (Ibid, 112). Hence Wood argues that class struggle is the facilitator to social change, but that the main factor of social change is in fact technology. The class struggle then becomes a facilitator but not the deep-rooted cause, such deep-rooted cause being new technologies. This is a crucial theoretical insight and a necessary modernist critique of both the Instrumental and Substantive theory since they lacked insight to link technology to society. However this understanding of social change still stands at odds with *technological determinism* hence this insight is always crucial in order for us to problematize it.

Understanding of *technological determinism* also stands in contrast to the neutrality associated with technology through the Instrumental Theory. There are two schools of thought when it comes to understanding *technological determinism.* There is hard determinism which ascribes technology as the sole shaper of societies, and soft determinism which associates the power of technology with other social factors (De la Cruz et al 2016, 1529). However, there is a common ground stemming from both hard and soft determinism which is that technology is an important factor in any case. This has led scholars such as Hrynyshyn to mention that researchers either understand technological development through *Technological determinism* or Instrumental Theory. This all resumes to the neutrality which is given by the author to technology in their research (2008). He argues that new technologies, which are cornerstones of the Fourth Industrial Revolution can be understood from both extremely different perspectives. Hrynyshyn also goes further as discussing the transformative power of new technologies, which also always come with new forms of governmental regulations (2008). Other scholars have even gone further as describing that those new technologies rather than being emancipatory turned out to be new hierarchical means copied on oppressing institutions (Margolis and Resnick, 2000). This stands in contrast with the neutrality assigned to technology by the Instrumental Theory. By identifying technology as a new mean of oppression, through control of the electorate, or access to information such as during the Presidential election of Donald J. Trump, one can start to understand how technology can drastically impact social organization and democracy. More credit is given to *technological determinism* rather than other theories mentioned earlier, since *technological determinism* understands technology to

be an integrate factor of capitalist development. This is why being critical of the *developmentalist* arguments brought forth by the Instrumental is crucial, for they are detached from the reality of other factors around, and take away our understanding of power relations carried through new technologies. On the other hand, Jacques Ellul's work on Substantive Theory has often been described as a certain interpretation of *technological determinism* even though he never classified it as such himself (Kline 2015, 109).

Technological determinism faced a lot of criticism due to its association with Marxism and the certain interpretation of Marxist theory of history that is has (Kline 2015, 109). This is especially based on the debate of the actual space we give technology in our societies. Has technology grown to be the means or the ends of development in human societies? Most scholars abiding by *technological determinism,* have understood technology has a mean in developing new power structures and the crucial factor of change (ibid, 110). This has been reflected in the three perspectives suggested by Ellen Meiskins Wood as mentioned earlier, which have placed technology at the top of the factors responsible for re-organizations of society and hence power relations. She has drawn up those three perspectives in order to categorize the thoughts behind technological determinism and criticize them. Now to further this discussion one must come to challenge this idea that new technologies such as the internet, are generally emancipating. New technologies come under new regulations created by the state as has been discussed by Hrynyshyn. For example the regulations of the United States government regarding educational access to sources on the Internet which effectively makes it a controlled space which lowers the possibilities for emancipation (2008). Hence one can understand that through the scope of *technological determinism* government policies come under the spotlight, as one can understand them as regulations to create controlled spaces which in fact limit the freedom of the user.

However *technological determinism* is academically linked to Marxist thought, and critiques have often preferred the use of the convergence theory over it. A critique of *technological determinism* would argue that technology is not the most crucial factor in developing new power structures, and exploitation. Convergence theory identifies state intervention in public policies for technological efficiency as the main factor which drives struggles into our societies (Skinner 1976, 3). Hence this divergence in thought is crucial to be understood as this thesis is based on Marxist thought, and testing *technological determinism* to the fullest in order to understand the actual impact of technology as a driver in our societies. In order to do so it is necessary to understand what impact technology can have on an individual's Alienation and Emancipation.

Marxist thought is noticeably linked to the concept of Alienation. That is a crucial term needed in order to provide an in depth sociology of technology and labour. Karl Marx's theory of alienation is anchored within its critical perspective of labor relations within a capitalist production line. Alienation refers to

the disassociation and estrangement workers feel in relation to their work and what they produce. It is a direct effect of mechanical labor and its conformity. Since it represses originality and it has emerged most noticeably in the Era of Fordism.

It is crucial for us to understand the importance of Trade Unions within the welfare/consolidated state in order to later analyze their importance within the policies. Their tendency to address alienation in labor, as well as their adaptation and emergence through Fordism, links these concepts, and make each and one of them crucial for the analysis. The evolution of Trade Unions under the neoliberal free trade is now coming under fire. The societal, economic and production changes that are being brought by automation require a change in Trade Unions. Academics such as Andreas Bieler and John Hilary have exposed the idea that neoliberal globalization and free trade, has been turned into a win-win situation by Trade Unions in the Global North. While this win-win situation may have helped secure their position at the bargaining table, Trade Unions all over the Global North are still left to be the last rampart against the alienation and redundancy of many lower-skilled workers. The threat of redundancy is more present than ever if one considers development through the perspective of *technological determinism*. *Technological determinism* argues that technology drives class struggle, and also ensures the exploitation of workers, through automation, exploitation will go a step further by removing the necessity of having as many workers in the production line.

Marx has understood, as portrayed through his works from 1844, that alienation and emancipation were at the core of what historically made social development possible (Comninel 2019, 2). The discussion surrounding alienation and technology can, therefore, be raised, especially considering the furthering of exploitation based on the perspective of *technological determinism* mentioned by John Roemer. Alienation can also go beyond a mere understanding of labor relations, since Marx also understood it as the dreadful impact which capitalist society had on humans, be it on their physical and mental integrity, or every single social process they participated in (Ollman 1996, 131). With this concept of alienation in mind, one can understand how devastating it can be on the individual level, to experience this estrangement from what one produces. In modern history, alienation cannot be understood without the transformations of industrial production. The decomposition of tasks of labor within Fordism allowed for unskilled labor and skilled labor to be separated, this has had further impact in the gentrification of society, urban centers, and labor since it was reinforced by the presence of a small population of skilled workers, and a large body of unskilled immigrant workers (Clarke 1990). Hence once can understand the intricate relation between technology, alienation and emancipation of the worker.

While this has been the focus of most studies on Alienation, there has been an emergence of critical studies regarding Digital Capitalism which address the issue of wide access to technology as alienating. Scholars such as Eran Fischer have discussed that through Marxist cultural analysis, one can understand

social media and access to technology as a new way of capital accumulation (2016, 183). It is to be remembered that alienation and exploitation are tightly linked in Marxist critical thinking. And that is ever so the case with controlled means of media, especially by states public policies controlling the outflow of such media and by using the *developmentalist* argument in their reasoning. By doing so Fischer identifies media, as an ideological tool, and while it might bring less alienation it creates more exploitation. As it essentially gives the state a controlled space for debating and exchange of information. This is a crucial insight needed in order to fully understand the extent and far reaches of public policies concerning Industry 4.0. Most especially in spaces for debate such as *Industrie 4.0* in Germany where the chain of debate and discussion could be interpreted as purposely narrowed down to promote exploitation all while giving a platform for less alienation. This will be further analyzed in the second chapter of this thesis. Fischer takes the case of Facebook, which promotes participation and debate providing a lessening of alienation among users while promoting exploitation by narrowing the scopes of debate with regulations and users guidelines (ibid,187). One can, therefore, make the case that such platforms are used in a way for capital accumulation. Instances of their use and possible usage in public policies regarding new technologies are flagrant.

However there seems to be a clear lack of scrutiny regarding the power decisions makers hold on the impact technology has on our societies. Which is a crucial gap in the research, by focusing too much on technology much like *technological determinism*. These academics have not given enough importance to human planning and influence, especially concerning the vast public policies which we now experience. The gap in the Fourth Industrial Revolution remains the lack of sociological insights. Academics such as Klaus Schwabb have set out to conceptualize it purely based on discussing technology, leaving the sociological impacts out. One could argue that the current conceptualization of the Fourth Industrial Revolution goes along with *technological determinism* and therefore must be critiqued. The following part of the chapter will portray an in depth conceptualization of the Fourth Industrial Revolution.

1.3 The Fourth Industrial Revolution

While academics seem to agree that the world is on the verge of another industrial revolution (Schafer 2018, Guoping et al 2017), there seems to still be dissonances as to the policy approach to guarantee the best functioning and fair society, as well as defining as to what is the *Fourth Industrial Revolution* that also is referred to sometimes as the Revolution 4.0. However, the consensus seems to be pointing towards digital technology as the driver of the *Fourth Industrial Revolution.* While some academics perceive the *Fourth Industrial Revolution* as a mere continuation of the third industrial revolution, Schwab argues that due to its velocity, breadth, and depth as well as systems impact, it is

clear that a fourth and distinct revolution is currently unfolding (2017,3). Therefore we can identify a need for data in order to strengthen the assumptions that have been brought forth by the dominant scholars in the field.

Defining the F*ourth Industrial Revolution* can be extremely challenging for scholars. The debate on its definition and meaning is quite diverse since some authors believe to have identified 2020 as the starting point of the *Fourth Industrial Revolution* others are still considering a later date (Park 2018). Others have come to the understanding, most noticeably Klaus Schwab, that it already is in full swing due to the rapid emergence of nanotechnology. The main understanding that academics currently have of the *Fourth Industrial Revolution,* is that in addition to replacing lower-skilled jobs by Artificial Intelligence (AI) the medium-skilled jobs with a lot of routines will also be affected by this revolution (Park 2018, Schwab 2017, Baweja et al. 2016). However, there seems to also be a consensus on the wide implications that will come from the Fourth Industrial Revolution from impacts in business, governments, and civil society and so on (Park 2018). However, the most complex issues are the ones concerning the human impact which will be widespread due to AIs decision and production chains which are slowly permuting within our societies and the labor market. Authors all point out the dangers for low skilled and medium-skilled workers based in production economies (Park 2018, Schwab 2017). These economies will face a significant rise in Technological Unemployment and find themselves in a difficult position should there be no government policies in order to help control it and reeducate people to another purpose/vocation.

While all seem to agree upon the impact, it all seems to be a normative interpretation of the circumstances, and empirical data is scarce or used in an extrapolating manner which may fail our real understanding of the impacts. This gap in the debate can easily be rectified by conducting interviews and the collection of data to monitor the unfolding events of what is commonly referred to as the *Fourth Industrial Revolution*. This collected data can be especially beneficial for policymakers in order to assess the dangers of Technological Unemployment, which will be the next concept to be explored in this Chapter.

1.3.1 Technological Unemployment

Over the centuries and the advent of several industrial revolutions, there has always been the spectrum of structural unemployment hovering above the heads of many workers. However, in this day and age, the concept of Technological Unemployment refers to unemployment due to technical processes or advances. Workers hence are made redundant due to changes in the methods of production and are left with having to compete with technology on the job market (Black 2012). With this definition in mind

one, can start to understand the importance of such concept. Especially concerning the important technological advances which are being made in different industries and society as a whole.

The main issue of the emergence of new technologies within the Fourth Industrial Revolution is definitely not an issue of production, but rather the issue of job destruction which will create a surge in unemployment (Peters 2017, 1). However not all academics agree with that statement, and some have denied the fact that we are in a technologically driven period of unemployment. Some have expressed with optimism the possibility of new types of jobs and higher-skilled jobs which will drive the labor market (Ibid). While this is a reality it will come at the cost of job suppression among the lower skilled positions available.

One can already start to comprehend the two sides which have formed within the academic debate when it comes to discussing the impact which new technology has on employment as well as work opportunities. Within the debate, there seems to be this 'Golden Age' of technology argument however, technological innovation does not guarantee better jobs for individuals (Loi 2015, 204). Much like Marx's observation of the First Industrial Revolution, the substitution of capital by labor as led to many individuals accepting worse jobs and worse working conditions (Ibid). Lower wages and lower purchasing power will further inequality between social classes, as the middle class will suffer the most. This is a risk which cannot be set aside when talking about the technological advances of the Fourth Industrial Revolution, especially considering the rise in Technological Unemployment should it go unchecked. This reasoning and argumentation in academia often emerge from authors which are pro-wealth redistribution especially for schemes such as Universal Basic Income (UBI).

However, on the other side of the debate, scholars such as Chomanski argue that the massive Technological Unemployment created by automation will not need to be addressed by state wealth redistribution strategies, and he further compels to optimism. His main argument proves that automation will drastically lower the prices of goods, hence lower-skill workers will need fewer work hours in order to afford the same kind of living standard as before automation (Chomanski 2018). This argument is detached from reality especially if you consider that only goods produced by automation would have lower prices, and those lower-skill workers would still need to rely on 'donation from the ultra-rich' as mentioned in his article, which seems very unlikely. Hence 'cautious optimism'[3] concerning Technological Unemployment will not be considered as a valid argument in the following thesis. Other Scholars such as Waslh have a more nuanced standpoint and argue that it is yet unclear whether the Fourth Industrial Revolution will, in fact, destroy more jobs than it will create (2018). The fact that there

[3] Term used by Chomansky

is no clear outcome to this argument, is mainly due to the fact that the author makes no difference between low, medium and high skill jobs available on the market.

1.3.2 Megatrends

The understanding of Megatrends is crucial since they are technological advances that revolutionize production and consumption within society. As mentioned by Klaus Schwab, the *Fourth Industrial Revolution* is at the center of most Megatrends that are emerging, and therefore possibly the defining factors for the development of our contemporary societies. Six megatrends have been identified by the researchers at the World Economic Forum:

1- People and the internet
   The understanding of how new technologies and the internet, interact with people and how they are slowly changing our societies. (World Economic Forum 2015, 5)
2- Computing, Communications, and storage everywhere
   The continued rapid decline in the size and cost of computing and connectivity technologies is driving exponential growth in the potential to access and leverage the internet. (ibid)
3- The internet of things
   Smaller, cheaper and smarter sensors are being introduced – in homes, clothes and accessories, cities, transport, and energy networks, as well as manufacturing processes (ibid).
4- Artificial Intelligence and big data
   Exponential digitization creates exponentially more data – about everything and everyone. In parallel, the sophistication of the problems software can address, and the ability for software to learn and evolve itself is advancing rapidly. This is built on the rise of big data for decision-making, and the influence that AI and robotics are starting to have on decision-making and jobs (ibid).
5- The sharing economy and distributed trust
   The internet is driving a shift towards networks and platform-based social and economic models. Assets can be shared, creating not just new efficiencies but also whole new business models and opportunities for social selforganization (Ibid).
6- The digitization of matter
   Physical objects are “printed” from raw materials via additive, or 3D, printing, a process that transforms industrial manufacturing, allows for printing products at home and creates a whole set of human health opportunities (ibid).

1.3.3 Tipping Points

Following these megatrends, Klaus Schwab and the World Economic Forum have identified 21 Tipping Points which once reached (estimated in 2025) will be the completion of the *Fourth Industrial Revolution* worldwide (Schwab 2017, 38). These tipping points are mostly concern with the percentage spread and reach of the *Fourth Industrial Revolution* concerning our society and most especially how integrated it has become in the behaviors of the citizens. However the most developed societies especially technology-wise have already reached a significant completion of each of these Tipping Points, hence stirring the academic debate regarding the urgency to study the Fourth Industrial Revolution.

The changes which are going to be brought forth by the *Fourth Industrial Revolution* are estimated that 60% of all occupations will see an estimate of 30% of all their activities automated (Powell and Vettise 2018). This in itself is a clear statement as to the disruption which will be brought by the *Fourth Industrial Revolution*, and that it ought to affect not the mere low skilled jobs but also the ones which traditionally need human decision making. The low to middle decision jobs could be replaced by sophisticated AIs (ibid). Along those same lines, our understanding of economic tipping points is crucial in order to analyze the full impact of policies and programs taken in relation to the advent of the *Fourth Industrial Revolution.*

Table 1 – Tipping Points

	%
10% of people wearing clothes connected to the internet	**91.2**
90% of people having unlimited and free (advertising-supported) storage	**91**
1 trillion sensors connected to the internet	**89.2**
The first government to replace its census with big-data sources	**82.9**
10% of reading glasses connected to the internet	**85.5**
80% of people with a digital presence on the internet	**84.4**
90% of the population using smartphones	**80.7**
90% of the population with regular access to the internet	**78.8**
5% of consumer products printed in 3D	**81.1**
30% of corporate audits performed by AI	**75.4**

In this table, the left column describes an event and the right column in percentage illustrates its likeliness to occur before 2025. This data has been collected by the World Economic Forum after the survey was conducted among 800 executives and experts from the information and communications technology sectors (Espinal 2015,7).

One can start to grasp the depth of the academic debate surrounding the Fourth Industrial Revolution, and the length at which authors have gone to describe bit as well as understand its projected impacts and current impacts on our societies. Those concepts that have been previously mentioned, are an adequate apparatus in order to analyze the progress of government policies that would want to fasten and further the reach of the Fourth Industrial Revolution. Identifying the spending, and effectivity of institutions within the frame of the Tipping Points can provide us with insights on such policies. Which the academic research as failed to explore as of yet, this thesis aims to rectify this gap within the debate. However there is one concern that ought to be addressed thoroughly in order to understand the impact which those

Tipping Points and Megatrends might imply, and that is the concept of Digital Inequality. Since the rapid changes in access to technology without proper education, can lead to misuse of technology and create further inequalities within a country or region.

1.4 Digital Inequality

When it first appeared in the academic debate, the concept of Digital Inequality was seen as the potential stabilizer in societies. One should understand Digital Inequality as an index to understand the lack of social status and social mobility from individuals who don't have sufficient knowledge to use technologies or don't have access to technologies. The inequality can hence be understood by addressing the *online experience* rather than merely looking at whether someone has access to technology or not (Hargittai and Hsieh 2013, 2). This is crucial to understand within the scope of government policy addressing the Fourth Industrial Revolution since they all address educational programs concerning technology in order to train individuals to have actual online experience. Especially considering that Digital Inequality is no a mere yes or no access to technology, but it also addresses the lack of high digital skills within a certain part of the population (DiMaggio et al, 2004).

DiMaggio further went and established five aspects of Digital Inequality, this research was extremely important since it was one of the first to theorize a framework around Digital Inequality (2004). The five aspects of inequality which make up Digital Inequality are the following: (i) the quality of hardware, software and network connection, (ii) autonomy of use, (iii) skills, (iv) availability of social support, and (v) the extent and quality of use. Now with these aspects in mind, one can start to understand how governmental policies may help lower Digital Inequality. Especially considering (iii) since governments can easily foster educational programs in order to address this issue, as well as (iv) by providing alternatives for jobs which have been replaced by automation and finally (v) by providing tax relief and incentives for better networks, as well as making sure that the government doesn't vastly limit access and use of technology. Hence there is a necessity from the state to provide, for individuals. Well planned providing could bridge the digital inequality gap and fulfill the stabilizer of societies role which was branded upon technological advances.

Furthermore, Digital Inequality, should it worsen, has the potential to seriously impair the human abilities and skills in general. The substitution of human work by computer-based mechanism could overall arm the opportunities and abilities of certain individuals, hence furthering inequality at a faster rate (Loi 2015, 201). Digital Inequality is furthered by the social inequality that arises from worse jobs, lower wages and lower purchasing power as has been mentioned previously in this Chapter.

Hence with these concepts in mind, one can grasp the analytical and theoretical framework that is needed in order to study governmental programs and strategies when it comes to the technological advances linked to the Fourth Industrial Revolution. The thesis will now present the case study of the Fourth Industrial Revolution, and the Public policies which have been adopted in various parts of the world to address the issues that come with such development.

Chapter II-The Future of Public Policy

The following chapter will empirically problematize current public policies within three unique and different case studies. Each case shares the will to develop a governmental/institutional way to address the social and technological changes brought forth by the Fourth Industrial Revolution. The cases of Germany, India and Thailand will be presented. Each case study has highlighted different priorities in their pursuit for technological development and not all cases are at the same level of completion. However it is possible from lines drawn by governments to understand their guidelines and interest in this new technological surge. Automation is the biggest threat faced by these three countries since it will drastically impact their labour force. Public Policy to safeguard employment, industries, workers and their emancipation is necessary. State interventionism and regulations is key in determining the outcome of technological changes.

Germany has been one for the first countries to understand the importance of a public policy regarding the Fourth Industrial Revolution, the *Industrie 4.0* platform was born out of it. While the intention might have been noble in the eyes of workers, the *Indutrie 4.0* initiative has fallen short of expectation. As further discussed in this chapter, *Industrie 4.0* seems to be solely aimed at private companies and industry in order to foster competitiveness on the world market. This is a threat to equality. Second in line comes the case of India. The Digital India Initiative faces an uphill battle, since most of the country has not transitioned through the 2nd nor 3rd Industrial Revolution and is lacking primary needs which are far more crucial than technology. India is attempting an interesting leapfrogging which might just turn out to be slightly too ambitious even for this power house of a country. The last but not least, is the case of Thailand 4.0 which is aiming to technologically develop through the Eastern Economic Corridor which will serve as a technological hub for the region, so much so that it even is attracting Indian investors. The wide of policies taken by the Thai government makes for a comprehensive public policy, regardless of its democratic downfall. Work governance has been mentioned by several actors has a key issue to be discussed in the wake of those public policies, however that issue has largely been ignored. All these case studies tend to be pointing to the hypothesis that was made earlier, inadequate public policy regarding the Fourth Industrial Revolution developments may lead to lessening of freedom, and equality in societies as well as being a threat to workers' emancipation.

2.1 Germany, *Industrie 4.0* and the European Single Digital Market

> "*We must (…) deal quickly with the fusion of the online world and the world of industrial production. In Germany, we call it Industrie 4.0."* – Angela Merkel, German Chancellor

Industrie 4.0 is a strategic initiative sponsored by the German government, which aims to create a platform of discussion between stakeholders, trade unions and the government in order to come up with concrete policies to foster automated industry over the 2011-2026 period (European Commission 2017, 3). This strategic initiative has been sold under the umbrella of the development and economic

advantages that the digitalization of industry can offer the German Industry. It also has been championed as the most advanced platform for decision making in Europe regarding the technological changes brought by the Fourth Industrial Revolution. The German government has understood the importance of adapting to technological changes in order to remain economically competitive on the world market. While the discussion platform seems to be opened to debate, issues such as competitiveness and productivity, workers' emancipation and technological unemployment are merely discussed.

In the following table (Figure 1), we can clearly see the chain of administration and decision making, and how policy recommendations are created through *Industrie 4.0*. However the implementation of said policy and their ratification by the Bundestag are not guaranteed. One can clearly notice that both ministries BMWi and BMBF seat at the top of the decision making but have implemented an apparatus that allows them to have a certain amount of dialogue with companies, stakeholders and trade unionists. However, this debate should indeed go further than discussing the outcome of technological advances, rentability, and productivity. As later discussed the issue of quality of work and governance of work have to be central themes to the debate which has been set up by the *Industrie 4.0* platform. Work governance ought to be a key development concerning the fostering of workers' emancipation, should it be neglected alienation would be furthered. At the moment *Industrie 4.0* falls right under the umbrella of the European Digital Market. The European Digital Market, in fact, fosters digital opportunities for individuals as well as companies in order to remain an economic world leader[4].

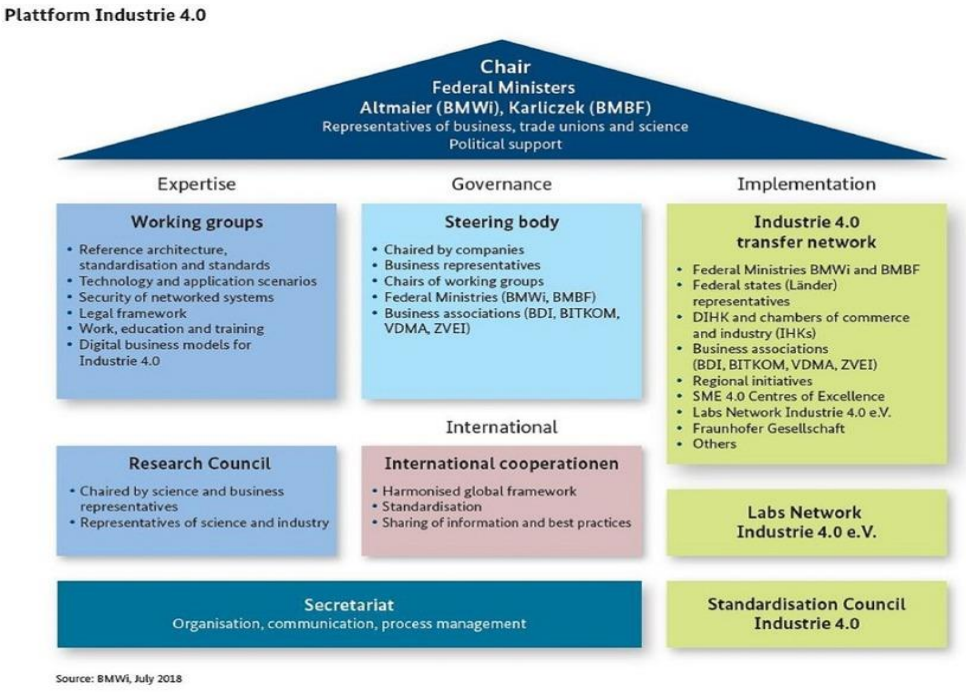

Figure 1 Source: [Federal Ministry for Economic Affairs and Energy (BMWi)]

[4] https://ec.europa.eu/digital-single-market/en

In Figure 1, one can begin to understand and identify all the different actors which take part within the *Industrie 4.0* platform, and how the exchange of ideas between different actors operates until the top level being the various Federal Ministries involved in the initiative.

> '*''There is no single "Industrie 4.0-policy" that can be evaluated as Industrie 4.0 raises many questions, challenges, and chances that can be addressed through various means e.g. in the realm of innovation, research and development, labor etc. Industrie 4.0 is an important concept whose various dimensions are discussed within unions and the German Confederation of Trade Unions. However, there is no one Industrie 4.0 policy. To us it is important that technical innovations are also social innovations and focused on solving societal problems. Labor in the context of Industrie 4.0 should always be characterized by co-determination, collective agreements, data protection, safety regulations, and opportunities for qualification.*''[5]

Based on this quote we can, therefore, understand that the platform aims to address many issues. During the gathering of data one insight seemed to prevail: actors of the same standing tend to stick together and discuss among each other before joining the whole debate, in this example the Trade Unions. This allows a united front, but it also fosters backdoor negotiations. There seems to be a common acceptance of technological advances as inevitable, hence making Jacque's Ellul early arguments of stagnation of technology ever so irrelevant in the academic debate. But it also points towards the fact that most actions from the actors of *Industrie 4.0* seem to be able to be understood through the Instrumental theory, as advances are meant to be but humans retain control over technology as a neutral entity. Yet on the other hand, one must understand that apparatuses such as *Industrie 4.0* are a controlled space within Digital Capitalism. Actors, hence humans involved, are far from neutral.

Along those lines in an internal unpublished document for DGB members, which has kindly be passed on by the organization for this study, the DGB admits to a debate regarding work governance and working conditions being necessary. The document claims that the current platform's interests seem to be solely focused on the betterment of production and technology. The DGB holds four main points on which the 'debate for future work' should be centred. The most relevant of these points being the 'governance of work' which is central in defining the future of labour relations, in a fully automated economy (see Appendix A for the detail definition of the issue as described by the DGB). However, the fact that Germany is technologically one of the most advanced countries in the world, and is operating within the frame of the European Single Digital Market should not be overlooked. It should also be noted that Germany holds quite a different place than other European country, for it still has a strong manufacturing industry unlike most Western European countries which are axed upon service industries. So much so that the Centre of Economic Research of Mannheim (ZEW) has established that Germany

[5] Answer Collected during email exchanges with Maria Beihof, representative of the DGB-Bundesvorstand Trade Union on 5th of April 2019.

will be the country in Europe in which jobs are the most threatened by automation. Nine percent of jobs are on average threatened by automation in Europe according to the ZEW, that number is Thirteen percent in Germany (Arntz et al. 2016).

Since the German initiative focuses mainly on production and private enterprises, it stands rather at odds with the European Digital initiatives of lowering Digital Inequality within the EU. According to the European Parliament's briefings, a mere 75% of households within the EU have a broadband connection, and the percentage of those with knowledge regarding technology is lower (European Parliament 2015, 1). This does, however, raise the question, of how impactful technological advances through automation can impact the population's participation and freedom of expression. Technology could potentially be going against the freedom and participation of citizens within modern democracies. Along those lines, one can understand that Technology may not be as neutral as once thought since even on the *Industrie 4.0* platform one can see the blatant omission of education in the discussions.

There also seems to be no way for a citizen to partake as an individual, and voicing its concerns, should they not have private financial interests in doing so or a trade union membership. This makes *Industrie 4.0* stand apart as a Public Policy, it does not seem to be overly concerned by Digital Inequality and Technological Unemployment. These are however two targets which have been identified by the European Union as necessary to address within the scope of the European Digital Single Market[6]. This attitude can be identified in several other European nations' public policy, which explains the creation of privately funded initiatives such as DigitalEurope[7] which has emerged as an alternative mean of governance than the state's public policy regarding digital matters. Therefore, one could potentially argue that failing public policy may contribute to the broader debate and hence higher participation from its citizens.

As a broad summary in describing the aims and reality of Germany's *Industrie 4.0* initiative, one can understand that it mainly is aimed at private companies and the industry in order to foster more competitiveness on the world market. That can be alarming, should one understand the changes through the lense of *technological determinism* as it would point towards higher Digital Inequality and Technological Unemployment.

The redistribution of wealth from the German State towards Education should also not be undersold, as it provides a future platform for employees retraining and finding a place within the job market. However, the current reality seems to strive more towards business entrepreneurship rather than the re-education of the jobless. This is even more so surprising considering the fact that the Germany Minister of Education, Johanna Wanka, chairs the *Industrie 4.0* panels (European Commission 2017). Hence while the *Industrie 4,0* initiative aims at achieving a lot there are some gaps present in its functioning,

[6] https://ec.europa.eu/digital-single-market/en
[7] https://www.digitaleurope.org/

and attribution of budget especially comparing the one attributed to private ventures and the one for education. Therefore one must remain critical of this initiative but also understanding the current discussions that are arising starting from the European Commission, top-down.

By analysing the *Industrie 4.0's* attempt to foster a platform for discussion of public policy, one can understand the secured position that Trade Unions have managed to secure in the Global North as previously discussed in this paper. This is a crucial difference in this case, the presence of Trade Unions at the discussion table. The German government potentially saves itself from critique by having them being part of the discussion, especially considering the high percentage of membership Trade Unions have in Germany. However this is a reality which does not apply to the next two cases, hence setting Germany further apart than just geographically and economically.

2.2 Digital India Initiative

"*Industry 4.0 will touch those aspects which still remain untouched so far, it will change the nature of the job and create new opportunities."* Narendra Modi, October 2018 – World Economic Forum's Centre for the Fourth Industrial Revolution

The current leadership of India, under Nerandra Modi has expressed a need to foster and fasten the transition towards new technology in all aspects of life. With that in mind the Indian government in early 2019 has come up with their own *Industry 4.*0 initiative, but with different aims than their German counterparts. The context surrounding India's initiative stands in contrast to the one in Germany. In India's public policy there seems to be an urgency to provide technology to its population, and obviously addressing the inequalities and poverty in the country. All while developing structural infrastructure allowing for high-productivity manufacturing which would reinforce the role of manufacturing powerhouse that India has on the world stage (Lele and Goswani 2017, 87). However, on the industrial side of things, India faces a challenge, which is to manage to bring the countries manufacturing industry from Industry 2.0 directly to Industry 4.0. This 'leapfrogging' is extremely challenging as one needs to consider the infrastructure and resources which must get dedicated in order to revolutionize the whole industry (Iyer 2018, 665). This seems to be the issue on all levels for India. Its' public policies concerning technologies face the challenge of catching up as well as providing fast technological education. Physical access and technological access also are issues in such a vast country where many are still impoverished and lack access to other primary needs. One must hence consider whether, such 'leapfrogging' would end up being beneficial for the workers or merely the economy.

In like most places that are implementing radical and revolutionary changes to their industry through the means of automation, there is the spectrum of Technological Unemployment haunting them. The case for India is particularly interesting, due to the leapfrogging of technology required in their society.

This leapfrogging is a social concerning which would leave many at the mercy of the job market should there be no re-education or learning of new skills available to workers (Mashelkar 2018, 140). This has even been picked up by the Indian Labor Bureau, which after surveys and investigation has stipulated that India lacked the skilled workforce to drastically integrate technological changes of the Fourth Industrial Revolution in their economy and society (Luthra et al 2018,735). While there seems to be an understanding from the Indian government concerning this rhetoric little has been shown, so far as to wider technological access and education from the whole of the population. This reality is extremely alarming as it will further foster, Digital Inequality in a country that already suffers from severe poverty and inequality on all boards. This is due to three main factors that have been identified by scholars: Poor internet connectivity, lack of talent/education and lack of infrastructure (Ibid 738). These are clearly identified factors, which could be addressed in order to make governmental public policy as effective as possible, in achieving development goals and fostering a more equal society.

Furthermore, on the topic of Technological Unemployment, the International Labor Organization (ILO) has identified 51,8% of all jobs in India as vulnerable to automation. This figure has been released in the 'Changing Business and Opportunities for Employer and Business Organizations' report, which aimed at dressing a reality in which quite a few countries will suffer from a job crisis (ILO 2019). The report follows through, and after surveying a panel of businesses in India clearly shows that most companies are looking for a different skills in new employees compared to three years ago. Most skills that are now sought after all share a connection with automation and the broader integration of the internet within the economy. The ILO report further identifies five major trends that will affect the economy, business, and industries. These five trends being: technological innovation, global economic integration, change in the composition of the workforce, sustainability as a challenge and skills needed in the modern workforce. For each of these trends, India has had major issues, and one of the countries with the most to address especially compared to the other BRICs countries. Especially if one is to consider the leap in robotics that is needed for India to achieve the goals they've set for themselves. As of the year 2014, India's industry counted 11,800 operational robots with learning capacities, which stands in poor comparison compared to their rival China which as of 2015 already stood at 68,600 actively learning robots in its industry (Roehricht 2016, Asian Robotics Review 2017). In addition to this, the current major issue faced by India is the skills needed for a modern workforce. Large scale deployment on a national level does require access to mass technological education and software sophistication, both of which are currently lacking in India (FactorDaily 2017). The grim reality of statistics stands in contrast to the goals aimed at by India.

The current stages of commitment to the Digital India Initiative seem to remain at best campaign promises at the moment. The normative intentions of the India government seem to be noble, yet for the rhetoric, they have provided it seems to be still in the realm of ideas. This is perfectly illustrated by the

allocation of resources in the field of research, which is mostly if not solely based on IT research through the heavy funding of both Centre for Artificial Intelligence and Robotics (CAIR) and Indian Institute of Technology (IIT) (ILO 2018,5). Hence even by the financial side of things India falls short of what ought to be expected by a well thought through public policy regarding the integration of new technologies. In addition to failing in their redistributive strategies, India seems to have schemed over the need to address labor protection strategies, even though there had been brief talks of implementing a kind of UBI in order to counteract poverty and inequality in the country.

In conclusion, one could agree that the intentions of the Indian government stem from a purely from the competitive argument, and in the process seems to be failing the population as to providing them a certain future with concrete labor protection laws and strategies. The ILO has raised several red flags regarding the current way the policies were developing, as they are considered to be especially detrimental to workers. One must, however, consider as well that India's *Industry 4.0* was an integrate part of Modi's campaign for reelection. Yet as it stands, the example of India seem to be proving that technology can indeed be used to limit the freedoms of citizens and their function in society. This limiting is achieved by restricting their job opportunities and access to education to learn about new technologies. This ought to be put in contrast to the German example which has been mentioned previously when the government made a genuine effort to open up a dialogue as well as include the Ministry of Education in its decision making. There seems to be a certain understanding taken for granted by governments, that technology is indeed neutral and is a mere tool for their programs, however, the reality of data seems to be pointing towards another kind of far-reaching technology that has lost its neutrality. A technology that is, in this case used for political gain however unrealistic it is in a country where half of the population holds a job threatened by automation.

2.3 Thailand *4.0*

Much like its Asian neighbour India, Thailand is aiming at doing a possible leap into the Fourth Industrial Revolution through the means of massive investment in its industries. However one of the main difference between both initiatives, is that Thailand's *4.0* initiative is based on a concrete project the Eastern Economic Corridor (EEC). The EEC involves a huge area in the Gulf of Thailand aiming to create a high-tech hub, with the addition of the construction of smart city from scratch. This will cement Thailand's position as a strong industrial powerhouse in the ASEAN core.

According to the Asian Robotics Review, 30% of Thailand's manufacturers used robotics, through the development of the EEC, the Thai government aims to turn that number to 50% in the next 5 years[8]. This is also a striking difference between Thailand's initiative compared to both India and Germany, it

[8] https://asianroboticsreview.com/home92-html Accessed on 15/11/2019

is geographically rooted, and it also has a set timeline unlike the two other nations. In time this could mean even more gentrification between urban and rural areas in South-East Asia. However, it ought to be noted that according to official statements, this is a pilot run and that the EEC could potentially be extended in the near future to all regions of the country, and exported to neighbouring countries[9]. For example, some Thai communities have expressed their will to attract India investment in their smart hubs in order to hasten the development of smart cities in the EEC (Maritime Gateway 2019). Attracting foreign investments from India would further damage the possibilities for Indian leap frogging as money would be diverted outside of the country. The commodification of technology once again becomes a threat to the emancipation of workers.

It should also be noted that while the EEC is one of the key programs within the Thailand 4.0 initiative it is not the only one that falls under the umbrella initiative from the Thai government. Yet it is the most crucial one, and for that matter out of the three case studies presented it is the most detailed one. The EEC is to occur in 8 steps, which are the following:

1-The EEC Infrastructure Development Implementation Programme

2-The EEC Targeted Industries Development Implementation Programme

3-The EEC Human Resource, Education, Research, and Technology Development Implementation Programme

4-The EEC Tourism Development and Promotion Implementation Programme

5-The EEC New City and Community Development Programme

6-The EEC Business Hub and Finance Hub Development Implementation Programme

7-The EEC PR and Mass Engagement Implementation Programme

8-The EEC Agriculture, Irrigation, and Environment Implementation Programme

Each of these steps has been logically thought through in order of most important to least, and the reality of having Education so far up the pecking order is a refreshing change. One might wonder however how are discussions and decisions made for each of these steps. Here is a diagram made by the EEC board to understand the workings of the program.

[9] https://www.eeco.or.th/en/content/development-goals Accessed on 15/11/2019

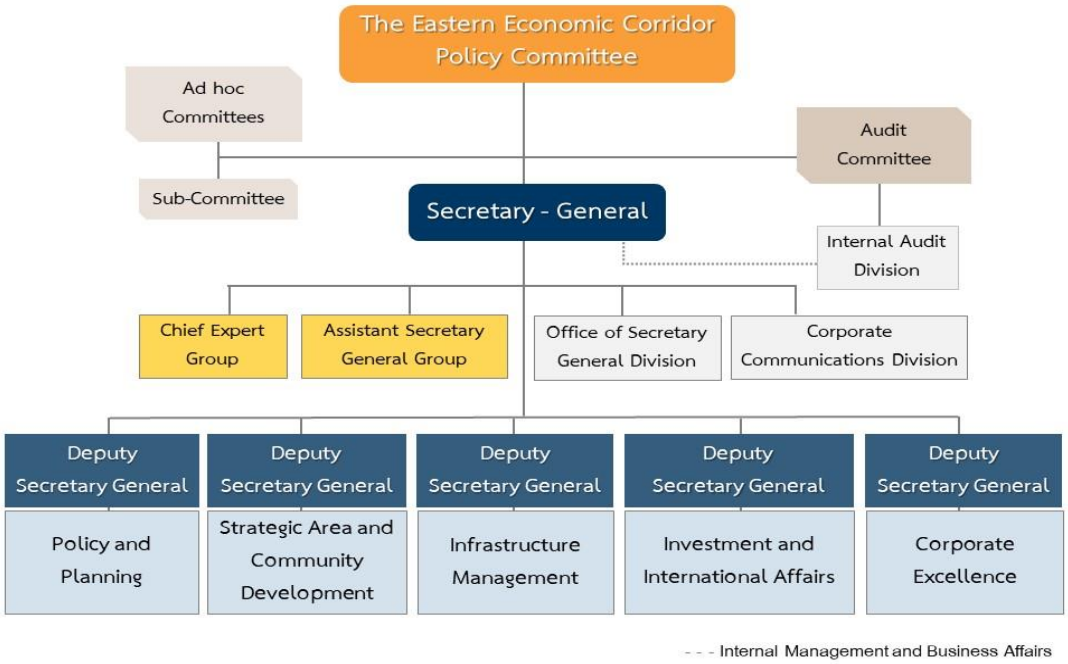

Figure 2 Source: [Eastern Economic Corridor Official Website]

One may notice that the decision chain behind all these steps is solely controlled by the state which stands in contrast to the platform implemented in Germany through *Industrie 4.0*. While creates a less than favorable open debate about policies, it does allow quick action from the Thai government. And while individuals and trade unions seem to have been omitted from the chain of command, so have the private interest which shows the will of the state for a common controlled vision of technological development in the country. However one could argue that through an election and appointing offices in fact, this policy committee could be interpreted as the will of the people.

In addition to having a more accurate and developed decision-making platform, Thailand's initiative also stands out for the number of industrial sectors that are concerned by government policies. While both Germany and India, are mostly focusing on manufacturing, Thailand has identified ten different industries on which to focus technological development. These ten industries are the following: Next-generation automotive industry, intelligent electronics industry, advanced agriculture and biotechnology, food processing industry, high wealth and medical tourism industry, digital industry, robotics industry, aviation and logistics industry, comprehensive healthcare industry, and finally the biofuel and biochemical industry[10]. This extensive list of industries targeted by the Thai government shows how revolutionizing their development plans are for the national industry as well as society. It can also show that taking a developmentalist approach to economic gain must touch all sectors of society

[10] https://www.eeco.or.th/en/content/targeted-industries Accessed on the 28/11/2019

in order for the benefits and redistribution to be efficiently gained by the whole population and not just a lucky few.

All case studies previously mentioned have their own merits and priorities. They are crucial to develop our understanding of what contemporary public policy and initiative regarding technology in society, industry and the economy ought to be like. While most of those initiatives are quite young, Germany 2014, India 2019, and Thailand 2016 they have provided us with critical insights in the spaces of debate and the participation of workers who are present in the decision making process. While the aim of each country seems to be the same, maintaining or improving economic capacities, the means and ways to achieve such development vary greatly. The following chapter will offer a critical understanding of those policies in order to answer the question of greater debate of the contemporary place of technology in our societies. Should technology be understood as a factor of emancipation and enhancer of democracy, as a tool used to oppress and exploit by furthering class struggle or does it remain a mere neutral tool that becomes what we make of it. In this debate, the following chapter will address how such policies have come short and how their use is, in fact, a threat to workers' rights, quality of life and the emancipation of the human race.

Chapter III: Technology in Public policies, or digital exploitation

Hypothesis and argumentation

At the beginning of the thesis, a hypothesis was made in order to channel the debate and test the public policies against the academic critics of technology in the era of Digital Capitalism. That Hypothesis was the following: a lack of adequate public policy regarding the changes brought forth by the Fourth Industrial Revolution would result in a lessening of freedom, and equality in societies, as well as being a threat to workers' emancipation. Based on this hypothesis, the following chapter will address the gaps in the public policies aforementioned, as well as proposing that a social public policy based on the concerns raised by digital inequality and technological unemployment ought to be the way forward. The chapter will argue that the creation of alternative spaces of debate and promoting digital participation in a unilateral manner could potentially foster a move towards a more equal society. On the other hand if public policies go on without popular spaces for debate, it will lead to the establishment of new exploitative power structures. These new power structure will foster inequality, lack of emancipation and exploitation. While the argumentation will highly be based on analysis with the concepts that were aforementioned, some primary sources will be presented as well as an interview with Professor Andreas Bieler in order to discuss his insight on the future of work and the emancipation of workers. All case studies aforementioned will be scrutinized in order to deliver the best interpretation of the hypothesis made by this thesis.

Out of the case studies that were presented it is identifiable that only one proposed a platform of communication and exchange between the policymakers and certain parts of the population. That case study being Germany's *Industrie 4.0.* As clearly shown in the document privately shared by the DGB Union, their representatives' feel more inclined and at ease discussing the issues arising from the use of technology with the ILO rather than use the platform of debate offered by the German government. This shows a trend of distrust towards the state. The need by Trade Unions to bypass state-controlled spheres of debate is a clear indication that their organization is not included enough in the platform of *Industrie 4.0* to discuss the future of work and wellbeing of their members. One can also notice the lack of inclusion of Trade Unions from the decision making in Thailand and India's initiatives. This in itself is a clear disregard as well as a threat to the freedom of workers and Trade Unions. During an interview conducted with Professor Andreas Bieler from the University of Nottingham, he expressed his concern as to the emergence of new technologies and their impacts on workers' emancipation. The strong involvement of private corporations in policy-making while there is an obvious lack of integration of civil society in those decisions was pinpointed as one of the biggest challenges faced during this transmission period of the Fourth Industrial Revolution[11].

[11] Interview done on the 30th of April 2019, Nottingham-The Hague. Recorded through skype.

This insight can even be worsened by understanding the academic debate surrounding the growing disassociations of the population with political participation in their home country (Chakravarty 2018, 236). In Europe, there has been an even steeper decline in democratic participation after the 2007 financial crisis. Yet most individuals in modern democracies seem to have a shared lack of interest in acquiring specialist knowledge about politics all while thriving to have a voice in policy decisions and applications (ibid). Consider this reality and the ways that the Fourth Industrial Revolution is being discussed is alarming, as it reinforces this idea of 'specialist knowledge' to which according to studies the masses have no interest in. Technology seems to be used as a smokescreen to hide the real debates on hand which are: the future of democracy, capitalism, work and human society. Hence in such a case, democracy and democratic participation is worsened by an inadequate platform of exchange that does not guarantee the input from individual citizens. Furthermore, by dismissing workers from it, the platform has effectively only created a controlled space of debate furthering exploitation and lowering the emancipation of workers. Hence to relate this argument back to concepts discussed before, the controlled use of media and spaces of participation through technology mean that public policies such as *Industrie 4.0* are failing their citizens and in fact are furthering the culture of capitalistic exploitation on top of lessening democratic participation.

Another downfall of such programs like *Industrie 4.0* is their failure to understand technology as a key enabler of class struggle and social reorganization. From the first Industrial Revolution of the 18th century in Britain, they've been several angles from which one can contextualize such Revolutions. Since this thesis focuses on the sociological impact of technology, the state, trade unions and workers rather than the economic output, a contextualization of the previous Industrial Revolution has been key to understand the unfolding one. Especially considering that no country as managed to Industrialize without massive social dislocation (Stearns 2007, 69). This is especially more flagrant in non-western democracies, and countries with high inequalities such as India and Thailand. Both countries have ambitious projects, however, the rapid technological changes are set to increase inequalities. This will further the divide at the root of all class struggle, by strengthening the position of capitalist interests. These are especially personified in the technological hubs created in India and Thailand, as well as tax incentives to attract foreign investment all while access to education to learn new technical skills is limited if not elitist. One realizes that the Indian projects has no guarantee for job reconversion and is totally ignoring the concerns raised by Technological Unemployment. This has been clear from the beginning with the Department of Commerce, the Ministry of Commerce and Industry being the only governmental bodies which have been involved in the development of Industry 4.0 in India[12]. Their argument to push for growth in engineering export from Indian origins has been the capitalist argument

[12] https://economictimes.indiatimes.com/news/economy/policy/industry-4-0-making-india-smart-and-intelligent-manufacturing-hub/articleshow/70585241.cms?from=mdr
Accessed on the 9th of December 2019

used for such intense investment regardless of the rampant poverty and inequality. Hence one can assert that such development based technology policies, in fact, are enabling the basis for future class struggles and enticing the already exciting divides. This is a direct threat to the workers' in India, but as well as setting an example among the other BRICs countries which might feel inclined to follow the Indian example.

One of the main issues which this thesis has come to identify is the lack of redistribution for education. This leads in the short term at a maintaining of the current levels of Digital Inequality, and in the long term, as technology becomes ever so present in societies, it will worsen. Digital Inequality is worsening due to the lack of public programs that educate the population on the uses of technology in the workspace and in society. The Germany program of *Industrie 4.0* is the only initiative that has incorporated their Ministry of Education in the debate and decision making. Emancipation should also be understood as a result of access to education especially when it comes to understanding that *Industrie 4.0* is co-managed by several ministries including the German Ministry of Education. Since as cleverly put by Periklis Pavlidis,

> '[…] knowledge and education in the contemporary world […] also include the investigation of phenomena that tend to shape a new social reality.' (2013, 299)

In this quote, we can directly identify the importance of understanding Emancipation within both its contexts, labor, and education. However, when one looks at the financing of *Industrie 4.0* one realizes that it is mostly private and aimed at the development of infrastructure rather than creating a more accessible educational program. This in itself can be understood as a lessening of workers' freedom, as it takes away opportunities and even the freedom to work in certain sectors. Taking away these opportunities, in fact, creates a new lower class, which has fallen victim to Technological Unemployment. This could not be shown clearer than by a survey done in 2014 at Davos when 80% of 147 participants agreed with the statement that technology was driving a jobless growth in most countries (World Economic Forum 2014). On the other hand, the Thai government has clearly identified education in its EEC program and dedicated the entire 3rd step of their initiative in order to address digital inequality by providing accessible courses and retraining of employees financed by the state, or by companies through public subsidies. The Thai government as further promised the establishment of new school and trainings centres within its EEC project. Those steps, however, cost money, time and effort which some governments are not willing to make in a world driven by a digital capitalist mindset. However Education should not be overlooked as it addresses the ever so present issue of Alienation at work, and address the impact technology has on workers by taking away connection and the feeling of having a use in the chain of production.

The use of education in order to address social inequalities and access to technology is also an argument that defeats the stance of hard determinism. Since hard determinism understands technology to be the

sole shaper of our societies, in what can only be described as a rather close-minded approach to the world and the intricate interactions in it. Hence, one could argue that education is one of the possible keys with which states can address the dangers of new technologies in society and industry, in order to avoid a lessening of worker's emancipation and a furthering of alienation across the board. While there seems to be a general consensus, as discussed in Davos, of the threat technology is having on the job market, workers' rights and emancipation there seems to be no discussion as to how these are opportunities to empower workers through education. This could also cause a favourable reshaping of current social structures for the lower classes.

Hence, this chapter has helped identify the current shortcomings of policies, but most importantly it has addressed the issues that current governmental initiatives are facing, and that the Fourth Industrial Revolution is, in fact, a threat to the emancipation of workers, democratic participation and the access to education without adequate public policies. The cases of Germany, India and Thailand have all shared crucial insights that were needed in order to make this point. The lack of understanding of the impact technology is having, is a direct threat to the current social organization. This is especially alarming considering how many initiatives based on technological development linked to the Fourth Industrial Revolution, are being started over the globe. Understanding these changes, and their threat to society through a sociology of technology has helped understand the way states are using the Fourth Industrial Revolution as a way to further their interests and provide yet another shift in capitalist culture. The conclusion of this thesis will offer a recap as well as describing opportunities for further research, and how research should be conducted in order to ensure the least negative impact from technological advances linked to the Fourth Industrial Revolution.

Conclusion

This thesis has taken the ambitious stance of critically analysing technology in our societies, by problematizing academic theories regarding technology through the case study of the Fourth Industrial Revolution. The use of public policies as specific cases has provided us with a comparative study, which has helped in the presentation of the following argument: inadequate public policies regarding the advances in technology brought by the Fourth Industrial Revolution would have a negative impact on the freedom, democratic participation, equality and workers' emancipation. Each case was picked due to its uniqueness, and also existence within bigger economic blocks. Also with each country being a powerhouse in their respective supranational organizations, Germany in the European Union, Thailand in ASEAN, and India as Regional power. Each of these countries have different socio-economic realities, yet all of them chose to implement initiatives to bolster technology in their industries.

The first chapter has helped establish the basis of this thesis by discussing the importance of each concept and anchoring this thesis by addressing past theories, and by offering a sociology of technology. There was a crucial need for a sociology of technology within the debate. This has been the crucial key that has been missing in discussing the dawn of the Fourth Industrial Revolution, a sociology of technology. This thesis has attempted to breach that gap. Each theory presented earlier has had an impact on the academic debate, however with the emergence of new technologies the validity of their arguments have become obsolete. Technology is not a neutral tool, especially if one considers the emergence of Artificial Intelligence. In addition to the theoretical debate, the thesis has established a clear definition of the Fourth Industrial Revolution unlike previously done in academia and has also provided the reader with means/factors to observe the evolution of the revolution. One must have also have grasped the likeliness of research when it comes to Industrial Revolution, and this thesis has clearly shown as to why such standardized approached have become irrelevant and should be critically assessed in further research. The current debates surrounding the Fourth Industrial Revolutions seem to have huge similarities to previous debates concerning technology which have emerged at each Industrial Revolutions which human societies have been through. This thesis set out on an ambitious objective of addressing the issues which have been overlooked by contemporary policies and technological advances brought by the Fourth Industrial Revolution. While it has provided academia with some answers, this thesis should be used as a starting ramp for further research in the field, in order to provide researchers with an adequate sociology of technology in the era of Digital Capitalism. This is mainly due to the fact that academia seems to study technology and human impact too often separately, leading to not enough empirical evidence on the impact technology has on freedom, democracies, and equality.

The second Chapter, allowed the reader to understand the current work being done concerning technology and the Fourth Industrial Revolution in public policy. One can easily identify the differences and similarities between the cases of Germany, India, and Thailand. While the implementation and

processes might be different from one another, the same issues have been identified in each country. Germany is the country that is further along the way of implementing its policy, and it has managed in setting up a platform for debate between decision-makers. However as previously discussed the exclusion of workers, and trade unions from this debate is a direct threat to workers' emancipation and democratic participation in the future of work governance. India has had the opportunity to discuss the importance of an *Industry 4.0* like policy during the presidential debate of the last election. However, the Indian government is far from being able to implement any kind of concrete policies, in the realm of workers' protection and addressing the rampant Digital Inequality in the country. Thailand has a more encompassing policy plan, but the one that is least open to debate and external inputs. All these are driven, by the will to remain competitive even when the economy is fully digitalized. However, their intention betrays the interest of the workers and their population, which are unwillingly being dragged in yet a new stage of capitalist exploitation, a reshuffling of social organization and a deepening of class struggles.

The third chapter argued that based on the hypothesis presented at the beginning of the thesis, the current public policies were a threat to workers' emancipation, freedom, and equality. The inadequate planning has been made worse by state-controlled spheres of debate which exclude workers, and lower class citizens from participating in the decision making about the future of work. The lack of investment and redistribution towards education programs threatens the balance of equality even further, from low skilled workers to digital inequality and technological unemployment. Education ought to have been a key basis for all three case studies but the belief that technology remains a neutral tool has led the government to promote profits and gain rather than emancipation and equality. Statistical research ought to be done, in the sector of Education in order to find out which programs and how much funding is necessary in order to avoid a backlash from Digital Inequality and Technological unemployment.

In conclusion, this thesis is a stepping stone in the research concerning the unfolding Fourth Industrial Revolution. Its insights will hopefully lead to funded research which would be able to analyse in depth all the factors at play in order to seize the opportunity states have in shaping the future of work and societies. Alienation and Emancipation of workers should be at the centre of any policy in order to ensure the wellbeing of the population, rather than focus on the mere financial side of development. By only focusing on financial development, states are planting the seed for further class struggle and tensions between authority and populations.

Appendix A

Four groups of issues should lend structure to the global discussion process:

Work and society – the change in the value of work is being discussed here, the role of social justice for a peaceful society, the global fight against poverty and exploitation, but also the effects of climate change.

Decent work for all – employment policy, macroeconomy, benefits and risks of technological change and finally education and lifelong learning are at the centre of these deliberations.

Organising work and production – the talk here is about the relations between the private sector of the economy and state-provided services, about government-dictated frameworks for businesses, about the increasingly precarious nature of labour relations and about security and flexibility in employee relations.

The governance of work – here are due to be discussed questions about employment and social policy legislation, the role of the conventions and recommendations of the ILO and their implementation and monitoring, voluntary obligations from firms along with the function of social dialogue and tripartism in structural change.

The German DGB sends a representative to the executive council of the ILO and is thereby directly joining in its debate on the future.

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