Where do we find sources for technological change and social division of labour?

Continuing technological and organisational progress, the emphasis being on continuing, is a product of the modern era. It did not exist before. It was the developments that took place in Europe, England and Scotland in the 17th and 18th centuries that brought about a fundamental change in the conditions governing technical advancement. I am speaking of the development of what Joel Mokyr called “a culture of growth and innovation”. This had not previously been in place. If you look at world history, you will find that technological changes occurred sporadically at various points. But these were individual events, there was no continuity. This has changed. And the change is the result of unintended consequences of human actions directed at particular purposes. So, people created institutions which together ultimately generated a culture of innovation. There are two fundamental factors which contradict the production of something new and the introduction of this to economy, to society. The first of these is possession of old knowledge. Those who hold old knowledge are able to use this as a basis for achieving monopoly returns. They are, of course, opposed to the introduction of innovations which will terminate their monopoly. We can note, for example, that farmers in the 15th, 16th, 17th century in Europe long resisted procedures to increase production on their lands because they understood that this would reduce the scarcity of the soils and thus drive down basic yields. This is an argument in favour of technical progress not readily coming about and being implemented. The second argument is that new knowledge cannot permanently and on average be kept secret. This means that it will be adopted and imitated. And secondly new knowledge does not compete for consumption. Thus new knowledge in general is virtually a public property. What does this mean? Private goods, think of a sausage sandwich, when I eat it, you will not. But with a Bessemer process in steel production firm A can use it and firm B as well – one does not exclude the other. Such goods quickly become available within the overall system, but this creates a problem. Those who bore the costs of producing the new knowledge receive only part of the revenue. In fact, they may not receive anything at all. And others
rake in the profits. Of course, this is a reason not to create new knowledge in the first place. This is referred to as market failure. Markets which are left purely to their own devices are not able to realise a sufficient degree of technological progress. And it can be said that competition is a momentum of technological change, a driver “par excellence”, if you will. The result of competition is that individual stakeholders are unable to be certain of whether they will survive in the market if a competitor introduces new products whilst decreasing manufacturing costs, i.e. if they launch goods on the market more cheaply, or implement newer products which exhibit better qualities. Competition acts like a productivity whip, a technological progress whip, and this is noticeable. This is also well documented in the literature. Marx speaks of the coercive law of competition, which forces individuals to realise technical innovations or otherwise be ruined. Smith and Schumpeter also express themselves very similarly, to name just a few important sociologists and economists.

Who is driving technological change and social division of labour?

I will begin with the structures. On the one hand, we certainly have structures that are compatible with providing incentives, as we economists like to say. This refers to laws, rules, and institutions and so forth which are open to new things. If this is not the case and a ban is in place in this regard, then this is of considerable detriment to new products. The second thing is the need for an initial and continuing training programme that provides fertile ground for new developments or else reflects these developments in the human capital that people are able to offer. A further important aspect certainly is the fact that progress produces not only winners, but losers as well. These questions have formed an object of discussion since the end of the 17th century. What are the mechanisms with which new things prevail? Adam Smith and others have essentially provided us with the following considerations. In a situation governed by competition, there is reason for a company to innovate technologically and carry out organisational progress is to arm itself against being displaced by others on the market. If companies successfully introduce a better production procedure in the sense of enabling them to reduce the unit costs of a given product, it is obvious that they will make extra profits on a market where they realise the same price as the competition which is producing to a worse standard. Such a company will generate higher profits than the other company. If these companies invest the same percentage of their profits in order to pursue growth, you will quickly see that the company which innovates will grow more quickly than the other company. New things are successively channelled in via differential growth. They diffuse within the system and displace other things in relative terms—though not absolutely. This is one mechanism. It is simply created via different rates of growth at an innovative company as compared to a static company. The second mechanism that plays a part is, of course, imitation. Companies which see that neighbouring firms are earning larger profits as the result of the introduction of a new technology will attempt to imitate the pioneering company. This may happen in different ways. Industrial spying is one such route, and this is not uncommon. But, of course, a company may also acquire a licence to use the new procedure or pursue other similar pathways. In such cases, new technologies are also introduced within companies which did not pioneer them. It is also obvious that innovations frequently suffer from growing pains. The first car that is
produced may exhibit serious defects whilst the “second mover”, as we call him, secures the advantage. For this reason, we can often observe that pioneering companies go bankrupt, because they operate using procedures that are in urgent need of improvement. But, in any case, competition will provide a push to usher in the new product, and this will ultimately tend to displace the old technology. #00:09:18-8#

Which consequences will arise from technological change?

Humans have been using devices - produced production tools - for quite a while. Tools which they have controlled, to varying degrees of success. They may involve anything from agricultural implements to scientists with computers and they exert an influence on the way we work. In the case of new technologies, some of this equipment is of such a quality that it controls you rather than you controlling it. This will create a fundamentally new situation. Of course, individual productivity will rise very sharply in many areas. This means that we will experience technological advancement in sectors which are naturally very valuable to us. Think only of medicine, health provision, and related matters. Think of treatment in hospitals. It is possible to say that current technical advancement is characterised by a conflation or merger of three spheres. This is something which we have not previously seen in such a form. On the one hand, of course, we have the physical sphere. On the other side is the biological sphere and then we have the digital sphere. And then there are these cyber physical systems in which hardware and software are linked and communicate with each other. You can now buy and sell anywhere in the world. You can dismantle and split production processes and produce some individual parts in Germany and others in China. This closely correlates with the circumstance that transport costs have fallen considerably over the course of time. This has led to an unbundling of value-added chains. What you get, in essence, is an internationalisation of production and very rapid changeability of production. Flexibility will increase. It is certainly possible to say that what happens in the long term will be strongly dependent on whether a machine will remain a human tool and thus become an appendage of the person or whether, vice versa, the human becomes an appendage of the machine. My supposition is that the average long-term balance of probabilities suggests that things will move in the latter direction. This means that humans will lose much of their sovereignty, formative capacity, and diversity, albeit not everywhere, and will be forced to operate according to the rhythm of the machine. Occupations in which knowledge is codifiable and only low levels of skill are needed will be susceptible to being taken over by machines. We must not close our eyes to the fact that artificial intelligence is also increasingly penetrating the skilled worker sector. One of the reasons for this is the wage differential that has become discernible recently. Less qualified workers have even had to accept decreases in real wages whilst the incomes of highly qualified employees have risen very sharply. Those seeking to minimise costs will start to agonise whether qualified workers in the lower and middle management tiers can be replaced by machines. That we have artificial intelligence, machines that are able to learn by themselves, during the production process, never sleeping – and you see, if this
is the case, if you have artificial intelligence and if this continues to develop in the same
dramatic way as in the past, you will arrive at a situation in which humans are completely
incapable of competing with machines except in a small number of exceptional cases.
We will reach a point of technological singularity. In its extreme form, this means that
machines are superior to humans in every regard. The new technologies of which we are speaking also make use of new forms of economic implementation. This is the
platform economy—eBay, Alibaba in China Facebook, Google, and so forth. And the
more data platform companies have processed, the more effective they will become.
This is a type of data capitalism which we need to examine carefully. Data is a modern
type of money which exists alongside real money. Even when you do not notice it, when
you surf on the Internet, you pay with the availability of your data. These companies learn. Algorithms and machines learn from your data. They constantly improve their
ability to tap into your preferences. They know when you wish to purchase certain goods
and when you may be suffering from an illness thanks to implanted micro chips and the
Internet. But this means that it will be virtually impossible to catch the company which
has established a lead and processed the largest quantity of data. Such a company will
turn into a gigantic monopoly, a footloose entity which does not comply with existing
labour law and trade regulations. These companies base themselves out of areas where
the lowest taxes are payable. These major firms pay no taxes whilst achieving vast
profits. This represents a threat to national sovereignty and, of course, also to
governments’ budgetary sovereignty. If tax revenues decline but at the same time
problems created by technological unemployment and the like, which the state has to
cope with, you see that budget deficits are imposed with no possibility of doing anything
about it. By technological development. Employee representative bodies will face
difficulties as a result of the erosion of their base. The degree of trade union organisation
appears to be declining and is in particular very low amongst cloud workers who take on
temporary jobs in the gig economy. Poor pay may mean that workers are unable or
unwilling to afford trade union memberships. So, worker representation is in trouble. But
companies and their own representative organisations also face difficulties. If there are
only a few very large companies, exercising power over the rest. Who cares about the
rest? In order to gain any scope for representation at all, the rest would have to join
forces, also in order to exert control over the major players. This is one reason why I
believe that many people in society are no longer prepared to expose themselves to
these giant monopolies. Coming developments will be very motley. There are, so to say,
lovely jobs—popular occupations in which workers are creative. Creativity is a huge
asset which will be in demand in the future, as will people with communication skills and
knowledge that extends beyond their own sector. This will be sought after. So, these
exist, lovely jobs, people who very much like to sit in front of their computer or operate
these technologies. But there are also lousy jobs. These basically reduce work capacity
and turn people into cheap henchmen. Also worthy of mention in this context is that
there will be a return to the putting-out system. This is already the case. In the old days
in Silesia, for example, entrepreneurs would distribute cotton amongst weavers for
processing on hand looms at home. The introduction of new looms put a complete end
to this practice. We are now experiencing the emergence of a growing gig economy. This involves jobs which are completed in one or two days before workers then lose this job again. This virtually constitutes the advent of digital day labour. Precarious employment within a larger environment. No trade union organisation, no social insurance, no health insurance or the like. People are left to their own devices and are pseudo self-employed. I believe that certain tasks will be cut in the longer term. It should be possible to preserve jobs, at least partially, if adaptations to the task profile take place. Of course, this places requirements on the training sector in turn. But noticeable economisations may occur. This is, if you like, a negative effect which contrasts with the positive effect of a rising quantity of goods and cheaper availability of such products. However, there are also many other effects of course. We know that new technologies facilitate the monitoring of people at and beyond work and allow much wider surveillance to be conducted than was previously the case. This could be said to constitute a threat to individual civil liberties. Developments in China are aligned towards maintaining control over people from early until late and to making evaluations in respect of availability of travel and other similar aspects. I think that this is a menacing approach. In a nutshell, technical progress exhibits characteristics that are reminiscent of Big Brother. Of a controlling and monitoring state. I see this as a huge danger. It should not be underestimated. Perhaps I can take this opportunity to refer to the work of Angus Deaton, a Nobel Laureate in economics who investigated the impacts of information and communication technology on various sectors of trade and industry in the USA. There was a particular focus on the sense of well-being of middle aged white Americans. Deaton discovered that it was possible to identify considerable gloom and dejection. People were embittered because they were suffering from poorer working conditions. This has led to a rise in obesity. People have become fatter, drug and alcohol consumption have increased, and family rifts are becoming more widespread. The final result is the so-called “death of despair”. Factors such as life expectancy, which has long since been rising in line with technological progress and has always been viewed positively, are now beginning to sink against the background of more recent developments. The negative effects are thus enormous. Of course, it is also clear that Trump and other similar persons enjoy considerable support from these groupings. This means that technical progress does not merely change the world of business and technology. It also alters culture and politics. So we are really speaking of the co-evolution of these systems with technology acting as the main driving force, so to speak. In order to prevent society from drifting off into popularist politics, which of course possibly may exhibit belligerent tendencies, I believe that care needs to be taken to pursue an inclusive programme.

How are drivers and consequences of technological change connected?

Division of labour exists within companies, between companies in a region or country, and thirdly, of course, internationally. I will begin with the last of these. It is already
possible to say that international division of labour is massively on the rise because of the unbundling process of value-added chains. This means that globalisation will take place more strongly than before, and division of labour may actually occur between regions and regions which lie far apart. If transport costs are low, it is no problem to import certain preliminary products from China to Europe. And, as we know, the Chinese are currently involved in the creation of a major innovation in the form of the “One Belt, One Road” project, i.e. a new Silk Route. This will take the form of a railway line that passes through the whole of Eurasia with stop-off points at certain places where large oil and gas deposits have recently been discovered. Scarcity of such resources will thus no longer constitute a problem, and this will be a major issue. Globalisation will advance unless military disputes lead to a new Cold War. This is something which at present cannot be excluded. Then, of course, there is division of labour between regions within a country. This, too, I believe will increase. We will see knowledge-based and knowledge-generating centres in particular, and these will be present to a greater extent than before. They will increase in relative significance compared to other centres, and labour division will also become much stronger between companies depending on the qualifications profiles of workers. The increase in pseudo self-employment, in the gig economy, and in the putting-out system is leading to a fragmentation of the labour market into lone participants. Each of these will try to take their own fate into their hands and it is to fear they will generally not really be successful. To this extent, they are different to the superstar companies that technical progress has created today. These firms are basically no longer in jeopardy. This is because of the endogenous learning processes of the machines, of the algorithms. Once a company is ahead of the pack, it will stay there. This means that monopoly positions are no longer assailable. This was not previously the case. It used to be the case that when a company had a monopoly, they were in danger of jeopardising their own monopoly by introducing technical innovations. This is far less prevalent today. There was also much more free competition in the past, as many firms entered into both national and international rivalry. Nowadays, however, there are no more than seven companies which call the shots worldwide in significant sectors.

**What measures can be taken to steer technological change?**

Well, how can we approach this issue? There are economic policy measures which are able to exert a level of control. One of these, for example, is to tax companies where business is transacted and not at the location of group headquarters. If you buy a book from Amazon in Germany, for example, you would pay tax in Germany rather than in Ireland. This is one option. The second possibility is to significantly increase taxation. One thing which we can say today is that huge superstar monopoly firms represent a stronger danger to freedom than most nation states. These companies possess an unprecedented level of power and have become uncontrollable. This means that the state will need to re-embrace its old task of securing individual freedoms. It can only do so by bringing these superstar companies to heel.