Journal of International Trade, Logistics and Law, Vol. 8, Num. 2, 2022, 133-153

THE EFFECT OF TECHNOLOGY CAPACITY CONCEPT ON COMPETITIVENESS IN INTERNATIONAL TRADE

Kerim Tolgahan NARIN
Istanbul Commerce University, Turkey

Received: September 16, 2022 Accepted: October 28, 2022 Published: December 01, 2022

Abstract:
For countries to produce products with high added value in international trade, they must integrate their technological competencies into their production systems. In addition, innovative technologies are one of the most important factors for firms and organizations that produce high value-added products competing in the international market to be one step ahead of their competitors in the market. In the world, consumer behavior and expectations are changing very rapidly due to cultural transformations with the "next-gen cul-ture" realities. Firms and organizations that carry out production and manufacturing activities in the international markets should integrate these dynamic customer expectations and requests into their processes in the fastest way, but with high technology. In addition to this situation, manpower and working culture also emerge as the most important concepts for the organization to benefit from the relevant technological investments at the maximum level.
At this point, the concept of technology capacity emerges. The concept of technology capacity can be used to differentiate or explain the organizations efficiency and capabilities against to its competitors like many organizations did previously with using different concepts: current production capacity, quality certi-fications, and manpower capacity and quality in competence. In addition to this situation, it can be posi-tioned as a new concept that firms that want to use these investments made by the field of technology in the market as a distinguishing factor in the field of competition, should measure within their existing organiza-tions.

Keywords:
Technology Capacity, Innovation, Change Management, International Trade, Industry 4.0, Artificial Intel-ligence, Firm Valuation.

1. Introduction
Within the scope of this study, the effect of technology investments on international trade and the posi-tive contribution of this effect to the competition score will be mentioned. The equivalent of technology investments in the field of investment will be expressed with a concept that shows the technological compe-tence and suitability expressed by the technology capacity.
The concept of technology capacity can be defined as the feasibility of new technology. This concept will be used to measure the efficiency of technology investments. In this context, the use of technology investments in foreign trade will pave the way for its use as an instrument to increase competitiveness in foreign trade operations. In other words, the technology capacity is expected to be high for a permanent and sustainable competitive advantage, as the speed of implementation of a new technology will be accompanied by the speed of adapting to the changes in the expectations of the market and its customers.
Institutions with high technology capacity will be able to access new markets at the right time, with the right audience and at the most optimum cost, by being open to technological investments, which is the most important distinguishing component of the age and competition.
In this study, we will investigate the effect of the concept of technology capacity, which is briefly de-scribed above, on the foreign trade volume. As a result of this research, we will examine in which areas and with which technological investments the concept of working technology capacity will have a positive ef-fect on foreign trade transactions. At the same time, we will examine how sustainable competition will be negatively affected if the technology capacity is low.

In the last part of the study, it will also be discussed how institutions with high technology capacity contribute positively to the valuation of companies in terms of asset valuation. In this sense, it will be shown that technological investment has a positive effect on both the intellectual capital of a company and its sustainable competitiveness in the market in today's world. In addition to this situation, it will be exam-ined in exceptional cases where the technology capacity is high, and the competitiveness is weak.

2. Technology Investments in International Trade

2.1. Alternative Energy Sources

Most of the international freight transport is carried out by sea, ports are one of the most im-portant components of all type of transport. In these transportation activities, environmental problems are likely to occur due to activities. These environmental problems some of them are air and water pol-lution. These environmental problems originating from the ports and the equipment's that are used for the international trade. Some societies have been established to reduce the number of international con-ventions however since the human needs and consumption behaviors are changing using trade path got increased in the last decades (Felicio et al., 2022).

As an example, from the implementations from all around the world; with the green-eco port approach, which has started to become widespread in Turkey also, it is aimed to disseminate environ-mentally friendly technologies, to minimize the environmental impact of ship and port operations, to save energy and as a result, a more sustainable transportation (Uçdu and Kılıç, 2022). Making and im-plementing environmental-oriented strategic decisions increases the power of businesses and provides competitive advantage. Because environmental awareness is a concept that directly appeals to the cus-tomer, and customer satisfaction is one of the most important issues that should be addressed by busi-nesses today. At the same time the optimization of ports is directly affecting energy consumption (Fang et al., 2022).

In addition to this situation, it has been revealed how important the role of ports, which is the most important component of international trade, both in the covid period and after the covid period, in this process and processes (Kurniawati, 2022). In addition to this situation, the fact that ports are man-aged by using sustainable resources in the same processes will also minimize the cost pressure on products and services at the same rate. In addition, the most important function of international trade is the creation of the supply chain between countries. The green supply chain is important for creating a sustainable supply chain (Gawusu et al., 2022). Increasing efforts of both consumers and institutions to prevent environmental problems caused by the danger of depletion of natural resources and pollution are the most important motivation points in the implementation of green supply chain. With the deple-tion of resources, people have sought to obtain the energy they need from unlimited sources, namely the sun and wind, in order to cause as little harm as possible to the environment and living things and to leave a livable world for the future as much as possible (Badakhshan et al., 2022). Shipment and Lo-gistics industry representatives and researchers have started to work on the use of alternative energy systems on ships in order to fulfill the obligations of international conventions, to turn to cleaner ener-gy sources against increasing environmental awareness and to use cheaper energy sources due to rising energy costs (Vakili et al., 2022).

Electricity generation from solar energy is realized by PV panel and electricity generation from wind energy is realized by wind turbine. Today, although the use of such renewable energy sources is encountered in ships with low power needs, it is now seen that renewable energy sources are used in ships engaged in commercial activities. The decrease in costs in this area is also directly pro-portional to the decrease in investment costs in other renewable energy sources. However, the point that should not be overlooked here is that the applications of these technologies in the field of ship-building engineering should be prioritized, especially in sea transportation, where it is important that both wind, wave energy and solar energy will be easy to reach on ships. This will also lead to a de-crease in logistics costs and an increase in the diversity of international trade.

2.2. Using Blockchain Technologies

Blockchain is a digital infrastructure used/shared to securely store data and exchange data with third parties. Such blockchains can be considered as a specific type of distributed database (Tekin, Öztürk and Bahar, 2020).

International trade is changing and transforming with the effect of technology. Turkey, which creates value in international trade with its production power, has opportunities and risks in front of it.

We can summarize the main features of blockchain technology as follows.

Recursive storage: Blockchains are used to share data within an ecosystem. Every participant of the ecosystem is expected to participate in the global infrastructure by providing resources to store the data, i.e., a node containing a local copy of the blockchain content. Therefore, several synchronized copies of the information distributed in the network are available to guarantee the flexibility of the in-formation.
Decentralized control and full consensus: Blockchains are used to share data in decentralized and horizontal ecosystems, meaning there is no single hierarchical leader with strong control over the ecosystem or infrastructure. No single actor can add or change information to the blockchain without approval from other participants. This process relies on predefined algorithms that ensure reliable veri-fication of new transaction entries by multiple actors.
Immovability, authentication and timestamping: Blockchains rely on cryptography to secure information stored and in circulation. Stored data must be explicitly validated, irreversible, and timed. Anything saved on a blockchain cannot be changed or deleted (Aslam et al., 2021).
Blockchain applications basically are grouped into three categories: process and document management, sharing product origin information with reliable and reliable sources, and payment sys-tems.
Process and Document Management; Manual, time-consuming and paper-based processes are still dominant in the logistics sector and foreign trade. Trading goods and sharing documents and data at every stage of the logistics lifecycle are required. This process can cause serious delays in trade. Blockchain technology connects all parties in the trading ecosystem. Blockchain-based monitoring sys-tems enable actors to record, share and access information easily and in a timely manner, reducing con-gestion and minimizing customs and inspection delays (Vurdu, 2021).
Product Origin and Protection of Ethical Values; The final consumer also wants to be sure of the originality of the product they buy. Authenticity tracking in blockchain technology makes it easy to track and trace every step of the value chain in luxury goods. Blockchain-based startups have devel-oped different platforms to trace the origin and authenticity of luxury goods (McDaniel and Norberg, 2019).
Blockchain-based e-origin documents for internationally sold goods reduce the risk of false declarations, making processes simpler, transparent and secure. In the service produced with this tech-nology, key stakeholders including a country's chamber of commerce, trade partners, logistics provid-ers can instantly and securely do e-origin shopping (Zhai and Tan, 2021). Blockchain enables instant exchange of thousands of certificates of origin. In doing so, it eliminates customs duty fraud, document verification costs, and streamlines, accelerates and secures processes that help stakeholders track the origin of goods (Owis, 2021).
Payment Systems: The letter of credit process involves costly operational processes with con-stant communication and extensive paperwork between multiple counterparties, banks, shipping com-panies. It is necessary to successfully coordinate the actors of the process and the process in order to eliminate inefficiencies, reduce complexity and transaction costs. While traditional letter of credit pro-cesses takes 5-10 days, it has been seen that the process is completed in a day in sample applications (Wang, 2021). While blockchain technology improves speed and processes, it aims to eliminate paper-work and thus reduce errors and fraud cases that occur in the process.
Cross-border payment processes usually take several days and are affected by exchange rate fluctuations. Making cross-border payments is costly because banks do not always cooperate directly with each other. Therefore, they work with intermediary banks to facilitate indirect transfer. Intermedi-ary banks charge a fee for this service from the total transfer amount (Huang, Yang and Zhau, 2022). In this traffic, there are delays in daily transactions, errors occur, international trade is directly affected, and costs increase. Blockchain solutions in trade finance aim to connect banks, companies, trading partners, payment providers, asset exchanges, transfer foreign currency in a transparent, secure, and al-most free international transaction system (Topcu, 2021).
Blockchain technology can pave the way for redesigning costly and inefficient processes, lead-ing to more visionary systems that can touch more people more directly. Today, it is seen that studies are carried out to use Blockchain technology in different applications in the fields of banking, energy, logistics, agriculture, and transportation (Fridgen et al., 2018).
All these industries are open highly motivated about the international trade. So, this reason at the end of the day blockchain will be must for logistics and international trade to fulfil the complete end to end requirements from other industries.

2.3. Internet of Things Applications in Customs and Trade

Technology, which has been developing at an increasing rate in the twentieth century, created the internet in the last quarter of the century. The developing internet has changed the way of doing business all over the world, has completely solved the communication problem and created new areas. With the twenty-first century, great transformations have started through the internet and digitalization has been integrated into all areas of life (Fonseca, 2022). Commercial activities have also been affected by this digital transformation, and as a result, great transformations and opportunities have emerged for entrepreneurs and businesses.

Internet of Things; It refers to a dynamic global network infrastructure with identities, physical properties, virtual personalities of physical and virtual objects, capable of using smart interfaces and seamlessly integrated into communication networks, with self-configuring capabilities based on stand-ard and interoperable communication protocols (Akinyoade and Eluwole, 2019).

That is, almost every object you can think of has RFID, GPS, etc. The foundations of a system are laid in which they can make decisions and implement applications by sensing the environment by means of sensors using technologies, generate data, and share these decisions and data with each other and people by connecting to the internet, and apply the instructions coming directly or over the inter-net.

Almost all supply chain and logistics process processes can be transformed or increased in ef-ficiency with IoT. The first things that come to mind are the real-time tracking of containers, the use of container data for optimal stacking, the transition to automated terminals, the shortening of the time re-quired for customs procedures, etc. can be sorted (Aydınocak, 2022).

Applying IoT to logistics operations has a significant impact. We can monitor the status of as-sets, cargo and people across the value chain in real time. We can measure how these assets are per-forming at the level of instantaneous changes (Papachashvili, 2018). We can automate business pro-cesses to eliminate manual interventions, increase quality and predictability, and reduce costs. We can optimize the interoperability of people, systems and business assets and coordinate their activities.

Another area that can benefit from IoT is warehouses. Warehouses are both important junction points for foreign trade transactions and are subject to special security criteria by customs administra-tions (Ma, 2018). In this respect, making warehouse operations based on IoT using RFID technology will increase efficiency and cost advantages for operators and users, as well as increasing security and facilitating inspection for the customs administration.

While RFID technology facilitates international trade and increases the speed of transactions, on the other hand, it provides important opportunities for customs administrations in the fight against arms and drug smuggling and commercial smuggling, as it provides effective and real-time traceability of these transactions. From this point of view, since the customs administrations will have detailed in-formation about the movement of the goods, they can direct their limited resources to other operations where they can use them more efficiently (Bernacchi and Torello, 2019).

Thanks to the online monitoring to be used in the logistics sector, it is foreseen that the unreg-istered money, which reaches billions, will be brought into the economy. Thanks to the informatics-oriented systems used in logistics and transportation, processes are now automatically controlled, while autonomously working driverless trucks, autonomous ships, pilotless aircraft, deliveries with drones and cloud technology can solve all kinds of problems (Intal and Pangestu, 2019).

2.4. Artificial Intelligence for Risk Management

Risk means the probability of an event occurring that could result in a loss or damage situa-tion. It is synonymous with danger and is used for events that are expected to occur in the future, but whose occurrence is not known with certainty. Risk is a concept related to the future because the future expresses uncertainty (Torres, David and Bowman, 2002).

Risk analysis is the identification, analysis, and evaluation of the effects of uncertainties in the process of achieving the objectives of a person, a project or a company. After all, creating profits and plans also means managing risk. All uncertainties on the way to the goal can turn into risks that require management.

Can risks be eliminated? Unfortunately, this is not possible. However, although risks cannot be eliminated completely, they can be reduced. This is possible with risk management (Vose, 2008). Risk management, risk analysis and risk assessment; necessary measures are taken in advance so that the danger can be eliminated. Because avoiding risk is cheaper than paying the price.

The first step in dealing with risks is intellectual preparation. It is important to follow the mar-ket, technological developments, political and economic developments to be prepared for where risks may come from. It is necessary to develop the foresight ability, as well as to prepare for how to act in the face of different developments. Therefore, scenario and simulation studies are particularly useful. The active and efficient use of simulation and game theories, which are also necessary in international trade, and the active and efficient use of artificial intelligence are very important in terms of managing and managing risks (Savinov and Taranovskaja, 2020).

One of the important tools to manage risks is to share them. For example, the main reason why many high-risk giant projects are carried out by consortia is risk sharing, not financing. One of the tools of risk management is to operate in different business lines or different markets. Risk manage-ment is one of the important reasons why companies operating in emerging markets, where political, sociological, and economic risks are higher, operate in more different business areas than those operat-ing in developed markets. In developed markets and stable economies, the focus is more important. Risky environments bring opportunistic approaches, while stable environments bring strategic focus and competency development to the fore.

In summary, managing risks is an issue that the company management should systematically address to achieve sustainability and success. For this reason, it is important to reflect the risk man-agement to the business perspective of the managers and to the business processes. Those who can manage risks well will also be successful in their business. Crisis and Risk management are processes that are handled with different understandings and approaches but feed each other. Unlike risk man-agement, which involves planning for future situations, crisis management involves reacting to nega-tive situations during and after they arise (Narin, 2020).

With all these facts and circumstances about risk and crisis, we need to find an innovative way to relate crisis and risks throughout the decision-making process. The innovation acceptance process, which defines the necessary stages for an individual to reduce uncertainty and decide about an innova-tion, consists of many steps. At this point, risk management should be planned with innovative tech-nologies in an area such as international trade, where each stage contains hundreds of different risks (Meltzer, 2018). When we look at foreign trade, we see that artificial intelligence applications provide significant benefits in all areas including the production, sale, storage, transportation, stock control, quality control, packaging, and customs processes of products. Improvements in these processes have especially cost-reducing and time-wasting effects. E-export emerges as an area where artificial intelligence technologies are widely used. E-export, which is one of the important developments brought by digitalization, develops by being supported by artificial intelligence technologies (Ferencz, Gonzalez and Garcia, 2022).

3. Growth Limitations And Issues in International Trade

Reforms to facilitate foreign trade vary according to the current situation of the countries. To facilitate foreign trade effectively, it is necessary to identify the problems first, and then develop solu-tions in accordance with international standards for the solution of these problems. To facilitate trade and implement futuristic and innovative technologies, the relevant countries and those responsible should make changes in the legislation and the laws in which the practices are defined. If these changes are not made, countries and institutions will fall behind the times and will directly affect their competi-tiveness in the market (Cherniwchan and Taylor, 2022). Many countries want to reform only in certain areas due to limited opportunities or fear of conflicts of interest and criticism. As a result, the impact of the reforms is limited. It would be appropriate for governments to prepare a comprehensive reform pro-gram that addresses the problems encountered with a holistic approach and to implement these pro-grams gradually in order of priority (Forrest and Liu, 2022).

Facilitating foreign trade makes it necessary to carry out studies on issues that fall under the mandate of many public institutions. For these studies to be carried out quickly and successfully, the relevant institutions should work in coordination. Inter-agency coordination is a problem in many countries. The main reasons for this are that some institutions are not open to change, there is a conflict of authority among institutions, and the institutions do not look forward to coordination due to the concern of loss of authority. Another problem is experienced in the structuring of the relevant institu-tions (Tian et al., 2018).

Specialized units should be established within the customs administrations in subjects such as risk management, information technologies and modern control methods. As in many areas, the inade-quacy of qualified workforce negatively affects the facilitation of foreign trade. Especially the lack of expert personnel in areas such as risk management, control methods and information technologies make it difficult to apply modern methods in these

areas (Moudatsou and Garcia, 2022). National inno-vation systems become increasingly dependent on each other day by day. The absence of sufficient number and quality of local talent limits its interaction with the rest of the world and isolates the sys-tem from the drivers of technical change and competitiveness. The extent to which developing coun-tries can connect with global learning and knowledge networks is determined by their national level of innovation. These forces can differ greatly from each other, and these differences can persist for long periods of time (Melitz and Redding, 2021).

The early stages of development require the development of internal innovation capabilities in the public and private sectors, and multinational firms can play an important role in strengthening the national innovation system (Dotta and Munyo, 2019). However, foreign entrepreneurs cannot always carry out high-level technological activities in the country with capital inflows. Many developing countries have long had foreign direct investment for resource generation. What is new is the tendency of multinational firms to expand their R&D to some developing countries. Invisible barriers are rules that must be followed for public health or safety in foreign trade. But it can also be used to restrict im-ports. By requiring many documents or necessary actions, the entry of some goods into the country is reduced. Also called administrative and technical barriers (Alazzam, 2021). Therefore, in fact, all ob-stacles, and constraints in front of the growth and development of international trade can be solved with the technologies mentioned in the previous sections. In addition, these technological investments allow the institution to show its own intellectual capital with the concept of technological capacity to represent suitability and competence.

4. Technology Capacity Concept

4.1. Technology as a Value

In a world where production processes have spread to a global scale, knowledge has increased in basic inputs, and life has begun to flow through social and industrial network structures, the place and effect of innovation in the formation of welfare is a vital issue for which policies and strategies have been developed in all countries of the last years.

It is a term used to measure the welfare generated by a firm, sector/sub-sector (for example, manufacturing sector/metal fabrication) or the economy in general. Accordingly, the added value creat-ed by a firm is calculated by subtracting the cost of goods and services purchased from the firm's return on sales. At the firm level, added value is the value a firm obtains by converting the goods and services it buys into purchasable products (Daniels, 1996).

Value added, which is also used as a measure of productivity, is the only measure of "output" in international comparisons of economies or sectors at the macro level (Rai and Patnayakuni, 1997). Gross domestic product, which represents the whole output of a country, includes the value added of different industries (sectors) and is the sum of the added values of individual institutions (Farhadi and Ismail, 2011).

The number of physical outputs in the type of units produced may be considered sufficient as a measure of efficiency in the production process. However, this indicator alone does not reflect the "value" of the product in the eyes of the customer. Added value, on the other hand, is a measure of the efficiency of production as well as the additional welfare created by the firm (Sütçü, Karşıyaka and Burhan, 2019).

The increasing understanding of the power of knowledge as a production input to create added value, especially its role in the development of innovative products, and the increasing development and multilateral nature of the network of relations created by the convergence of the relationship be-tween innovation processes and the market, increases the importance of "technology transfer" in pro-duction and service processes (Abdurazzakov et al., 2020). For companies in competitive markets, the fact that technology transfer is an integral part of their vision and strategy has become their reason for existence (Yun, 2010). As a solid foresight for the future, it can be said that only companies that take the ability to acquire, absorb and reproduce knowledge at a higher level to innovative product process-es among their main competencies will be successful.

Information and technology suppliers of the R&D process are other stakeholders that contrib-ute to the creation of added value. The expectations of the stakeholders in the process will help define the values created for each one.

Innovation can also be defined as the transformation of ideas into commercial returns (Archibugi and Iammarino, 2002). Based on this definition, it can be said that a significant part of the added value created by innovation is formed in the commercialization process.

Firms should analyze these factors when they plan to develop a new product as investment re-quirement, cash flow, risk, return on investment differ in these approaches. However, mostly compa-nies adopt one of these approaches

without calculating because there is no "choice of the method of commercialization of innovation" (Pellikka, 2014) in their decision processes and with their established habits. In this case, the probability of failure will be high.
Although there is no ready-made recipe for choosing the right method, a holistic analysis of the industry, innovation and risks related to the new product must be made. When this analysis is done by considering all three factors together, it is possible for the firm to exceed its profit the most.
The first role of technology emerges in the product development process. With the technolo-gies selected or developed in practice, it has been ensured that product costs are reduced, advantages are provided in terms of physical weight and usage in design, and the process is accelerated (Tiernan and Peppard, 2004). The efficiency and adequacy of the product development process has been made possible using information technologies on a large scale.
At this point, the use of technology in the field of foreign trade allows the full application of the value of the technology described above. In other words, technology is applied to add value to the company and industry where it is applied. The main purpose of this investment is to increase the added value and to increase the profitability and competitiveness in the market with this increased added val-ue.
On top of this, E-export emerges as an area where artificial intelligence technologies are wide-ly used. E-export, which is one of the important developments brought by digitalization, develops by being supported by artificial intelligence technologies. Businesses operating in the field of e-export can use artificial intelligence to produce creative solutions on their websites and offer a better experience to their customers. Industrial production, logistics and supply chains powered by artificial intelligence make it possible for businesses to be more competitive in the international arena (Falk and Hagsten, 2015). In this way, companies can increase their exports.
In summary, the concept of capacity, which constitutes the content of this study, is the value added of technology. Technology capacity can be defined both in the short term (with its impact on products and services) and in the long term by increasing the suitability of the company to other tech-nologies that are likely to be implemented in the next stages.

4.2. Definition of Technology Capacity Concept

The concept of capacity expresses the maximum amount of production that an enterprise can achieve in a certain period (usually taken as a year) by using its available resources. Capacity is the ex-pression of the factors of production held by an enterprise with a certain measure (Zhao, Song and Li, 2018).
In addition to this situation, the concept of operating capacity, which has more to do with technology; It can be defined in terms of "production quantity" and in terms of "costs". The amount of goods and services produced by the enterprise in a certain period by bringing together the production factors such as money, raw materials, materials, machinery, labor and information in the most appro-priate way; it refers to the capacity of the enterprise (Karakaş, 2019). At this point, we will examine the impact of technological investments on the concept of operational capacity, the next stage of this defi-nition.
In addition, before we can determine the technology compliance level, we also need to define the leveling of the capacity. Accordingly, it expresses the production level or production power in a certain period. Business capacity is a concept that expresses the ability and possibilities of enterprises to produce a certain good or service with a certain measure (Wang et al., 2019). The production unit is often used as a measure of capacity, but our study will show the effect of technology on this power.
Within the scope of this study, we should also talk about how technological investments affect different capacity concepts. Because the main purpose of technological investment should be to affect the positive change of different capacitive situations. To give an example, it will be to increase the benefit of the technological investment to be made for the use of idle capacity and accordingly the in-crease in the added value to be created by the capital.
It is not possible to reach the theoretical capacity since there are many other activities that needs to be handled as an operational activity like; Maintenance-repairs, waiting, pauses, assembly and adjustments, getting ready to work, etc. due to operational interruptions. Due to these reasons 100% of the working capacity of the machines or enterprises cannot be filled (Özçelik, 2019).
When these activity interruptions are removed from the theoretical capacity, the "normal (prac-tical) capacity" is reached. Normal capacity is the capacity that emerges after a technological invest-ment has met all ideal conditions

(Çağal, 1994). As it can be understood from the definitions above, it is expected that every technological investment will reduce all the waiting, pauses and losses in transi-tions that negatively affect the capacity at this point.
The actual or actual production capacity of the enterprise in any period is called "actual capaci-ty". (Temel, 1997). Normal (practical) capacity always gives the "achievable production quantity". While the actual capacity may be below the practical capacity due to decreases in demand, disruptions in production, the actual capacity may exceed the practical capacity due to the increase in demand due to seasonal fluctuations in demand. At this point, technological investments should be flexible and manageable in periodic processes. production technologies are flexible and suitable for scaling to in-crease capacity; it will show that the technology capacity of the institution is high.
If the production amount, that is, the actual capacity of the enterprise in a certain period, is be-low the normal capacity, the difference is called the "idle (empty) capacity" of the enterprise (Orhan and Bozdemir, 2009). At this point, technological investments should be planned at the point that will activate these idle capacities of institutions. The most important example of this situation is the elimi-nation of waiting times and queues in production systems and the capacity planning of a line to mini-mize these waiting times. The determination of idle empty capacity at the foreign trade point with arti-ficial intelligence will also play an important role in reducing costs in terms of logistics management.
The state of the production technology of the enterprise also affects the capacity closely. Ca-pacity size should be planned to consider sufficient technology. In capacity planning, technological possibilities should be evaluated from two perspectives. In the first case, keeping the capacity size at a certain level is limited by the applied production technology. Production below this capacity becomes meaningless especially due to the high cost.
Today, technology; It is defined as a process that covers the transformation of the data of basic and applied sciences into production within creative processes, their use and the analysis of their social effects (Carroll, 2017).
At this point, technological capacity can be defined as the whole of the processes that include the measurement of all the factors that will be realized in order to reveal all the capabilities and capabil-ities of the institution (Çetindamar and Günsel, 2009). In this sense, technological capacity will include different motivation and analysis points for each industry branch. Within the scope of this article, the effect of technology capacity on foreign trade will be emphasized.
The table below summarizes how technological investment in different capacity concepts af-fects:

Table 1 Capacity Concept with and Cross Relation

Capacity Concept	Technology Investment Impact
Theoretical Capacity	The relationship between theoretical capacity and technology capacity is the relationship that emerges with the method of direct calculation. Since the theoretical capacity forms the basis of technological investments, its calculation with real-time data will enable the theoretical capacity to emerge as the closest capacity to the real capacity. In this sense, it will enable the investments made to be used at the highest level in terms of technological capacity. The concept of technology capacity will also make a difference in terms of measuring technological competencies (Kachru, 2009).
Real Capacity	It is expected that the real capacity and accordingly the technology capacity will increase with technological investments. In this sense, as the Technology Capacity increases, the real capacity will increase (Markowich, 1979). In cases where it does not increase, this technology will require re-

	evaluation in case the technological competence level of the institution does not match, focusing on the improvement points that emerge as a result of this evaluation and completing the relevant actions (Niles, 2014).
Actual Capacity	Technological investments have no direct effect on the increase in actual capacity. However, if the investments made include improvements in product quality and sales processes indirectly, it will have a positive effect in the medium and long term. The same situation will cause the actual capacity to decrease in parallel with the decrease in product quality. The concept of actual capacity may change periodically (Primrose, 1988). Companies with high technological capacity are those with a flexible technological infrastructure that can predict these periods and produce complementary products and services during these periods (Qin and Wang, 2006).
Idle Capacity	It is the type of capacity that technological investments will be most interested in and have the most impact. While technological investments increase technology capacity and competence, they also aim to reduce idle capacity. In this sense, an efficient and effective technological investment reduces the idle capacity and paves the way for the institution to produce products with high added value (Wang et al., 2013). With a correctly calculated theoretical capacity, a decrease in idle capacity will be inevitable as a result of increased actual capacity.
Optimum Capacity	The effect of technological investments on optimal capacity may be at the point of increasing product quality. In this sense, technological investments made by an institution working with optimal capacity can be at the point of reducing its costs, producing value-added products and increasing its profitability (Fine and Freund, 1990). Since the optimal capacity is the point at which the cost of a one-unit increase in product production capacity has a minimum effect on the cost of products and services, the increase in capacity after this point will unfortunately reduce the rate of increase in revenues. Therefore, optimal capacity can be the maturity point (Asl and Ulsoy, 2003) of institutions. However, since new technological investments to be made will focus on product variety and quality, the increase in technology capacity of institutions working with optimal capacity in this

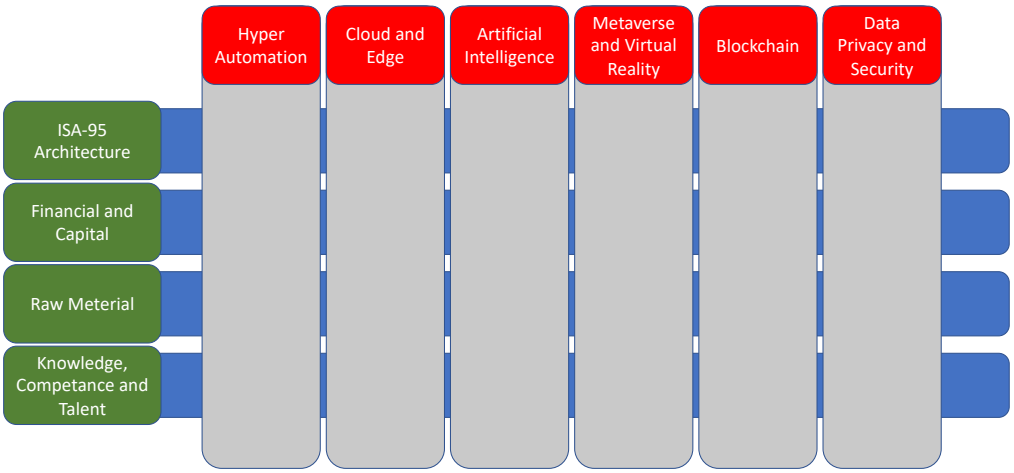
	sense has a positive direct effect on their income.

5. Technology Capacıty Impact in Internatıoanal Trade

5.1. Technology Capacity Differentiators

In this section, the definition of the variables that affect the capacity of technology investments will be made. These variables will also be evaluated in terms of technology capacity. In addition to this situation, the effect of foreign trade in terms of its effects on technology capacity will also be exam-ined.

Table 2 Cross Relation of Technology Capacity and Technology Differentiators



• ISA-95 Architecture: This is a framework that will represent the automation standards with respect to having a support in Industry 4.0.

• Financial and Capital: This is the representation of companies' financial readiness to make investments.

• Raw Material: This is one of the most important factors that has an impact on the produc-tion capacity.

• Knowledge and Competence: This is a point to identify the technology capacity impact on human resources in the company.

On top of this the scope of the technology that will have an impact on the capacity has been included in the vertical site. These technologies will be interreacting in different departments, organiza-tions, assets and resources in the company.

5.1.1 Capital

Capital accumulation, technological development and employment growth are the main deter-minants of economic growth. The fact that employment growth is highly dependent on investments as well as population growth makes technological development and capital accumulation factors critical elements of economic growth (Battisti, Del Gatto and Parmeter, 2018).

In its most general form, capital accumulation or capital stock can be defined as the capacity of a production unit to produce goods and services in a certain period. Although the dependence of pro-duction capacity on capital accumulation is relatively weak, especially in some service sectors and ag-riculture sector where labor (labor force) is used intensively, it is very difficult to talk about a produc-tion activity without capital accumulation (Malinvaud, 1953).

Capital accumulation constitutes one of the most important sources of technological develop-ment and increase in employment, therefore it has a critical importance in the processes of economic growth and social development (Kaldor, 1961).

In this sense, for technology investments to be sustainable and continuous, the capital struc-tures of companies and institutions must be very strong. Because technology is the most important part of a rapidly developing and changing process. Technological investments cannot be made in a very short term and at once, as in the past. Today, technological investments must be handled within a cer-tain transformation process, because a very large technological investment does not result in any way from today to tomorrow. A technological investment has various stages of development and implemen-tation. These phases should be evaluated from every angle and handled at the right time and with the right financing model. Today, very different technological investments can be made because technolo-gy offers different development and change opportunities to institutions and companies in many differ-ent fields. Institutions should prioritize these opportunities, considering their own capital and strategic goals, and according to their strategy and capital structure. otherwise, a mistake that may occur during the investments will fundamentally affect the transformation process and cause a deterioration in the capital structure. For this reason, the fact that technology investments can be made in the right order and at the right time depends on the capital structure and at the same time directly affects the change in the capital structure.

These activities include high-budget and long-term research and development activities. It is important for the sustainability of the enterprises that the companies have a capital structure to finance these activities. Capital structure decisions of enterprises are related to capital budgeting and working capital decisions (Yapa Abeywardhana, 2017). Therefore, the capital structure is of great importance both in determining the market value of the enterprise and in measuring its risk.

Since strategic flexibility (De Toni and Tonchia, 2005) is the ability to respond to the oppor-tunities and threats arising from the changes in the market with the technological uncertainty arising from the changes in technology, the technological capacity of the institutions that are strategically flex-ible on their technology capacity will be high. It is expected that the technology capacity will be strong, as the capital structure that is manageable and will be affected by the risks in the least way will also ensure strong strategic flexibility (Galbraith, 1990).

The strategic flexibility of exporting and importing enterprises also depends on their success in international trade, the price and characteristics of the goods and services subject to trade, the deliv-ery methods, the technical knowledge of the enterprise, the risk of the enterprise and the legal regula-tions, as well as the financial resources related to foreign trade activities. Technological investments have a direct impact on technology capacity.

5.1.2 Labor

Today, when technology management is very important in enterprises, as a result of evaluating and measuring technological competence, enterprises need to use some evaluation methods in order to determine their own capacities and to see their deficits. It is possible to get better results by making competency-based evaluations instead of the methods used mostly within the scope of performance evaluation.

Since the multidimensional effects of the developments in information and communication technologies extending to economic growth are seen, it should be stated that the improvements in labor productivity as a result of the developments in information and communication technologies play a role in the reshaping of the economic structure (Solocha, 1991).

Another new challenge for labor markets, both at the global and national level, is adapting to digital transformation. Based on the prediction that the whole world will meet with the 4th industrial revolution by the first quarter of the 21st century, it is thought that adaptation to digital transformation will also deeply affect the labor markets (Mantulenko, Zotova and Makhovikov, 2020).

In the axis of the risks of the future due to uncertainty and the new opportunities created by in-formation and communication technologies, it is of great importance how to raise human capital for the labor market of tomorrow and which knowledge and skills should be invested in this sense.

By evaluating the positive and negative effects of technology on jobs holistically, precautions should be taken today both in terms of the workforce employed in jobs and professions that may disap-pear due to routine/task-oriented technologies, and to prepare for the jobs and professions of the future with the skills needed in terms of technology's potential to create new jobs (Rajnai and Kocsis, 2017).

With the effect of technological changes, there are transformations on a global scale in todays and future jobs, in labor supply with demographic and migration dimensions, in employment relations with the effect of changes in work, in social reconciliation with the distribution and security of income. The technology-driven transformation in production forms increases the demand for qualified labor and reduces the demand for medium and low-skilled labor in jobs subject to automation and reduces the share of medium-level qualified jobs and wages in employment, especially in developed countries. With the developments in digital technologies, new professions and ways of doing business are emerg-ing, and countries are changing their labor legislation to include different forms of flexible working. These developments create new job opportunities for young people on a global scale.

After the important industrial revolutions in the production sector, countries and companies had to keep up with these global changes and developed some strategies in order to maintain their su-periority in the increasing competitive conditions.

The accelerated digitalization process with the spread of new technologies and the increase in efficiency provided by these technologies; It changes the way of doing business, organizational struc-tures, the quality of the products and services produced and the places where production is made (Mu-thusami and Srinivsan, 2020)

New technologies have a significant impact on labor markets on a global scale, by eliminating existing employment on the one hand and creating new employments on the other. In this context, companies that has high technology capacity should be developed that supports young people in secur-ing employment, which is critical for future socioeconomic progress.

The issue is about the labor required for the development of technology independent of indus-tries. In this sense, it should be aimed to maximize the technology capacity of societies in all areas of the country independent of industries. Otherwise, inter-sectoral interaction and technological develop-ment will be disrupted, and this situation is thought to affect foreign trade fundamentally due to the lack of technological incompatibility between sectors also.

5.1.3 Machinery

Due to the increasing competition, today's businesses abandon the classical production meth-od, "the model based on economies of scale on the basis of multiple production" and turn to the pro-duction of fewer and differentiated products that will meet the expectations of the market (Schmiedbauer and Biedermann, 2020). In this respect, it can be mentioned that there is a direct rela-tionship between the product life cycle and technological developments. As a result of this relation-ship, product life cycles are getting shorter and product variety is increasing rapidly.

The design, simulation, and analysis of the products to be made in the manufacturing sector, business plans and accounting issues are primarily carried out in the digital environment. Along with digitalization, machines can do and report many jobs. For example, by using robots in manufacturing (Akyazi et al., 2020), more difficult, complex, and risky works can be done, and these works can be monitored digitally. Those working in the sector who can use the digital environment in the field of manufacturing are now preferred.

They can make many predictions by combining the obtained data in digital environment. Re-cently, a profession called Data Mining has emerged. Data mining is the work of extracting useful in-formation from large-scale data (Kusiak and Smith, 2007). It can also be defined as the search for corre-lations that can enable us to make predictions about the future from large data piles using a computer program.

For the Machinery Industry, digitalization can be defined as the integration and active use of advanced technologies into systems, as well as the emergence of smart products and services as a result of innovative business models (Pini, 2011).

Companies generally have a waste-intensive structure in production. Although they follow the production and flow with programs such as ERP, they prefer a labor-intensive structure instead of modernizing their production systems, due to losses, rework, malfunctions, wastage items such as loss-es, reworks, malfunctions, transportations that are ignored due to factory layouts, movements, interme-diate stocks and product stocks, and Hidden losses that affect production costs cannot be tracked or monitored and no action is taken against them. It is seen that it is necessary to use lean production techniques in production processes and to work on process improvement.

In companies that are far from these systems, the labor-intensive structure in production also shows itself in the quality organization and stages. Companies generally focused on quality control ac-tivities in order to control the problems they could not control and solve in production, and at this stage, very expensive and error-prone methods such as visual control and 100% control were applied.

Statistical process control methods, digital control methods and Failure Mode and Effects Analysis (FMEA) required for root cause studies for quality problems are rarely used in the sector. Im-provement activities with the direct participation of employees, such as kaizen studies and individual suggestion systems for the solution of quality problems, are not very common.

From this perspective, the machine parks in the production systems and all the work processes that will complete these machine parks have a direct impact on digital capacity and technology capaci-ty. technology capacity should not be designed only to measure how much digital data a machine park has produced. Because the production output of a machine park has a direct effect on the products and services, and therefore, the same level of digital competence should be provided in measuring the quality of these products. In addition to this situation, the maintenance and repair of the machines should also be followed by digital processes in the same way and predictive maintenance should be possible. If these competencies are not possessed, the technology capacity will be low since the process of purchasing digital machines is not digitalized end-to-end.

5.1.4 Raw Material

Many of today's developing economies have abundant natural resources, it is seen that only a few of these economies base their long-term development strategies on resource-intensive sectors. This is probably since these countries think that they will never be able to move from low value-added raw material production and export to more developed industries.

For companies to be highly productive, raw material flexibility must be high. For raw material flexibility to be high, it is necessary to use technology intensively in processes and R&D studies where material science is used. As this situation will keep the strategic flexibility of the companies at a high level, it will reduce their costs at the raw material point and eliminate their dependence. In this sense, it is expected that the technology capacity of companies with high productivity will increase at the same rate. In this case, since the company will be minimally affected by the raw material crises in the market, the income of the companies will be sustainable, and they can produce products with high added value. In this way, high value-added product production, high strategic flexibility and at the same time sus-tainable high-income targets will be achieved in institutions with high technology capacity.

Effective use of material technology is essential for groundbreaking research and innovative products (Tomita, 2009). One of the most important factors affecting the success of the work done is to choose the material suitable for the purpose correctly, and to use it in the most correct way by knowing the properties of the material. Especially in today's industrial sectors, the mechanical properties of ma-terials (tension, tensile, compression, elastic limit, flexibility, durability, hardness) are not only criteria for selection, but also come to the fore in physical, chemical, thermal-electrical properties (Çiltepe, Gürbüz and Şeker, 2012).

Materials management is a core supply chain function in every organization. Basically, materi-als management is the capability that firms use to plan their total material requirements. Plan is the keyword. The process behind materials management is scheduling and is an essential component of ERP solutions used to manage stocks and production (Akindipe, 2014). The purpose of the process is to stay ahead to see future problems. Being ahead will provide a seamless chain of components for pro-duction to produce goods for customers on time.

Inventory is the natural products of raw materials, semi-finished products, products, or assets that a company has to produce. Keeping stock is one of the cost items of manufacturing companies (Silver and Zufferey, 2005). Like every cost, inventory should be kept under control without raising al-ternative costs. While keeping enough stock to meet the production demand, logistics, storage, wear, etc. trying to reduce costs.

Inventory management is one of the factors that positively affect technology capacity. Because stock management also ensures that raw material management is kept at an optimum level (Michalski, 2008). Keeping the raw material at an optimum level will ensure that the financial management is healthy, sustainable, and predictable. Businesses with this financial model can offer high value-added products to the market at competitive prices, especially since they ensure that production costs are kept at the lowest level. Stocks have been viewed as a positive asset for many years and have not been given much attention by businesses. However, this situation has been changing in recent years and modern production techniques have been used effectively and efficiently in the light of digital applications in enterprises with high technology capacity.

Even after raw materials have been evaluated and purchased, the function of raw material man-agement will continue. As part of the support given to the production process, enterprises with high technology capacity also

focus on the waste of raw materials. In this sense, the production stages where waste occurs and the changes that will minimize this waste should be determined and corrected with the advantages brought by high technology.

5.1.5 Real-Time Information

Considering that the raw data from the production floor forms the basis of all production re-ports, companies need to eliminate possible shortcomings when collecting this data. Automated pro-duction data collection systems help with this.

Thanks to the production data collection systems, the margin of error is minimized and the da-ta yields much healthier results. Collecting production data automatically will help eliminate these problems. If you have several different machines and controllers, you will need several different data acquisition systems that need to integrate a third-party software. Many proprietary aggregation systems require special serial networking and client software (White, 1982).

Data acquisition systems in a modern production include a data logger, a transaction manager, a database, and a report generator. These programs typically run together on a single server. Some con-figurations run the database on a separate server. Today's digital process control systems offer the op-portunity to leverage extensive data. To be useful, systems for collecting data in production must be capable of turning this information into actionable information. Process systems that are operated and maintained based on actionable information are more reliable and more profitable.

Production data collection systems vary according to needs. For example, some systems need a historian who can quickly record large volumes of data; there are no others. Many involve analysis and reporting; others simply export data to existing or preferred analysis and reporting systems.

In addition to the collection of scalable production data, the basic rule for any production man-agement system and the production planning subsystem or quality management system to function cor-rectly is to close the opened work orders in a timely manner as the relevant operations are completed. In other words, it is the timely and accurate receipt of production confirmations from the production site (Delen, 2014).

In this sense, it would not be a mistake to say that the information collected at a very high lev-el in one day is the most important asset to improve the technology capacity of the enterprise. This data is as important as the capital structure of the business. Because all technological strategies and trans-formation scenarios will be built on all this data. At this point, big data projects will be the most im-portant technological investment of foreign trade processes that can make a difference.

Big data describes a large amount of data, whether regular or irregular, that complicates the functioning of everyday work. As a result of the analysis of big data, better strategy and decision-making opportunities are provided for studies (Delen and Ram, 2018).

Industry 4.0 includes technologies that leverage Big Data and artificial intelligence to feed ma-chine learning systems. Today, manufacturers, in order to achieve product perfection; It tries to achieve business intelligence through the collection, analysis and reporting of all data (Jayaratne, 2021). Thanks to Big Data, predictive models are created for new products and services. For these models, Da-ta and analytics from focus groups, social media, test markets, and early store rollouts are used.

Developing the potential of Big Data in your own production environment is a rewarding, if not easy, process. It's not enough to just collect data and create a few charts. It is necessary to filter production-related information from the data and present it to the right target audience in the right way. The key is to transform data into useful information. This should be done in close collaboration be-tween data science experts and experts in the manufacturing process. Only in this way can a solution that is popular, frequently used and creates long-term value be developed.

In this context, in order to ensure capacity increase and sustainable technological capacity in-crease, it is necessary to establish systems with the necessary analytical capabilities to collect data and store this collected data, in addition to transforming this stored data into meaningful and valuable in-formation. This is necessary at least as far as a strong capital to develop sustainable growth, strategic flexibility and value-added products.

5.2. Business Processes Management Impact on Technology Capacity

The new business environment, fraught with multidimensional and interrelated systematic challenges, is defined by an extensive division of labor. As a result of much research, it is seen that the biggest enemy of sustainable productivity and success in the rapidly changing business world is the in-creasingly complex business models. Evaluating inefficiencies in business processes is an important step for companies to grow. At this stage, the process is viewed from a bird's eye view and a general photograph is taken. With the identification of areas open to development, the growth of companies ac-celerates, their reputation and business continuity increase.

A series of activities or activities that have inputs, add value to them, and produce outputs are processes. The process and its elements should be defined to ensure good control over the process. How the process works, how many people work, what are the constraints in the processes are deter-mined, performance parameters, risks, location, document, digital tool, stakeholder activity, process connections and other tools are determined (Li, Merenda and Venkatachalam, 2009).

Is the system actively used, is there a problem in the process flow, what are the factors that de-lay the process, what are the factors that hinder the good operation of the process should be determined can be the questions that needs to be asked during the analysis.

In this case, all processes that directly affect the digital capabilities and capabilities of the en-terprise will be analyzed with healthy and manageable processes. The processes developed after these analyzes and reaching the level of technological maturity will increase the technological capacity of the enterprise. The increase in the technological capacity of the processes will ensure that the relevant pro-cesses become strategically flexible along with the flexibility brought by technology.

In an organization that has identified and started to manage its processes, the first thing to do about the process handled in the continuous improvement cycle is to examine the current state of the process. It is then decided whether to redesign the process or to make minor changes to the existing process (Moço, 2018).

At this point, it is also important how much the concept of continuous improvement is sup-ported in terms of technological investments. In this case, when technological investments are consid-ered as a part of continuous improvement, the technological capacity of the institution will increase in a sustainable way (Brown and Rusk, 2019). This will enable the business to be a part of the necessary change and transformation in the field in which it operates. Especially after covid, there have been revolutionary changes in the way of doing business. In order to keep up with this change, the ways of doing business need to be analyzed and designed in ac-cordance with renewed customer expectations. Because businesses applying this approach were able to quickly change their way of doing business during the covid pandemic. In this case, it is the most im-portant proof of how sustainable the current business models are even in the most catastrophic envi-ronment. In the changing world order, the way of doing business may need to be redesigned according to both local and global risks. In this case, artificial intelligence and big data supported crisis and risk management should be integrated into process improvement processes. In this way, risks can be deter-mined at the source.

At this point, the most important instrument required for sustainable improvement is the data that needs to be collected in real time. We can also define the data to be used in the improvement of processes as process mining (Van Der Aalst et al., 2007)

Process mining can be considered as a relatively new technology that can bring process man-agement to the agenda and make it a focal point in companies. Businesses that can use the concept of real-time process mining in their foreign trade processes will also maximize their technology capacity as they will be strong in strategic flexibility.

5.3. Technology Impact on Human Resources Management

Information technologies, which are developing day by day, continue to find more and more places in our lives. Human resources are one of the areas where information technologies are increas-ingly used in business life as well as in daily life. As a matter of fact, as technology changes every as-pect of our lives, it is not surprising that it also has a huge impact on human resources. Companies to-day are leveraging the latest human resources technologies to attract and recruit new candidates, retain more of top-performing employees, and provide support in workplace management and administration.

Within the scope of this study, competition must be experienced at the highest level in order to operate in the field of international trade. To be able to have a high technology capacity is to have the human resources to realize the

technology used and applied. Because the diversity and depth in human resources will enable institutions to be strategically flexible and, in this sense, to increase their tech-nology capacities at the same time. The fact that the management of human capital can also be managed with the opportunities and capabilities brought by technology will increase the end-to-end technologi-cal capacity of the institution.

Human capital management describes the comprehensive approach a company takes to manage its most asset, its employees. This approach refers to both the strategic and technological elements needed to address a wide variety of human resources-related activities (Kalinina and Valebnikova, 2017). Appropriate human capital management plans help companies strategically manage their work-force productivity. This strategy is essential for companies that want to use their human capital assets with maximum efficiency. When this strategy is combined with technology, it also has a direct impact on the production capacity of institutions. Because the high idle capacity in technology-intensive ways of doing business is mostly due to the insufficient use of this technology, that is, to having insufficient and uneducated manpower. Admittedly, processing on paper or transferring information between dif-ferent systems takes longer. You can see that time equals money, especially when you consider how many hours your human resources team spends entering data or correcting errors caused by manual processes. The right human resources technology can save your human resources team a lot of data en-try and administrative tasks (Mihova and Ivanova, 2020). This way, instead of spending time on com-plex HR processes, you can plan for your growing workforce, for example, or help managers identify and retain the best talent.

The data collected from the employees will be used in determining the strategic Human Re-sources policies, extracting the employee experiences, and determining the changes to be made. Effi-ciency will be increased with more participatory and satisfied employees by creating an employee pro-file that will guide decision making. With this big data provided, it becomes possible to determine em-ployee performance, process improvements, talent transformations and required new talents. At this point, the important thing is to establish flexible and quick-learning organizations that can meet the needs of tomorrow rather than the skills needed today. In addition to this situation, big data technolo-gies are also used for the loss of employees who are likely to leave their jobs. Considering that human resources management is a function that emerged because of the industrial revolution, it will be inevi-table that there will be a transformation in human resources management with digitalization (Gospel, 2009). Unfortunately, it is not enough to invest only in machinery in the field of competition for the ef-fective and efficient use of technology at the point of international trade. Of course, in addition to this situation, we will also need to examine the impact of technology on human resources processes through blockchain and artificial intelligence (Tambe, Cappelli and Yakubovich, 2019) where there is big data. Because only having data will not be enough in this sense, artificial intelligence technology is needed to measure the performance of employees and to keep this measured performance on the block-chain architecture, even to group the same positive or negative performance owners and to investigate the reasons and to offer personalized solution suggestions for these reasons.

5.4. Technology Impact on Infrastructure and Equipment Management

In industrialized countries, the creation of industrialization value is shaped by what is now called Industry 4.0, which is the fourth stage of industrialization. This development follows the third industrial revolution that started in the early 1970s and relies on electronics and information technolo-gies to realize a high level of automation in production. Industry 4.0 reveals the smart production economy of the future based on digital transformation dynamics (Kannan et al., 2017). Organization of businesses that want to be ahead in global competition in the world of the future, smart robots that will work in production and distribution processes, artificial intelligence systems to be used in R&D, sales, marketing and management processes, internet objects that will enable them to exchange information with the outside world, and that will ensure that all these smart systems work together in harmony. They will be able to succeed with a team of designers, software developers and practitioner experts who have the necessary skills. At this point, so to speak, the place where all the technological capacity of the enterprise takes place is the entire production systems. The production system of the enterprise is therefore the medium where all the output of the technology capacity is used. Manufacturing Execution Systems (Shojaeinasab et al., 2022) is the name given to a structure formed by information technology (IT) systems that support the basic production process in a manufacturing facility. These applications fill the gap between ERP systems and production equipment control, DCS systems, PLC systems, SCADA systems. Digitalization in the manufacturing industry has the potential to create value with ef-ficiency and productivity increases at every stage of the value chain. While digitalization offers im-portant opportunities for regions and businesses that have made progress in this area, it also poses a great threat to regions

and businesses that have not taken a step in this area. In the digital transfor-mation process of the manufacturing industry, it is necessary to use digital technologies efficiently, ef-fectively, and effectively in order to be in a competitive position in production. At this point, the tech-nology capacity basically focuses on how effectively and efficiently all the components in the integra-tion architecture work. It is also important to measure how flexible an architecture it is designed to re-spond to different markets and expectations in terms of its impact on foreign trade. In the digital trans-formation process of the manufacturing industry, technologies such as "artificial intelligence, autono-mous robots, big data and advanced analytics, cloud computing, augmented and virtual reality, internet of things, additive manufacturing, new generation smart sensor technologies and cyber security" will contribute to added value, efficiency, profitability, it is seen as the leading technologies in maximizing quality and many similar elements. In this sense, the technological capacity of an institution is related to how harmonious, effective, and efficient the above-mentioned areas are used. This harmony and effi-ciency can be handled under 3 main headings in the ISA95 framework (Hannola et al., 2017).

1. Hierarchical model: The hierarchical model in ISA-95 provides a convenient way to structure and align information from different levels of the company. In today's environment with data lakes, UNS, and systems that collect information from multiple cells, lines, sites, sites, and even organizations, this organization is very useful when organizing information and annotat-ing it.

2. Information Model: Models in ISA-95 can be very complex and detailed. These models cover multiple structures, including personnel, equipment, physical assets, and materials. It also co-vers the disciplines of production, maintenance, quality, and inventory. The ISA-95 specifica-tion defines interrelationships.

3. Data Flow; Defines data flow from different functional models. These functional models can be in a single system or in separate systems depending on the organization and production en-vironment. When integrating with separate systems, it is important to identify the use case, then the data requirements of the source and target system, and then define the execution or trigger event.

6. Conclusion

Within the scope of this study, the concept of technology capacity has been tried to be examined by considering the concepts of strategy flexibility and capacity in enterprises that carry out foreign trade activi-ties. In this context, the concept of technology capacity was basically defined as a study on measuring all digital solutions and concepts that affect capacity and strategy.

The concept of technology capacity emerges as a concept that may differ in each industry branch, due to the differing application areas. But at this point, there is a common industrial standard for all manu-facturing and manufacturing enterprises. Thanks to this standard, which is defined as ISA-95, the integration of use cases within the scope of industry 4.0 and accordingly digitalization of all manufacturing and produc-tion enterprises is made with a certain standard. In this sense, apart from the factors that affect capacity and strategic flexibility, the ISA-95 audit, and assessment results of institutions guide the institutions about the capabilities and capabilities of the technology capacity within the scope of digitization of manufacturing and industrial systems.

Apart from these issues, the audit and assessment performed for the technology capacity must be able to be done continuously to reach the result and purpose. It is very important that such processes are handled within the scope of continuous improvement. Because at this point, it is necessary for institutions to carry out change management effectively and efficiently and with the same motivation and excitement throughout the organization.

In addition, this study, which will be considered as a part of continuous improvement, also needs to be handled within the scope of automation. Because, in order to determine its suitability for variable market and world conditions, it will be necessary to obtain the result of this assessment in a very short time and to be able to apply it in necessary actions quickly. In this context, it would be healthy to measure technology capacity with an artificial intelligence robot. In addition, the fact that the data collected in the enterprise will increase will require this artificial intelligence robot to be run on cloud technologies to meet the increasing infrastructure needs over the years.

References

Abdurazzakov, O., Illés, B.C., Jafarov, N. and Aliyev, K., 2020. The impact of technology transfer on innovation. Polish Journal of Management Studies, 21.

Akindipe, O.S., 2014. The role of raw material management in production operations. International Journal of Managing Value and Supply Chains, 5(3), p.37.

Akinyoade, A.J. and Eluwole, O.T., 2019. The internet of things: Definition, tactile-oriented vision, challenges and future research directions. In Third International Congress on Information and Communication Technology (pp. 639-653). Springer, Singapore.

Akyazi, T., Goti, A., Oyarbide-Zubillaga, A., Alberdi, E., Carballedo, R., Ibeas, R. and Garcia-Bringas, P., 2020. Skills requirements for the european machine tool sector emerging from its digitalization. Metals, 10(12), p.1665.

Alazzam, F.A.F., 2021. The Importance Of Non-Tariff Barriers In Regulating International Trade Relations. Public Administration and Law Review, (1), pp.92-104.

Archibugi, D. and Iammarino, S., 2002. The globalization of technological innovation: definition and evidence. Review of International Political Economy, 9(1), pp.98-122.

Asl, F.M. and Ulsoy, A.G., 2004. Stochastic Optimal Capacity Management in Reconfigurable Manufacturing Systems. Journal for Manufacturing Science and Production, 6(1-2), pp.83-88.

Aslam, J., Saleem, A., Khan, N.T. and Kim, Y.B., 2021. Factors influencing blockchain adoption in supply chain management practices: A study based on the oil industry. Journal of Innovation & Knowledge, 6(2), pp.124-134.

Aydınocak, E.U., 2022. Internet of Things (IoT) in Marketing Logistics. In Logistics 4.0 and Future of Supply Chains (pp. 153-169). Springer, Singapore.

Badakhshan, S., Senemmar, S., Li, H. and Zhang, J., 2022, April. Integrating Offshore Wind Farms with Unmanned Hydrogen and Battery Ships. In 2022 IEEE Kansas Power and Energy Conference (KPEC) (pp. 1-6). IEEE.

Battisti, M., Del Gatto, M. and Parmeter, C.F., 2018. Labor productivity growth: disentangling technology and capital accumulation. Journal of Economic Growth, 23(1), pp.111-143.

Bernacchi, M. and Torello, A., 2019. Advantages of pre-clearance procedures in maritime transport. WIT Transactions on The Built Environment, 187, pp.233-238.

Brown, T. and Rusk, R., 2019. Applying lean tactics in the Factory of the Future. Plant Engineering, 73(10), pp.32-35.

Çağal, İ.F., 1994. Sanayi işletmelerinde kapasite planlama.

La Shun, L.C., 2017. A comprehensive Definition of Technology from an Ethological Perspective. Social Sciences, 6(4), pp.1-20.

Çetindamar, D. and Günsel, A., 2009. Teknoloji yetenek kapasitesinin değerlendirmesi: nedir ve nasıl uygulanır?.

Cherniwchan, J.M. and Taylor, M.S., 2022. International Trade and the Environment: Three Remaining Empirical Challenges (No. w30020). National Bureau of Economic Research.

Çiltepe, E., Gürbüz, H. and Şeker, U., 2012. Tasarim Ve İmalat İçin Malzeme Seçimine Yönelik İnternet Tabanli Bir Yazilim Geliştirilmesi. Batman Üniversitesi Yaşam Bilimleri Dergisi, 1(2), pp.127-137.

Daniels, P.L., 1996. Technology investment and growth in economic welfare. World development, 24(7), pp.1243-1266.

De Toni, A. and Tonchia, S., 2005. Definitions and linkages between operational and strategic flexibilities. Omega, 33(6), pp.525-540.

Delen, D., 2014. Real-world data mining: applied business analytics and decision making. FT Press.

Delen, D. and Ram, S., 2018. Research challenges and opportunities in business analytics. Journal of Business Analytics, 1(1), pp.2-12.

Dotta, V. and Munyo, I., 2019. Trade openness and innovation. The Innovation Journal, 24(2), pp.1-13.

Falk, M. and Hagsten, E., 2015. Export behaviour of micro firms in the Swedish computer and business service industries. Economics, 9(1).

Fang, S., Wang, C., Liao, R. and Zhao, C., 2022. Optimal power scheduling of seaport microgrids with flexible logistic loads. IET Renewable Power Generation.

Farhadi, M. and Ismail, R., 2011. The impact of information and communication technology investment on economic growth in newly industrialized countries in Asia. Australian Journal of Basic and Applied Sciences, 5(9), pp.508-516.

Felício, J.A., Batista, M., Dooms, M. and Caldeirinha, V., 2022. How do sustainable port practices influence local communities' perceptions of ports?. Maritime Economics & Logistics, pp.1-30.

Ferencz, J., González, J.L. and García, I.O., 2022. Artificial Intelligence and international trade: Some preliminary implications.

Fine, C.H. and Freund, R.M., 1990. Optimal investment in product-flexible manufacturing capacity. Management science, 36(4), pp.449-466.

Fonseca, M.E.S., 2022. The impact of digital economy on international trade (PPUE2021) (Doctoral dissertation).

Forrest, J.Y.L. and Liu, Y., 2022. When Government Policies Improve Firm Performance. In Value in Business (pp. 425-441). Springer, Cham.

Fridgen, G., Radszuwill, S., Urbach, N. and Utz, L., 2018. Cross-organizational workflow management using blockchain technology: towards applicability, auditability, and automation. In 51st Annual Hawaii International Conference on System Sciences (HICSS).

Galbraith, C.S., 1990. Transferring core manufacturing technologies in high-technology firms. California management review, 32(4), pp.56-70.

Gawusu, S., Zhang, X., Jamatutu, S.A., Ahmed, A., Amadu, A.A. and Djam Miensah, E., 2022. The dynamics of green supply chain management within the framework of renewable energy. International Journal of Energy Research, 46(2), pp.684-711.

Gospel, H., 2009. Human Resources Management: A Historical. The SAGE handbook of human resource management, p.12.

Hannola, L., Kutvonen, A., Papinniemi, J. and Lampela, H., 2017. A conceptual framework for linking worker and organizational needs to data and information requirements. In Proc. 23rd Int. Conf. Prod. Res. (p. 15).

Ma, C., Jin, Z., Mei, Z., Zhou, F., She, X., Huang, J. and Liu, D., 2022. Internet of Things Background: An Empirical Study on the Payment Intention of Central Bank Digital Currency Design. Mobile Information Systems, 2022.

Intal Jr, P. and Pangestu, M., 2019. Integrated and Connected Seamless ASEAN Economic Community.

Jayaratne, D., 2021. Self-structuring artificial intelligence for digital equilibrium in hyper-connected environments (Doctoral dissertation, La Trobe).

Kachru, U., 2009. Production & operations management. Excel Books India.

Kaldor, N., 1961. Capital accumulation and economic growth. In The theory of capital (pp. 177-222). Palgrave Macmillan, London.

Kalinina, O. and Valebnikova, O., 2017, April. Human capital management as innovation technologies for municipal organization. In Energy Management of Municipal Transportation Facilities and Transport (pp. 1315-1322). Springer, Cham.

Kannan, S.M., Suri, K., Cadavid, J., Barosan, I., Van Den Brand, M., Alferez, M. and Gerard, S., 2017, April. Towards industry 4.0: Gap analysis between current automotive MES and industry standards using model-based requirement engineering. In 2017 IEEE International Conference on Software Architecture Workshops (ICSAW) (pp. 29-35). IEEE.

Karakaş, A., 2019. İşletmelerde kapasite, büyüme ve birleşme.

Kurniawati, N.I., 2022. Sustainability of E Commerce Business through Logistic System in the COVID 19 Pandemic. South Asian Res J Bus Manag, 4(3), pp.122-132.

Kusiak, A. and Smith, M., 2007. Data mining in design of products and production systems. Annual Reviews in Control, 31(1), pp.147-156.

Li, J., Merenda, M. and Venkatachalam, A.R., 2009. Business process digitalization and new product development: An empirical study of small and medium-sized manufacturers. International Journal of E-Business Research (IJEBR), 5(1), pp.49-64.

Ma, H., 2018, September. An Industry 4.0 Technologies-Driven Warehouse Resource Management System. In International Workshop of Advanced Manufacturing and Automation (pp. 27-33). Springer, Singapore.

Malinvaud, E., 1953. Capital accumulation and efficient allocation of resources. Econometrica, Journal of the Econometric Society, pp.233-268.

Mantulenko, V.V., Zotova, A.S. and Makhovikov, A.E., 2020, April. Digital transformation of the labor market: Values and competences. In International Online Forum named after A. Ya. Kibanov" Innovative Personnel Management" (pp. 321-328). Springer, Cham.

Markowich, P., 1979. Sensitivity Analysis of Tech 1-A Systems Dynamics Model for Technological Shift.
McDaniel, C.A. and Norberg, H.C., 2019. Can blockchain technology facilitate international trade?. Mercatus Research Paper.
Melitz, M.J. and Redding, S.J., 2021. Trade and innovation (No. w28945). National Bureau of Economic Research.
Meltzer, J.P., 2018. The impact of artificial intelligence on international trade. Brookings Institution, Thursday, December, 13, p.2016.
Michalski, G., 2008. Corporate inventory management with value maximization in view. Zemedelska Ekonomika-Praha-, 54(5), p.187.
Mihova, T.B. and Ivanova, I.M., 2020, June. Digitalization of HR activities in industrial enterprises. In IOP Conference Series: Materials Science and Engineering (Vol. 878, No. 1, p. 012069). IOP Publishing.
Moço, R.M.M., 2018. Development of a model for Business Process Reengineering: A practical application in a Corporate Center of a Logistics Company.
Moudatsou, A.K. and Garcia, A.S., 2022. International Trade and Growth Limitations: The case of Africa. African Journal of Economic Review, 10(3), pp.63-88.
Muthusami, S. and Srinivsan, M., 2018. Supply chain 4.0: digital transformation, disruptions and strategies. Review of Business and Technology Research, 14(2), pp.32-35.
Narin, K.T., 2020. Bölüm 11 Pandemi Öncesi, Süresi Ve Sonrasinda Kriz Yönetimi. Pandemi Sonrası Yeni Dünya Düzeninde Teknoloji Yönetimi ve İnsani Dijitalizasyon.
Niles, A., 2014. Stochastic capacity modeling to support demand/capacity gap planning (Doctoral dissertation, Massachusetts Institute of Technology).
Orhan, S. and Bozdemir, E., 2009. Üretim işletmelerinde atıl kapasite maliyetleri, muhasebeleştirilmesi ve örnek bir uygulama. Muhasebe ve Finansman Dergisi, (43), pp.54-64.
Owis, M.A., Investigating the impact of Block Chain on International trade Documentation process (Doctoral dissertation, ARAB ACADEMY FOR SCIENCE).
Özçelik, F., 2019. Kapasite Maliyet Yönetimi Açisindan Maliyetleme Yöntemlerinin Karşilaştirilmasi. Business & Management Studies: An International Journal, 7(4), pp.1311-1333.
Papachashvili, N., 2018. Industry 4.0 and its Impact on the International Trade.
Pellikka, J., 2014. The commercialization process of innovation in small high-technology firms-theoretical review. Handbook of Research on Techno-Entrepreneurship, Second Edition, pp.91-109.
Pini, F.M., 2011, September. Business Model Innovation Through Design Led Innovation: An Experience From the Machinery Industry. In Proceedings of the First Cambridge design management Conference (pp. 7-8).
Primrose, P.L. and Leonard, R., 1988. Investing to improve product quality. International Journal of Quality & Reliability Management.
Qin, Y.N. and Wang, W., 2006, June. A dynamic forecasting model of unit production capacity for process industries. In 2006 6th World Congress on Intelligent Control and Automation (Vol. 2, pp. 6855-6858). IEEE.
Rai, A., Patnayakuni, R. and Patnayakuni, N., 1997. Technology investment and business performance. Communications of the ACM, 40(7), pp.89-97.
Rajnai, Z. and Kocsis, I., 2017, September. Labor market risks of industry 4.0, digitization, robots and AI. In 2017 IEEE 15th International Symposium on Intelligent Systems and Informatics (SISY) (pp. 000343-000346). IEEE.
Savinov, Y.A. and Taranovskaja, E.V., 2020. Artificial Intelligence in international trade. Russian Foreign Economic Journal, (4), pp.58-71.
Schmiedbauer, O. and Biedermann, H., 2020. Validation of a lean smart maintenance maturity model. Tehnički glasnik, 14(3), pp.296-302.
Shojaeinasab, A., Charter, T., Jalayer, M., Khadivi, M., Ogunfowora, O., Raiyani, N., Yaghoubi, M. and Najjaran, H., 2022. Intelligent manufacturing execution systems: A systematic review. Journal of Manufacturing Systems, 62, pp.503-522.
Silver, E.A. and Zufferey, N., 2005. Inventory control of raw materials under stochastic and seasonal lead times. International Journal of Production Research, 43(24), pp.5161-5179.
Solocha, A., 1991. Comparative cost advantage and trade performance: A panel data Approach. The International Trade Journal, 5(3), pp.403-416.
Sütçü, A., Karşiyaka, O. and Burhan, M.E., 2019. Bir Mobilya Üretim Tesisinde İş Analizi ve Benzetim Uygulaması ile Süreç Verimliliğinin Artırılması. Avrupa Bilim ve Teknoloji Dergisi, (17), pp.45-57.

Tambe, P., Cappelli, P. and Yakubovich, V., 2019. Artificial intelligence in human resources management: Challenges and a path forward. California Management Review, 61(4), pp.15-42.

Tekin, M., Öztürk, D. And Bahar, İ., 2020. Akıllı lojistik faaliyetlerinde blokzincir teknolojisi. Kent Akademisi, 13(3), pp.570-583.

Tian, X., Geng, Y., Sarkis, J. and Zhong, S., 2018. Trends and features of embodied flows associated with international trade based on bibliometric analysis. Resources, Conservation and Recycling, 131, pp.148-157.

Tiernan, C. and Peppard, J., 2004. Information technology:: of value or a vulture?. European Management Journal, 22(6), pp.609-623.

TOMITA, J., 2009. New Product Development and Evaluating Capabilities The Case of the Material Industry. Annals of Business Administrative Science, 8, pp.43-54.

Topcu, Y.E., 2021. Akreditif ödeme yönteminde blokzincir teknolojisi kullanımı.

Torres, A., David, M.J. and Bowman, Q.P., 2002. Risk management of international trade: emergency preparedness. Revue Scientifique et Technique (International Office of Epizootics), 21(3), pp.493-498.

Gökhan, U.Ç.D.U. and KILIÇ, A., Investigation of Turkish Ports Within the Scope of Port Location Selection and Green Port. Deniz Taşımacılığı ve Lojistiği Dergisi, 3(1), pp.35-49.

Vakili, S., Ölçer, A.I., Schönborn, A., Ballini, F. and Hoang, A.T., 2022. Energy-related clean and green framework for shipbuilding community towards zero-emissions: A strategic analysis from concept to case study. International Journal of Energy Research.

Van Der Aalst, W.M., Reijers, H.A., Weijters, A.J., van Dongen, B.F., De Medeiros, A.A., Song, M. and Verbeek, H.M.W., 2007. Business process mining: An industrial application. Information Systems, 32(5), pp.713-732.

Vose, D., 2008. Risk analysis: a quantitative guide. John Wiley & Sons.

Vurdu, S.A., 2021. Dış Ticarette Blokzincir Uygulamaları. Sosyal, Beşeri ve İdari Bilimler Dergisi, 4(9), pp.924-936.

Wang, W., Ferguson, M.E., Hu, S. and Souza, G.C., 2013. Dynamic capacity investment with two competing technologies. Manufacturing & Service Operations Management, 15(4), pp.616-629.

Wang, X., 2021, December. Design and Implementation of a Blockchain-Based International Trade Stable Digital Currency Issuance System. In International conference on Big Data Analytics for Cyber-Physical-Systems (pp. 827-837). Springer, Singapore.

Wang, Y., Li, R., Dong, H., Ma, Y., Yang, J., Zhang, F., Zhu, J. and Li, S., 2019. Capacity planning and optimization of business park-level integrated energy system based on investment constraints. Energy, 189, p.116345.

White, J.A., 1982. The Factory of the Future. Georgia Inst Of Tech Atlanta Production And Distribution Research Center.

Yapa Abeywardhana, D., 2017. Capital structure theory: An overview. Accounting and finance research, 6(1).

Yun, M., 2010. Technology Transfer and Competition: Does Mode of Foreign Entry Matter?. Korea and the World Economy, 11(2), pp.341-360.

Zhai, H. and Tan, R., 2021, August. The Impact of Blockchain Technology on International Trade and International Settlement. In The Sixth International Conference on Information Management and Technology (pp. 1-4).

Zhao, T., Song, Z. and Li, T., 2018. Effect of innovation capacity, production capacity and vertical specialization on innovation performance in China's electronic manufacturing: Analysis from the supply and demand sides. PloS one, 13(7), p.e0200642.