



# LAST-MILE DELIVERY - A CHALLENGING OPPORTUNITY FOR SMES: MANAGERIAL AND ECONOMIC ASPECTS

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## Abstract

*Cities are expanding and becoming more populated. Citizens are becoming increasingly demanding in meeting their needs. Retail must constantly adapt to new client requirements. As a result, last-mile delivery is becoming more complex and requires new methods and innovative solutions. SMEs are becoming increasingly significant participants in the logistics chain. Transformation of last-mile delivery provides them with new development opportunities. After a short consideration of the current situation and forecasting future needs in logistics, the article details the importance of SMEs and the importance of modern last-mile delivery. In the second chapter, the authors analyzed modern e-commerce through the opportunities for SMEs participating in the global market and logistics chains and the challenges SMEs face. Specific attention the authors paid to the analysis of security and financing, which can be considered the most critical factors in the participation of SMEs in last-mile delivery. Some of the most common innovative logistics solutions and the need for legal regulations are analyzed below. Based on the analyses carried out in the work, in the Conclusions chapter, the conclusions reached by the authors are systematized and presented with suggestions for the continuation of the research.*

**Keywords:** last-mile delivery, SME, logistics, innovative solutions, regulatory support, security, funding.

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## 1 INTRODUCTION

The world is increasingly changing. An enormous rise in e-commerce took place during the COVID-19 pandemic. The physical stores faced many

restrictions. E-commerce got a chance and became a solution for lockdowns. At first, due to the overload of suppliers, customers were satisfied if they managed to receive the ordered goods at all but soon, with the development of delivery, customers became more demanding and began to expect same-day delivery. In today's conditions, customers have increasingly diverse requirements that are becoming challenges for all small and large companies. The daily growth of e-commerce and restrictions caused by legal regulations contribute to that. In the desire to preserve the environment, governments and city administrations impose restrictions primarily on CO<sub>2</sub> emissions. That is not a whim but a struggle for survival. According to predictions, the total emission of greenhouse gases in cities will reach 70% by 2050. (Safonov, Kirsanov, & Čekerevac, 2022, p. VIII)

Various means of transport have different effects on the environment. Emphasizing the ecological aspect of transport types should be a significant aspect of the transport policy of an advanced society. The European Commission regularly issues recommendations and directives that deal with some areas of traffic development. States define the priorities of traffic development in their traffic policy, both for the provision of transport services and for the expected impacts on the environment. The authors of the article come from Central and Eastern Europe, and the experiences presented in the paper mostly show that these countries have very similar transport policies, where the aspect of environmental protection still plays a less significant role. (Dvorak, Rehak, David, & Cekerevac, 2020)

Last-mile delivery, the final part of a logistic chain, has many specifics. Its goal is goods' delivery from the last distribution logistics hub to customers' doors accurately, quickly, and at a reasonable price. The crucial specifics are the consequences of the environment where the activities take place and the size and number of shipments. According to the estimates, goods in the city exceed 20 to 30% on average of the total distance traveled from the producer to the customer (Rodrigue & Dablanc, 2021)<sup>1</sup>.

Electric vehicles are suitable for last-mile delivery, as the delivery takes place in cities where solving the problem of air pollution is crucial. If thermal power plants generate electricity using fossil fuels, using electric transport vehicles outside populated areas is still not advantageous. The fuel utilization degree in internal combustion engines is often higher than in thermal power plants. (Čekerevac, Dvorak, & Prigoda, 2021)

Modern last-mile delivery has introduced significant changes in the supply chains' operation. These changes are not the result of the carrier's work alone. A characteristic of last-mile delivery is that there appear to be many participants who are less visible in other parts of the supply chain. The most important here are public actors such as branches of government, advocacy groups, residents, and retail activities. Because of their specific viewpoints, these groups are often in conflict. (Cekerevac & Bogavac, 2023)

### 1.1 The significance of SMEs

Nowadays, there is a consensus that micro, small, and medium-sized enterprises<sup>2</sup> are drivers of economic growth. The SME sector contributes prominently to the economy by creating employment opportunities, generating production, and introducing innovation and entrepreneurship skills. The dynamic role of SMEs is especially significant in developing countries. The successes of SMEs are often apostrophized, giving hope to other potential business entities. Due to the small size of SMEs, their failures go unnoticed, but the failure does not necessarily prevent owners from creating new SMEs in the hope of achieving success.

99.8% of European non-financial businesses are SMEs (Eurostat, 2020) and they employ about 100 million people. In March 2020, about 25 million European SMEs provided two of three jobs and 50% of Europe's GDP. 50% of SMEs undertake innovation activities. (EC, 2020)

In Europe, the Transport and Storage sector is one of the most significant and fastest-growing sectors. For example, in Latvia and Lithuania, this sector accounts for 9.5 and 12.3% respectively. (Aricha, 2018)

<sup>1</sup> Mileage traveled by ship or plane is not considered here.

<sup>2</sup> In this article, we have labeled micro, small, and medium-sized enterprises as SMEs.

The transportation and storage services employed ~8% of employed persons in the EU in 2020 and covered 5.5% of all enterprises. Figure 1 presents

the sectoral analysis of employment by enterprise size class in transportation and storage in the EU in 2020.

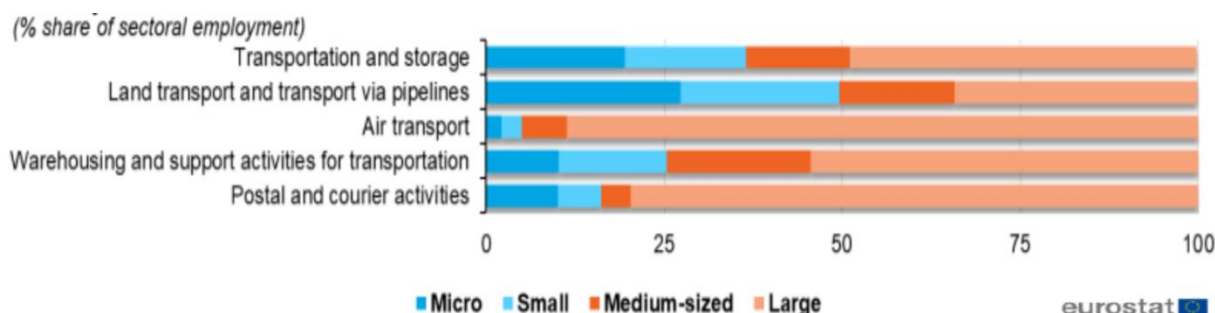


Fig. 1 Sectoral analysis of employment by enterprise size class

Source: (Eurostat, 2023)

Analysis of Figure 1 allows us to conclude that the largest share of SMEs working in the transport and warehousing services sector is in ground transport. It makes up approximately 70% of the total number of workers in this area, while large businesses account for about 30%. This fact is due, first, to the fact that in recent years, many individual entrepreneurs have appeared on the transport services market, carrying out labor activities without forming a legal entity. Starting a business here does not require relatively large expenditures of financial resources and time. In contrast, aviation transport accounts for the smallest number of SMEs employed (approximately 15%).

In our opinion, there are several reasons why there are few SMEs in the air transport sector:

1. *High competition in the market.* Many large companies in this industry have extensive

experience and resources for business development. Small businesses may find it difficult to compete with such large companies.

2. *High costs of starting and maintaining a business.* For launching a business in the air transport sector, one must invest heavily in equipment, staff training, aircraft purchases, etc. That can be overwhelming for smaller companies.

3. *Limited expansion opportunities.* Unlike other industries where small companies can expand by acquiring other companies or opening new branches, this can be more difficult in the air transport industry due to high competition and strict regulations.

4. *Difficulty in accessing financing.* Launching an air transport business requires heavy investments. That makes this type of activity less accessible for small companies.

Table 1 SDBS Structural Business Statistics (ISIC Rev. 4): Value added of SMEs and large firms

Variable	Labor productivity (in 1000 Euro)														
ISIC4	49_53: Transportation and storage														
Source	BSC: Business Statistics by Employment Size Class														
Time	2016			2017			2018			2019			2020		
Size Class	Total	Total		Total	Total		Total	Total		Total	Total		Total	Total	
		SMEs	Large		SMEs	Large		SMEs	Large		SMEs	Large		SMEs	Large
Country															
Greece	31.00	24.00	51.00	36.00	29.00	53.00	29.00	20.00	58.00	34.00	23.00	65.00	25.00	19.00	44.00
Hungary	19.65	19.60	19.70	20.35	20.90	19.85	20.80	22.59	19.27	21.91	..	..	17.20	23.26	11.54
Slovenia	42.00	32.00	65.00	43.00	33.00	71.00	43.00	33.00	70.00	43.00	34.00	67.00	42.00	34.00	60.00
Bulgaria	12.82	11.28	15.90	13.33	11.28	16.92	14.36	12.31	18.46	15.90	13.33	20.00	15.38	13.85	18.46
Croatia	24.04	24.57	23.64	23.37	23.90	22.97	27.09	26.43	27.76	3.45	2.92	3.98	2.79	2.66	2.92
North Macedonia	10.95	10.75	11.71	11.13	10.80	12.35	11.55	..	..	12.09	..	..	..	..	..
Romania	12.10	10.48	14.52	13.31	11.69	15.73	13.91	12.50	15.93	15.73	14.11	17.94	14.92	15.12	14.72
Serbia	13.48	13.62	13.38	13.69	13.51	13.83	13.79	13.77	13.81	14.69	15.73	13.67	13.79	15.52	11.97

Data was extracted on 08 Sep 2023 at 08:47 UTC (GMT) from OECD.Stat

Source: Authors compilation based on (OECD, 2023)

Let us look at the dynamics of the added value of SMEs and large companies by country (Tables 1 and 2).

The dynamics of value added by SMEs and large companies depend on many factors, such as company size, industry, geographical location, innovation and technology, and the competitive environment.

In general, we can say that large firms usually have higher added value than SMEs. That is because large companies have significantly richer resources (human, financial, material), which allows them to develop new products and services, introduce advanced technologies, and

improve the quality of their products and services. In addition, large companies often have access to the best specialists and experts, which helps them grow their businesses faster and more efficiently.

However, it is worth noting that in some industries, for example, in the IT sector or the production of high-tech goods, small companies may have higher added value than large firms. It is also significant to consider that added value is not the only factor in business success. Success depends on the company's management strategy and ability to adapt to changing market conditions and customer needs.

Table 2 SDBS Structural Business Statistics (ISIC Rev. 4): Value added of SMEs

Size Class		1-249 persons employed (SMEs)				
ISIC4		49_53: Transportation and storage				
Source		BSC: Business Statistics by Employment Size Class				
Time		2016	2017	2018	2019	2020
Country	Unit					
Greece	Euro, Millions	3,270.3	3,751.1	2,760.0	3,193.3	2,584.3
Hungary	Euro, Millions	2,270.6	2,465.8	2,655.5	...	2,838.5
Slovenia	Euro, Millions	1,095.8	1,178.6	1,248.4	1,354.3	1,335.3
Bulgaria	Euro, Millions	1,180.7	1,260.6	1,350.8	1,461.6	1,502.2
Croatia	Euro, Millions	985.5	1,001.0	1,119.6	146.8	130.5
North Macedonia	Euro, Millions	268.3	270.1	..	..	..
Romania	Euro, Millions	2,386.7	2,783.6	3,090.7	3,543.8	3,688.0
Serbia	Euro, Millions	587.5	632.9	686.6	810.2	838.4

Data was extracted on 07 Sep 2023 at 17:08 UTC (GMT) from OECD.Stat

Source: Authors compilation based on (OECD, 2023)

Data in Tables 1 and 2 showed that the most interesting from the point of view of further analysis is 2020. In four out of eight analyzed countries, the added value of SMEs exceeds this indicator in large businesses. In our opinion, this trend is directly related to the COVID-19 pandemic, as it happened:

1. Increased demand for goods and services. During the pandemic, the need for many goods and services has increased significantly, which has led to increased production and sales. Many small and medium-sized enterprises had to increase their production and expand their assortment of production to satisfy the growing demand.

2. Improvement of technologies and innovations. During the pandemic, many small and medium-sized enterprises actively introduced new technologies and innovations to improve the quality of their production and services and increase their work efficiency. For example, they could use process automation, production robotization, artificial intelligence, and other modern technologies.
3. Flexibility and adaptivity. During the pandemic, many small and medium enterprises had to adapt quickly to changes in economics and consumer demand. They changed their production, pricing, and marketing strategies to remain competitive.

4. Availability of skilled employees. Many small and medium-sized enterprises have highly qualified personnel who can quickly learn about new technologies and products and effectively manage their processes. That allowed them to react to changes quickly and offer the best solutions to clients.

Table 3 SDBS Structural Business Statistics (ISIC Rev. 4): Employment of SMEs and large firms

ISIC449_53: Transportation and storage										
SourceBSC: Business Statistics by Employment Size Class										
Year	2016		2017		2018		2019		2020	
	persons employed		persons employed		persons employed		persons employed		persons employed	
Units	1-249	250+	1-249	250+	1-249	250+	1-249	250+	1-249	250+
Company size	SMEs	Large	SMEs	Large	SMEs	Large	SMEs	Large	SMEs	Large
Country										
Greece	138,093	46,058	127,435	46,922	137,689	44,699	136,949	45,910	135,213	44,363
Hungary	115,873	131,230	118,007	131,082	117,543	137,532	..	..	122,045	130,691
Slovenia	33,745	13,112	36,237	13,307	38,092	14,315	39,980	15,056	38,795	15,036
Bulgaria	106,064	63,208	109,334	63,280	110,037	63,817	111,080	62,893	107,243	60,893
Croatia	39,977	43,176	41,810	42,674	42,145	38,894	49,325	43,258	48,624	41,541
North Macedonia	24,963	6,585	25,010	6,559	25,363	6,343	25,500	6,555	..	..
Romania	218,717	147,097	229,113	150,526	235,356	154,713	239,122	155,260	233,751	149,687
Serbia	43,156	58,036	46,860	55,590	49,866	54,008	51,516	52,291	53,996	51,626

Data was extracted on 07 Sep 2023 at 16:56 UTC (GMT) from OECD.Stat

Source: Authors compilation based on (OECD, 2023)

Thus, the added value of SMEs was higher during the COVID-19 pandemic due to increased demand for their products, improved technology and innovation, flexibility and adaptability, availability of highly skilled personnel, and other factors. Analysis of the Structural Business

Statistics for the study period shows that the share of SMEs in all countries presented in the table is growing steadily, except Hungary, where the employment share in small and medium-sized enterprises does not exceed the share of employment in large enterprises.

Table 4 SDBS Structural Business Statistics (ISIC Rev. 4): Turnover

Variable Turnover (Euro, Millions)										
ISIC4 49_53: Transportation and storage										
SourceBSC: Business Statistics by Employment Size Class										
Time	2016		2017		2018		2019		2020	
	1-249	250+	1-249	250+	1-249	250+	1-249	250+	1-249	250+
Size Class	persons (SMEs)	persons (Large)	persons (SMEs)	persons (Large)	persons (SMEs)	persons (Large)	persons (SMEs)	persons (Large)	persons (SMEs)	persons (Large)
Country										
Greece	9,171	4,071	10,041	4,388	9,327	4,714	10,208	4,843	8,502	3,509
Hungary	8,497	7,506	9,041	8,014	9,384	8,857	..	..	10,164	7,040
Slovenia	3,889	1,393	4,292	1,536	4,693	1,674	4,953	1,646	4,711	1,317
Bulgaria	5,188	1,756	5,793	1,785	6,318	2,025	6,623	2,137	6,322	1,748
Croatia	2,769	1,798	3,091	1,706	3,234	1,766	440	273	400	181
North Macedonia	925	156	980	171	..	..	..	..	..	..
Romania	10,525	4,773	11,799	5,393	13,178	6,118	14,398	6,633	13,687	5,599
Serbia	2,496	1,765	3,106	1,475	3,398	1,609	3,635	1,753	3,292	1,100

Source: Authors compilation based on (OECD, 2023)

As noted earlier, SMEs generate 50% of Europe's GDP. The data in Table 4 shows that in all

analyzed countries, the turnover of small and medium-sized enterprises in transportation and

storage significantly exceeds that of large enterprises.

The study showed that small and medium-sized enterprises often occupy a large market share, which allows them to make significant profits. Large companies, on the other hand, are more limited in their ability to make a profit due to competition in the market.

In general, SMEs have advantages in flexibility, low market share, and innovation application, which allows them to offer customers better products and services at lower prices.

## 1.2 The significance of last-mile delivery

In 1950, of 2.5 billion people 30% lived in cities. Because of significant increases in the world population and the urban population, 7.66 billion in 2018, 4.2 billion or 54.8%, lived in cities. (Čekerevac, Prigoda, & Bogavac, 2022) We can expect an increase in the share of the urban population to 68% by 2050. Now there are more than 8 billion people on the planet Earth. This brings a series of challenges in providing conditions for the normal life of citizens. In addition to housing and streets, citizens should be provided with water, food, and clean air, as well as energy, consumer products, sewage, waste removal and processing, and more. In meeting most of these needs, last-mile delivery plays a significant role, and in most activities of last-mile delivery, SMEs are already engaged or can be engaged. The quality of last-mile delivery significantly affects the quality of life of the population. In the process of evaluating the quality of services, it is necessary to form a set of criteria and define appropriate indicators. Indicators must quantify individual criteria. With services, it is easier to quantify subjective factors, either through surveys or in some other way. Objective factors are more difficult to quantify fully. (Čekerevac, Davidović, & Čekerevac, 2010) For example, one factor that appears in last-mile delivery might be the delivery success rate. However, in addition, it is possible to measure fuel consumption, CO<sub>2</sub> emission, vehicle depreciation, the number of persons involved, and many other parameters, so the success of the delivery does not give a clear picture of the quality of the service. For this,

qualitative indicators are more useful, because they provide more information.

In the case of good organization and implementation, last-mile delivery services will be imperceptible and taken for granted by the population. Problems arise when something is not working properly. Then everyone feels the consequences. An obvious example is garbage collection. When it works, it's unnoticeable. When it doesn't work for some reason, the malfunction becomes more than obvious.

To meet the client's demands, transporters increasingly focus on just-in-time supply, but often customers want goods immediately. Therefore, the need for courier and express services is increasing. This is especially pronounced in food delivery.

## 2 E-COMMERCE - LAST-MILE DELIVERY AND SMES

SMEs can be significant participants in production and logistics chains. They can actively participate in e-commerce and last-mile delivery in many ways. In addition to providing a delivery service for their products, they can act as a last-mile warehousing and delivery service provider for other companies. Participating in global production and supply chains provides them with many benefits but also brings challenges to overcome.

### 2.1 Opportunities for SMEs when participating in global production and logistics chains

When small and medium-sized enterprises (SMEs) participate in global production chains, they can benefit from various opportunities. Some of them include:

1. Increased market access: Participation in global production chains allows SMEs to access expansive and varied marketplaces, expanding their customer base beyond domestic borders. That provides opportunities to tap into demand and reach international consumers.
2. Enhanced competitiveness: Collaborating with multinational companies can contribute to the competitiveness of SMEs as it allows them to learn from best practices, adopt advanced

technologies, and acquire valuable knowledge and skills to improve their business.

3. Technology transfer and innovation: Integration into global production chains often involves technology transfer and knowledge sharing. SMEs can benefit from exposure to advanced technologies, production techniques, and innovation processes, which enhance their productivity and capabilities.
4. Networking and collaboration: Engaging in global production chains gives SMEs contact with various partners and stakeholders. That networking opportunity opens doors for collaboration, partnerships, and access to resources, talent, and expertise.
5. Learning and capacity building: Participating in global production chains exposes SMEs to international standards, quality requirements, and best practices. This learning experience can enhance operational efficiency, product quality, and business performance.
6. Potential for growth and scalability: By integrating into global production chains, SMEs can scale up their operations, increase production volumes, and expand their business reach. This growth can lead to increased revenues and profitability.

Yuhua & Baihaki (2013) see the following benefits of SMEs participating in the global production chain (GPC):

- Participation of SMEs in GPCs improves their technical capacity. It allows them to adopt new production methods and the know-how of multinational corporations (MNCs). Through the training of workers in partner companies, SMEs can more quickly meet the conditions for meeting the set business standards. A successful business requires constant construction and improvement of technical capacities.
- It is a great advantage to be an MNC supplier and to participate in the GPC, as it means increased demand for MSP products and services, with all the accompanying benefits. Expanding to different markets enables small and medium-sized enterprises to reduce business risks, especially in crisis conditions.
- Cooperation with leading companies builds prestige and increases the credibility of SMEs. Such business enables easier access to

finance and attracts investors and human resources. This is advantageous because it allows SMEs to invest in new facilities and businesses with greater added value.

- GPCs provide SMEs with internationalization and indirect exports. In this way, they gain experience and more easily meet international standards. In case new market needs arise, SMEs can use their flexibility and quickly position themselves.

In addition to the mentioned advantages of involving SMEs in the last-mile delivery process, the location of SMEs can also be a significant advantage. Because of their size, SMEs are most often located in urban areas, which allows them to use their premises and warehouses as micro-hubs. That way, they can provide shorter distribution routes to the surrounding population than would be the case with large distribution logistics hubs.

SMEs need to assess their capabilities, identify suitable opportunities, and develop strategies to effectively participate in global production chains.

## 2.2 Challenges for SMEs when participating in global production chains

In addition to the advantages, small and medium-sized enterprises (SMEs) can face many challenges in last-mile delivery:

1. *Cost management*: Due to limited resources, balancing last-mile delivery costs (including transportation, personnel, and technology infrastructure) can be a challenge for SMEs.
2. *Efficient route planning*: Optimizing delivery routes to minimize distance, time, and fuel consumption can be complex, especially when dealing with multiple deliveries and unpredictable traffic conditions.
3. *Customer expectations*: Meeting customer expectations for fast, reliable, and on-time deliveries can be challenging for SMEs as customers increasingly expect expedited delivery and real-time tracking options.
4. *Infrastructure constraints*: Inadequate transport infrastructure, road conditions, or limited access to certain areas can hinder smooth and timely deliveries for SMEs.
5. *Labor availability*: SMEs may struggle to find and retain skilled delivery personnel,

especially during peak seasons, leading to potential delays or inefficiencies in last-mile delivery operations.

6. *Fleet management*: Fleet management, including maintenance, fuel management, and optimization of vehicle capacity, can be a significant challenge for SMEs with limited vehicle resources.
7. *Technology adoption*: Integrating and using advanced technology solutions like route optimization software, GPS tracking, or automated inventory management systems can be expensive and challenging for some SMEs.
8. *Reverse logistics*: Managing product returns, exchanges, or service requests can be complex and time-consuming, requiring efficient logistics and customer support processes.
9. *Sustainability and environmental impact*: Ensuring environmentally friendly last-mile delivery practices, such as reducing carbon emissions or using electric vehicles, can be challenging for SMEs due to higher costs and limited access to sustainable transport options.
10. *Regulatory Compliance*: Navigating complex local regulations and compliance requirements related to transportation, permits, customs, and labor laws can be challenging for last-mile delivery SMEs.
11. *Big data use*. SMEs can use the potentials of big data basic postulates (Cekerevac, Dvorak, Prigoda, & Cekerevac, 2016): more is always better; by their quantity, data create new knowledge and prediction possibilities; and using big data, one can answer all questions. Powerful software packages become available at very moderate prices. However, only a few SMEs can use big data in their businesses because of the lack of these kinds of skills. That is why it is difficult for SMEs to compete with large companies in a global market. They can achieve a competitive advantage in local markets because, due to constant contact with clients, they can understand client needs and habits and provide appropriate goods and services.

### 2.2.1 Security

Shipment insurance costs can have significant impacts on SMEs in last-mile delivery:

1. *Financial burden*: High insurance costs can financially burden SMEs. That can further strain their operating margin and affect overall profitability.
2. *Competitive position*: SMEs suffer comparatively higher insurance costs. That may reduce their competitive advantage and affect the SMEs' ability to attract and retain customers compared to other players in the market.
3. *Shipping costs*: High insurance costs can increase shipping costs. That can hurt the perception of SME's services value and make them less competitive.
4. *Financial risk*: Inadequate insurance or partial coverage can increase the SMEs' financial risk when shipment losses or damages. That can have far-reaching consequences for the financial stability of SMEs.
5. *Business Planning*: High insurance costs may require careful business planning and adjustments to maintain profitability. SMEs must incorporate these costs into their business models and financial projections.
6. *The challenges related to the cost of insuring shipments in the last-mile delivery can be significant for SMEs. It is crucial that SMEs carefully assess their insurance needs, negotiate with insurers, and find a balance between adequate protection, financial viability, and competitiveness in the market.*

### 2.2.2 Funding

The growth of the company undoubtedly depends on the managers and their knowledge. SME managers are mostly less trained than managers of large companies. Due to the inability to choose the most appropriate technology and software with their knowledge, they often do not have a clear picture of their company needs, so they often underestimate the necessary financial resources. That later creates difficulties in the work of SMEs. Due to low productivity, insufficient utilization of equipment, and lack of technology improvement, SMEs are often insufficiently competitive. Most SMEs are mainly users of technology, not creators of technology. One of the reasons for these events is insufficient financial resources. Empirical research by Baragwiha Frederick (2013) showed that surveyed companies agreed that financing constraints limited their ability to increase their business activities in many other areas, including

marketing, R&D, and technology. External financing is often an obstacle to growth.

For many SMEs and entrepreneurs, borrowing from banks is the most common source of external financing. To meet needs, they rely heavily on traditional bank financing. However, it is a big challenge for new, innovative, and fast-growing companies with a high risk/return profile (Cusmano, 2015). Most small businesses will never be able to raise enough funds from banks because they do not have good credit potential. Bank credit restrictions have become the "new normal" for SMEs and entrepreneurs, forcing them to look for ways to expand the range of available financial instruments.

Alternative forms of debt provide a distinct approach to SME financing, setting them apart from traditional lending methods and involving investors in the capital market stepping in to provide funds. That can be done through various means, both direct and indirect.

Direct tools refer to options that allow SMEs to raise funds directly from investors in the capital market. Examples of direct tools include corporate bonds, which involve issuing debt securities to investors seeking investment opportunities. By utilizing corporate bonds, SMEs can tap into the pool of available capital without relying solely on traditional bank loans.

In contrast, indirect tools encompass mechanisms like securitized debt and covered bonds. In these cases, SMEs still rely on bank loans. However, these loans are made possible by the activities of banking institutions in the capital market. Securitized debt involves bundling individual debts into a tradable financial instrument, allowing SMEs to have additional capital. Covered bonds involve securing the borrowed funds through a portfolio of assets, enhancing the creditworthiness of the SME.

The alternative to straight debt may be 'asset-based finance', 'alternative debt', 'hybrid instruments', and 'equity instruments'. Cusmano's analysis (2015) highlights the potential of SMEs to uptake these instruments. By utilizing alternative debt, SMEs can explore additional avenues for funding beyond traditional bank loans. Diversification brings greater flexibility and can

lower dependence on traditional banking institutions. However, SMEs need to understand the specific implications and requirements of each form of alternative debt and the regulatory frameworks that govern them.

Capital gaps are more pronounced in SMEs when they want to speed up the repayment of debts, but also in cases of change of ownership of the enterprise. The response of governments during the COVID-19 pandemic by focusing on mechanisms that allowed firms to increase their debt drove many SMEs into over-indebtedness.

### **2.3 Innovative logistics solutions**

More than anyone else, the creators of smart cities have become aware of the necessity of introducing new solutions for last-mile delivery. SMEs can be effective agents in implementing such solutions. One of the innovative solutions is "smart" lockers. If SMEs are engaged in retail trade and have free space, they can offer deliverers to install smart lockers on their premises. When picking up the shipment, recipients of shipments will likely become customers and buy some of the products the store offers.

Also, they can offer their warehouses to deliverers to use as micro-hubs. Thus, the couriers could pick up the shipment closer to the delivery point.

One of the innovative solutions is the delivery of parcels by drones. In certain situations, SMEs can become bases from which drones will take off with shipments. With the introduction of robots in households, we can expect their mass application in delivery. SMEs can offer services in the form of micro hubs where robots will come to pick up goods.

We can expect innovative solutions also in the organization of delivery. When ordering goods electronically, sometimes the merchants do not need to deliver goods from a central warehouse. When SME stores are networked, merchants will be able to know if the ordered goods exist in a store near the place of the purchaser. If the requested goods are available in the MSP store, the store can deliver them from its warehouse with appropriate compensation. It can be a win-win combination when considering the rise of e-commerce.



Fig. 2 An example of smart cabinets in Portugal

These and other innovative solutions are discussed in more detail in (Čekerevac, Bogovac, & Radovanović, Some Solutions to Overcome Challenges Faced by Last-Mile Delivery in Smart Cities, 2023)

## 2.4 Regulatory support

As in other areas, the state can contribute significantly to last-mile delivery. In unregulated conditions, every SME must manage as they know how. Since the management usually does not have quality knowledge in this area, it is possible that there will be a lot of wandering and wrong solutions and that many SMEs will fail to the detriment of themselves and their clients. The state must provide regulatory support and, for the best solutions, provide incentives for SMEs to adopt green practices in last-mile delivery. The policy must be in a direction that promotes the growth of logistics startups and encourages innovation and cost-effective solutions for SMEs (Team Happen Recently, 2023).

Regulation bodies should remove from the regulation many ambiguities arising from the application of innovative solutions. Legislation should cover all aspects, starting from the basic definitions and ending with the issuance of work licenses and insurance. Drones and robots used in last-mile delivery and their participation in possible traffic accidents cause specific problems.

One of many possible situations is the robot being involved in an accident when the robot is new or still under warranty. Who will be responsible for the accident? The robot manufacturer, his owner, or the company that hired him to deliver the shipment? Or, maybe, someone hacked the robot because of inadequate protection? The same applies to the use of drones in delivery. Some experiences already exist with autonomous cars, but their street use is still an experiment. However, it is not possible to equate robots with autonomous vehicles. In the application of robots, we are talking about machines that move on sidewalks and in closed spaces, not on streets. Expanding the area covered by the Traffic Law cannot obtain the solution. In addition to the problem of possible traffic accidents, there is also a problem with delivery data protection. The question is how well SMEs are able to meet the GDPR criteria. Penalties in case of violation of GDPR requirements caused by delivery data collection and transmission are risks that SMEs, if decide to use delivery robots, must consider. Hoffmann and Prause (2018) discussed these problems and potential solutions in more detail in their paper.

Besides these requirements, with the mass use of robots, we can expect their mass appearance on the pavements. The question is how pedestrians will feel when robots appear in large numbers on pedestrian paths. Governments need to regulate that area. We should not lose sight of the fact that robots can become a target for criminals, not only high-tech criminals. Robots are easy targets. How will the theft of goods carried by robots, or even the theft of the entire robot, be treated?

The above indicates that it will be necessary to invest great efforts in drafting legislation to activate this type of last-mile delivery. Technical problems are much easier to solve.

The states can enact fundamental laws, but the cities must do most of the work. Last-mile delivery performs in cities, and they must take a specific interest in making it run smoothly. City administrations need to improve the quality of their services in a way that is characteristic of total quality management (TQM). Therefore, they must plan the implementation of TQM carefully. Due to the participation of many stakeholders, it is crucial to define the actors who will participate in the process and the success of the undertaken

activities' evaluation. Analyses based on the achieved numerical results are suitable for academic purposes, but to obtain a complete picture of the city authorities' work meaningful involvement of key stakeholders is necessary. The city management must respond promptly to the initiatives of citizens and groups of citizens, but also to the initiatives of SMEs and entrepreneurs. (Čekerevac, Davidović, & Čekerevac, 2010)

### 3 CONCLUSIONS

Last-mile delivery is a much-talked-about and studied problem. Since it is a complex problem involving many participants and influenced by many time-varying factors, it is impossible to find an ideal solution for all possible scenarios. That is why managers intend to find the optimal solutions in specific cases. When solving problems, managers often use artificial intelligence capabilities and techniques. However, many such solutions are not adequate in practice. Solutions based on the drivers' experiences are often more suitable. Drivers are on the streets daily and for a long time and know the conditions in which they move very well.

The competition in last-mile delivery is high. New deliveries appear every day. SMEs can be more significantly involved in global supply chains,

especially in last-mile delivery as goods deliverers, micro hubs, or traders who deliver goods from their warehouses to customers on behalf of larger companies. The potential is significant, but their ability to use it is questionable. Insufficient financing, ad hoc solutions in business, unclear legal regulations, poor knowledge about it, and the constant risk of failure in the case of irregular deliveries make it difficult for SMEs to operate and can threaten their survival.

Currently, last-mile delivery mainly takes care of the client and technological solutions. It cannot last indefinitely. Mass application of robots and drones in last-mile delivery cannot be expected soon due to several unresolved problems, primarily in legislation. Technology is currently ahead of legislation. Technological solutions are rapidly and unstoppably improving. More attention governments must pay to the people, the executors of the delivery service. Each last-mile delivery ends with human-to-human interaction. Deliverers often work to the limit of their endurance and in unfavorable conditions that can endanger their lives. They also have their lives and needs. To better protect deliverers, an appropriate legal framework creation requires additional efforts.

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