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SMALL TO MEDIUM-SIZED ENTERPRISES DATA PERCEPTION AND APPLICATIONS

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ABSTRACT

In all sectors where digital elements and tools are becoming more and more widespread, it has contributed to the formation of large volumes of data due to the increase in the data flow rate regarding company processes. These data-related developments have contributed to the fact that small and medium-sized enterprises (SMEs) are seen as an important resource for processing and making sense of data. Data capital can enable SME businesses to become aware of things by showing correlations, risks, and opportunities that they weren't aware of before. This study it is aimed to evaluate the knowledge, technological infrastructure, precautions and data perceptions of SMEs for big data applications in the future. In order to find out the above-mentioned elements, a survey analysis study was carried out comprising the company managers in the scope of the selected samples. By using explanatory and confirmatory statistical criteria, this study presents to companies, particularly SMEs, the business opportunities and policy recommendations hidden amongst big data.

Keywords: *Technology, Big Data, Business Data, Data Processing.*

Jel Codes: *Y1, C80, C89.*

1. INTRODUCTION

Sophistication and development of internet-based network technologies, availability of different communication possibilities and broadbands have been influential in the development and spread of new generation applications and platforms which are running on the network. Technologies such as big data applications, cloud technologies, the Internet of Things (IoT) and social media are current applications triggered by network systems. The fact that software related to production and business processes communicates with integrated machines and devices over the network has greatly increased the amount of data produced and shared.

Nowadays, the amount of data is increasing, and it is seen as an institutional resource for companies, which, creates a competitive advantage. These positive approaches to data include the processes of analyzing data sources and transforming them into meaningful information. For companies, the accumulation of data to reach the dimensions, which is called big data, requires the solutions offered by experts as human resource, machine and software investments. The effect of big data on firm performance depends on the interpretation of the data and the success of the evaluation and analysis

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processes. In uncertain and rapidly changing competitive environments, meaningful data sources provide a guide for the management of operations and other activities. The problem experienced in small and medium-sized companies, which are called SMEs, is the inability to create activism and awareness programs for the accumulation, processing and management of data generated in business processes, rather than making sense of data. However, SMEs and companies of similar scale need to go to a paradigm shift in the management of data accumulated in production and other unit activities.

The most important advantage of SMEs is their experience and skills derived from production. When they align these skills with a data-driven culture, they learn to move from production to marketing by instilling their goals from predictive uncertainty. A realistic budget and cost control for SMEs is the key element of creating a competitive advantage and will play a more decisive role in the near future.

Speed and accuracy in operational activities, success in procurement processes, reduction in business turnover, decrease in service errors and positive feedback are the targets that will carry SMEs to success in the domestic and foreign markets. The degree of success that has been achieved towards the targets should be open to continuous controls with performance measurements. A real improvement and evaluation can be achieved by sharing the readings on the data with all units. SME has to invest in data science and important technological developments, in order to increase its market shares, reduce the cost ratio and ensure its competitiveness. Data awareness is one of the main crucial points for making fast and correct decisions under market conditions dominated by uncertainty.

The purpose of this study is to determine SME's company situations, practices and technological frameworks for processing the accumulated data regarding their activities.

2. BIG DATA AND CONCEPTUAL FRAMEWORK

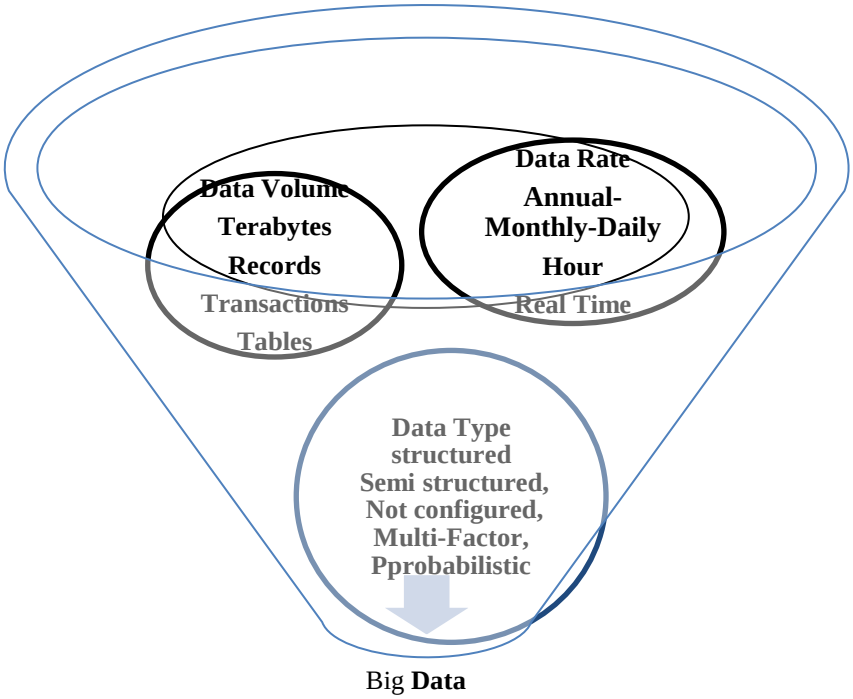
The amount of digital information produced for current business applications is increasing day by day, and data is constantly being produced by the internet, smartphones, satellites, social networks, and sensors. The rapid transfer of all data produced in business processes to the database after verification forces database dimensions. The change in the volumetric structure of the data accumulated during this cycle is defined as an indicator of big data. Big data is a fashionable expression that has experienced exponential growth in database volumes since ancient times, and in the history of data management, increasing data volume has always been a remarkable option (Harrison, 2015: 21).

Different studies have been conducted on big data regarding security, marketing, education, health and all other fields, and these studies adopted similar definitions given in the following lines below: Big data is a term used to describe large and complex datasets that have different and complex structures and which are found not only in social media but also in traditional contexts of data, including text, photos, audio or video, credit card information, science data and semi-structured and unstructured data such as surveys or customer feedback (Saatçioğlu, 2020:199). Big data provides diversity and requires

an innovative step forward from traditional IT and both software and hardware tools in order to manage not only the diversity but also the volume of data produced and the speed at which they change (Sağıroğlu and Sinanç, 2013:44).

Big data, which provides companies in industrial sectors with opportunities to gain insight into customers and operations, has been described as the "new oil" by some researchers because of the strategic support they provide in marketing, decision-making and new product development (Wibowo et al., 2021:175). Big data is a word used to describe such a large volume of structured and unstructured data that it is very difficult to process this data using traditional databases and software technologies (Kumar et al., 2014:29; Lydia et al., 2016:22). Producing and using information requires the use of more advanced technologies, and big data plays a very important role in this regard (Thompson et al., 2013:945). Big data is characterized by volume, speed, variety and accuracy. It can provide information and useful insights regarding storage, transmission, processing and analysis (Wolff, 2014:301). The key features of big data can be characterized by 3V; volume, speed, diversity, accuracy and high value (Jin, 2015:62). Big data is also defined as information that represents change in our analysis of information. The most accepted features of big data are data volume, data velocity and data diversity (Sing and Sing, 2011: 2).

Figure 1. Big Data and 3 V (Velocity, Volume, Variety)



Source: Big Data: A Review (Sağıroğulu ve Sinanç: 2013:43)

Figure 1 shows appropriate perspectives and critical dimensions for understanding and managing the Big Data paradigm. In the first stage, the variables are expressed with three Vs, which are the initials of the words volume, velocity and variety (Laney, 2001:949; McAfee & Brynjolfsson, 2012:4). The

volume describing the data sizes is related to the storage space needed by servers and databases and is estimated as exabytes today (Kaisler et al., 2013:995) and, it tends to grow continuously (Anshari et al., 2016:1666). Speed, defined as the speed of creating, sharing, and storing data, also represents the aging of existing data. This is more relevant to volume in some industries. Variety means breaking down existing data, types including text, images, video, audio, etc. (Kaisler et al., 2013). It is important to remember that the primary value derived from big data comes not from the raw form of the data, but from the way it is used in processing and analysis, and the insights, products and services that emerge from the analysis. In addition, capturing the right amount of data and information in the right time, in the right place, provides the potential for greater efficiency and performance.

3. BIG DATA AND SMEs

Big data technologies are next-generation technologies that help companies increase their production efficiency by extracting useful information from the big data set. The collection of data for a certain time period has made big data a technological product and has enabled it to take place as an effective company asset in SMEs. Big data has been accepted as a fundamental driver of growth (SAS, 2022) and it has been tried to learn what can be done with it rather than a large amount of data (Polkowski and Malgorzata, 2016:15). That's why data can now be perceived as "big", but that doesn't mean it's just for big businesses. It is now a tool known to be better and more accessible for small and medium businesses (SMEs) as well.

As data technologies mature, companies have begun to reap more data advantages (Polkowski, 2016: 3). Processing data and turning it into an advantage requires a new paradigm shift and technological investment in SMEs. It imposes a general rethinking that includes tools, software, methodologies and organizations (Vaccari, 2014:8). In order for these changes and investments to turn into added values gradually, SMEs must develop data-driven plans, policies and solutions for sustainable growth, planned production and a collaborative approach. The data information kept by the firm creates a competitive advantage for the firm and provides the capacity to distinguish it from its competitors. Data-driven solutions aim to eliminate uncertainties in company activities by providing scientific contributions and predictive solutions to SMEs from production to marketing. These goals offer opportunities such as better strategic decisions in the future (Sen et al., 2016: 161), faster decisions, eliminating unnecessary targets and ease of process (Karim et al., 2017: 919). Learning to understand how to transform data into valuable inputs to increase the competitiveness of companies is recently recognized as a new challenging dimension with managerial implications for SMEs (Gandomi & Haider, 2015). For SMEs, therefore, the adoption of big data is seen as a hope for recommendation.

When it does not involve high costs and is applied correctly, analyzing and predicting market and customer behaviors through data provides corporate efficiency for SMEs (Massa and Testa, 2009:129). Data processing brings added value to companies like real-time foresight, cost reduction, new product

development and optimized offers (Gonzales, 2015:164). Developing dynamic talents and creating value in terms of performance management and productivity have made significant contributions to organizational success within the framework of human resources. The job opportunities created by Big Data can help firms share knowledge and redefine relationships between companies. The 'intimate nature' of Big Data and the information gathered from them can create different opportunities (Xiang and Fang, 2017:64). Such rich information can be beneficial to consumer goods manufacturers, especially SMEs who can conduct extensive market research (Chen et al., 2012: 1169). Cost-conscious SMEs can reduce their costs with simple practices such as estimating weight differences in logistics shipment processes or reducing revenue leaks.

Data lay the groundwork for correct solutions in order to understand and reveal the cause-effect relationships of the phenomena (Dyche, 2013:30). Oracle company, which produces large solutions for data applications, emphasizes that big data can benefit every industry and organization and supports these statements with twenty-two use cases for different industries (Oracle, 2022).

4. BIG DATA CHALLENGES

The continuous increase and analysis of big data is turning into a more competitive phenomenon. The challenge is not only to collect and manage large volumes of different types of data, but also to extract meaningful value from it (Bakshi, 2012:3). It also requires managers and analysts to have an excellent grasp of how big data can be applied. Companies should accelerate their employment programs while making significant investments in the education and training of key personnel (Sağıroğlu and İnanç, 2013:43). In order for data to be analyzed by a computer, the computer must be able to recognize that data. It is the metadata that enables this recognition process. Meta data makes it easier to access the sought-after data. In a sense, metadata is descriptive information that includes access to a dataset, how the object and resource were formatted, when and by whom they were collected, and how the data was measured and calculated.

Processing big data requires advanced technologies and users with the required knowledge and skills to use these technologies. In fact, the reliability of data sources and control of data quality is a crucial requirement to achieve desired results. However, data sources may hold noises, errors or missing data. Otherwise, distribution, management and support of big data as a raw resource for the computing of end-users can be a complex undertaking for SMEs (Janet and Chua, 2013: 970).

One of the real challenges facing the big data community is how to clean up such large datasets and make decisions about data reliability. One of the key requirements to take appropriate action through big data implementation right now is to minimize the complexity of the nature of big data nature (speed, volume and diversity).

The challenges of big data can mean different things depending on the types and nature of organizations. Challenges of big data analytics in SMEs can be handled in four different categories regarding the law, social norms, markets and architecture (Chuah and Thurusamry, 2021:2). Besides these; technical difficulties, administrative difficulties (Matthew and Noble, 2017:416), economic difficulties (Coleman et al., 2008:2153) are some of the problems encountered regarding big data. Big data technologies offer countless opportunities, and the potential is undeniable. However, data scientists face different challenges when dealing with large datasets to extract information from knowledge mines (Oussous et al., 2017).

It shows that challenges exist at different levels: data capture, storage, search, sharing, analysis, management and visualization. In addition, distributed data-driven applications also face security and privacy issues. The application of big data technologies also overcomes a multitude of challenges that ultimately create challenges for researchers and deployment professionals. Listed below are some of the most common and relevant factors.

- Data awareness,
- Field experts in SMEs,
- Organizational structure and culture issues,
- Lack of internal big data experts,
- Lack of experience in data solutions,
- Software options,
- Data security.

SMEs often do not have in-house capabilities for selecting, installing, configuring and maintaining complex information systems. These factors are a potential barrier to big data analytics in SMEs (Soroka et al., 2017:695).

The volume of data with which the average business has to deal is nearly double. This is a huge problem. Identifying a user across devices and tagging their digital footprints to the same user is a challenge. This causes the mid-market company to have a distorted view of its customers.

Big Data is generated from humans or machines and in multiple formats (e.g. text, videos, audio, comments, diaries). Big data consists of structured and unstructured data, public or private, local or remote, shared or confidential, complete or incomplete, etc. Simply, diversity is all about the system's ability to categorize incoming data into various categories (Qussous, 2017).

To produce reliable results, big data technologies need advanced analysis algorithms that can determine the relationship between big data features. These algorithms can help organizations extract valuable information and monitor their business models. Currently, there are various analytical

techniques, including tools such as data mining, visualization, statistical analysis, and machine learning can be demonstrated (Delloite, 2020).

SMEs can derive value from voluminous data by using and developing big data technologies in fields of supply chain management, logistics and customer and business understanding. Adoption of big data in SMEs can be fruitful in tackling key business challenges. SMEs are also ignoring new opportunities that can help them develop and diversify their businesses.

5. METHODOLOGY OF THE RESEARCH

This study is about the extent to which current concepts such as digitalization and big data, which have been mentioned frequently in recent years, are implemented and used by existing small and medium-sized businesses. For this purpose, the existing technologies and data processing processes used by small and medium-sized enterprises operating in the Bandırma region were determined by face-to-face survey method. In the face-to-face survey method, the information given by the interviewer is taken on paper and the analysis is done later (Arıkan, 2018:99).

5.1. Purpose of The Research

The content of the research, it is aimed to determine the company situations and technological frameworks for the processing of accumulated data in the evaluations of small and medium-sized enterprises regarding their activities. A case study (Subaşı and Okumuş, 2017) is the problem or issue that is planned to be investigated; It is about the systematic collection, analysis and conclusion of data to determine what position it is in in real life (Chmilia, 2013).

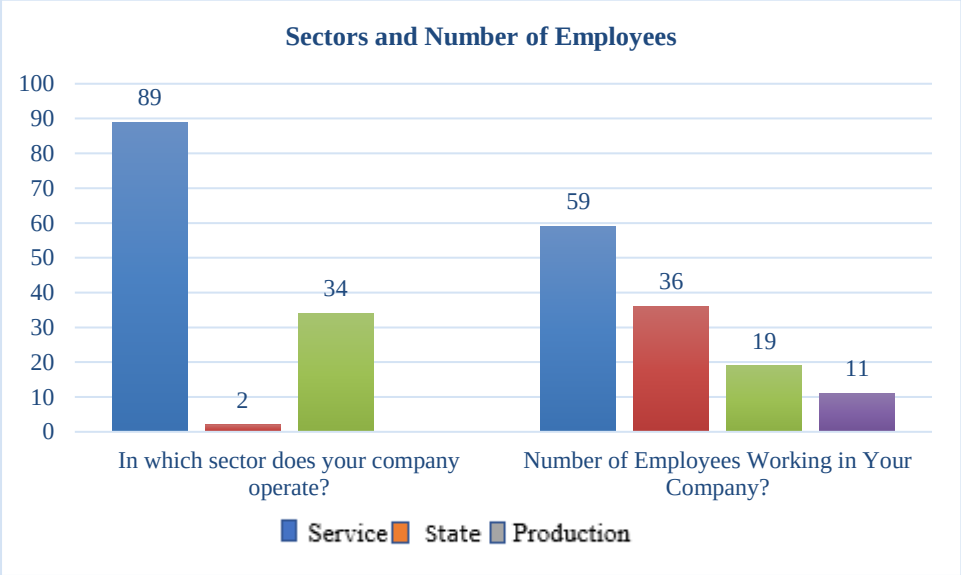
5.2. Data Collection Method

The data used in the study were obtained through questionnaires from small and medium-sized companies operating in Bandırma district. Data collection is one of the most important stages of a statistical research (Esin et al., 2006: 7). The methods and perspectives used to evaluate surveys will become increasingly useful in evaluating quantitative data from other sources. The collected data were coded according to a certain pattern in the Excel software program. The analysis process was conducted in detail by creating a Pivot (Summary) table over the coded data. Excel Pivot tables is a software technology that demonstrates that usage data can be used to conduct flexible analytical processing and gain valuable insights (Dierenfeld and Merceron, 2012:1; Zhou ,2021).

5.3. Data Analysis and Findings

Companies were filtered categorically according to service, public and production areas according to their sectors and were coded in a similar way to the system together with the number of employees of the companies with other nominal data. The encoded values are shown in the graphic image as follows.

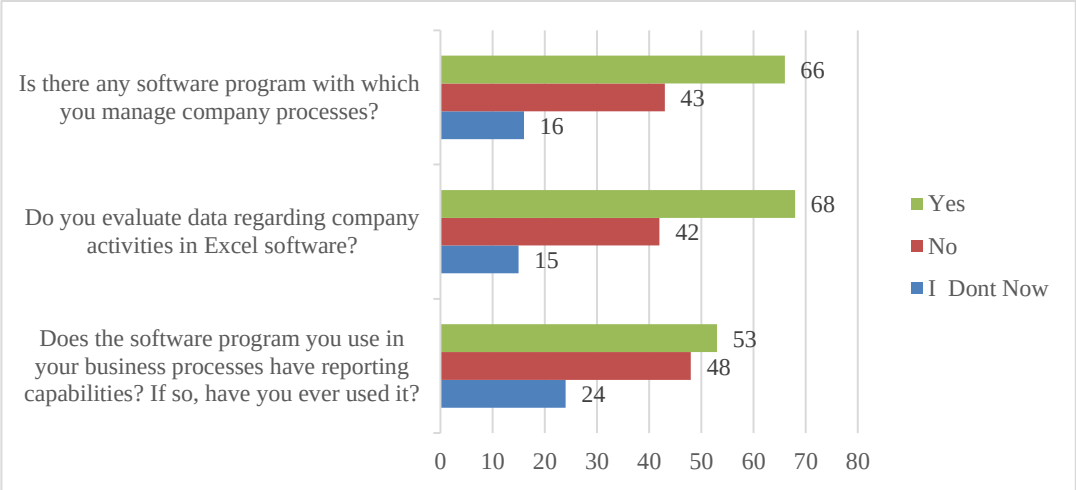
Figure 2. Sectors and Number of Firm Employees



As shown in Figure 2, SME companies are more active in the service sector, and the production sector is in the 2nd place. In the public sector, it seems that there are fewer companies of this scale. It seems that there are more employees with 10 people or less in these companies, which are included in the business life. It seems that medium-sized companies with 51-100 employees are less involved in-service sector. The answers given by SME enterprises to the questions about technology ownership and which functions of the technologies are used are shown in the Pivot Table.1 as percentiles and reflected in the graph.

Table 1. Technology Ownership

Row Labels	Yes	No	I Don't Know
Does the software program you use in your business processes have reporting capabilities? If so, have you ever used it?	28,34%	36,09%	43,64%
Do you evaluate data regarding company activities in Excel software?	36,36%	31,58%	27,27%
Is there any software program that you use to manage company processes and if so, what is its brand?	35,29%	32,33%	29,09%
Grand Total	**100,00%**	**100,00%**	**100,00%**



When we look at the Table.1 and the graphic attached to it; it seems that the technology ownership of the companies is not at the desired level proportionally. Most of the companies document and follow up their current transactions (36.36%) through Excel software. Firms stated that they do not have any information about the technologies they use in their current activities and their functions. In particular, companies related to the use of options such as reporting and analysis modules, with a ratio of 43.6%, stated that they did not have any experience of using these modules. The software technologies owned and actively used by the companies are listed in Table 2.

Table 2. Technologies Used by Firms

Program Name	**Number of Firms**
Logo	16
Sap	2
Mikro	20
Eta	10
Dynamics	3
Private	23
Excel	40
Manuel	11

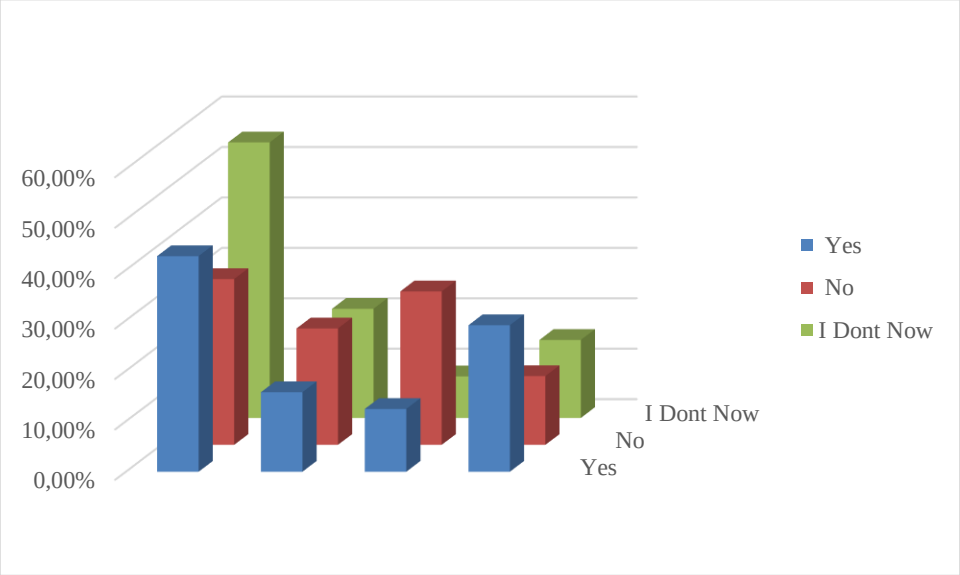
As seen in Table 2, the companies seem to prefer accounting-based software that helps to keep track of current transactions and stock activities. In addition to ready-made package programs, customized software for the business processes of the sector or the company was preferred. This accounting-based software manage all the processes of SMEs, and Excel software seems to be a horizontal solution for small businesses. Micro software is preferred more in the market and retail side, and Logo solutions are preferred by larger companies in terms of volume. It seems that software such as enterprise resource planning, which is called ERP, is preferred by a few businesses where it is not common. Companies that are members of online platforms such as the food cart follow the processes

such as order and delivery, but do not integrate the activities into their systems. All these processes are followed manually.

The data accumulated in the business processes of the companies, the data policies regarding the collection, processing and conclusion of these policies, the technological infrastructure for the execution of these policies, and the answers to the survey questions regarding the ownership of data specialists are given in Table 3 and Table 4 as percentages and shown with graphic visuals.

Table 3. Company Data Policies

Row Labels	Yes	No	I Dont Now
Do you have expert personnel to evaluate the data generated in your company business processes?	42,74%	32,87%	54,64%
Do you have knowledge about concepts such as big data and data mining?	15,77%	23,08%	21,65%
Have you had any training initiatives regarding Big data and data mining in your company?	12,45%	30,42%	8,25%
Would you like to learn about topics such as big data, Data Mining, Machine Learning?	29,05%	13,64%	15,46%
Grand Total	**100,00%**	**100,00%**	**100,00%**



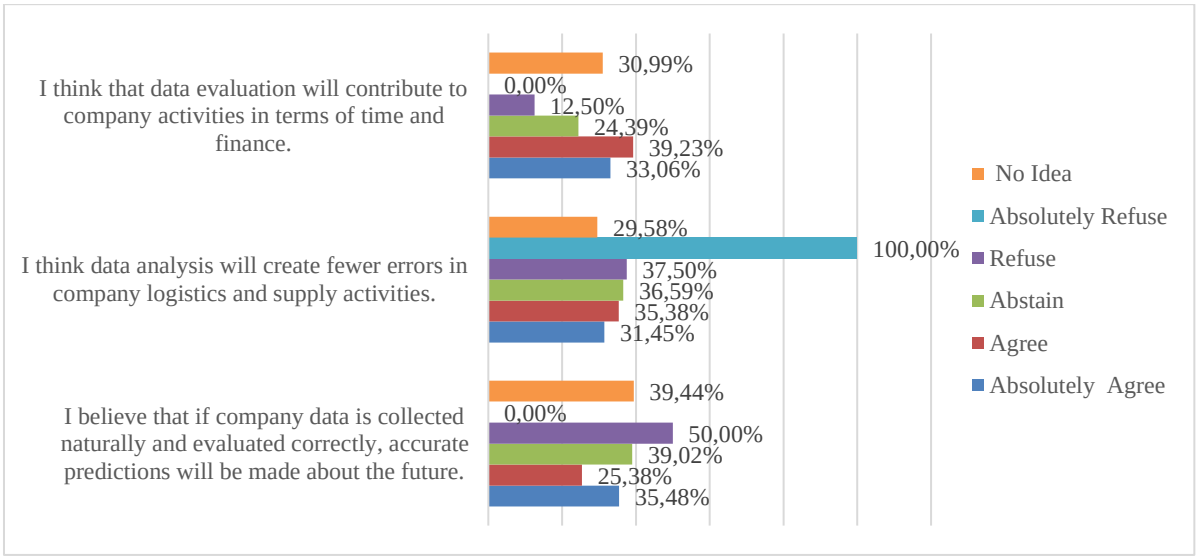
The percentages of the answers given by the companies to the data processing and evaluation policies are shown in Table 3 and explained with graphic visuals. Although the companies are willing (29.9%) about data analysis, analytics and mining; they cannot invest in the data due to problems such as insufficient budget (13.28%), lack of expert personnel (19.2%) and insufficient technological infrastructure (39.9%) (Guven et al., 2007). Firms stated that they did not even attempt training because of these problems related to data mining (30.42%).

Table 4. Challenges to Data Mining

Survey	Budget	Expert Staff	Technological Infrastructure
What seems to be the biggest challenge for your company regarding data processing?	13,28%	19,23%	39,18%

The answers of the participants to the questions regarding the opinions about the fact that data processing and analysis methods will have an important place in the future and for the investment of the company is given in Figure 3, indicating that it will make a positive contribution.

Figure 3. Data Analysis and Evaluation Interpretations



According to the data in Table 5, for the advantages and benefits provided by cloud systems and services, companies want to benefit from cloud services (50%), but there is no information about the need for human resources (66.6%), security (33.3%) and costs. They hold he idea that there would be no change. Some companies reported that they have no idea about the advantages and disadvantages associated with the cloud.

Table 5. Cloud Technologies Comments

Row Labels	Absolutely Agree	Agree	Abstain	Refuse	Absolutely Refuse	No Idea
Cloud Technologies require less personnel and computers for the company.	25,00%	30,17%	35,14%	66,67%	66,67%	45,90%
Cloud technologies provide a faster and more	25,00%	36,21%	24,32%	33,33%	33,33%	54,10%

secure environment for company software and databases.						
Cloud technologies provide a faster and more secure environment for company software and databases.?	50,00%	33,62%	40,54%	0,00%	0,00%	0,00%

6. CONCLUSION AND RECOMMENDATIONS

Popular topics such as data mining and big data, which constitute the digital agenda, have caused changes in different speeds and directions, even if not at the desired level, in small and medium-sized enterprises, which we call SMEs. Although SMEs have data that falls into the big data category, they think that they do not have the sufficient technological infrastructure, budget and expert personnel to analyze this data. The experiences and business practices they gain in the field are not based on solutions such as big data analytics. Observational and seasonal experiences are more decisive in decision processes.

Despite the current software applications developed for business processes, it is observed that SME companies continue to carry out their business processes with traditional methods and observations. Many businesses track the current movements of company processes (stock, sales and invoices) through Excel software. Small-scale commercial programs used other than Excel software seem to be limited to pre-accounting and stock tracking. Commercial software programs such as Logo and Mikro are the most preferred software by SME companies, and it has been determined that some companies use specially developed or customized software for their own processes. Enterprise resource software (ERP) is used with all its modules by only a few companies. The relevant modules of these software, which have data analysis and reporting modules, are almost never used or the software functions are not known by businesses. The increasing speed and abundance of demand regarding production and service processes have resulted in large volumes of data. However, the lack of expert personnel and the inadequacy of the software infrastructure do not allow the evaluation of the accumulated data.

Some medium-sized companies, where technologies such as cloud technologies are not common in small businesses, only manage their daily activities by connecting to software running on the cloud through short-cut applications. In the reporting section of the software running on the cloud, they track the turnover comparisons, which coincided with the same time in previous years, via mobile applications. However, all administrators support physical computers to be in operation in terms of security. They do not take initiatives such as booking and renting a certain space on the cloud.

Although businesses are curious and eager for operations such as analytics and analysis of accumulated big data, it seems that no attempt has been made for various reasons. In this sense, professional organizations and other responsible organizations can organize training activities for companies on the processing of data subjects. There is a need to examine and understand the driving forces of big data; therefore, there seems to be a need for systematic knowledge in the field (Zaher et al.,2020).

Big data sources; It provides insights into studies that contribute to company performance, supports timely decisions that increase comparative advantage, and offers different tools for managing environmental uncertainty by encouraging innovation. As companies experience the positive aspects of the impact of accurate and timely information on decision quality, investing more and more in data technologies and organizing business processes in the context of data will add value to all parties (Popovic.etc,2016:

According to this study, the following suggestions should be addressed within the framework of a data policy so that companies can evaluate the data obtained regarding their business processes as a resource.

- ✓ **Businesses**

• The power and functions of the data concept in companies are not practically understood. If data-based solutions and positive decisions increase and are proven, it is inevitable that all processes from production to sales will add added value to companies in terms of time and cost (Aycı, 2022).

• It should be known that making the necessary technological and human investments that will enable the processing of existing and future data sources regarding business processes and other service activities is a necessity for company competition.

• In order to manage company resources in a more planned and efficient manner, data-oriented solutions should be given more space.

• The entrepreneurial attitudes of business managers are prominent elements in the discovery of new generation technologies such as artificial intelligence, cloud technologies, data analysis and analytics.

- ✓ **Professional Organizations**

• Training courses can be opened for companies on subjects such as data literacy by the chamber of commerce and similar non-governmental organizations.

• By establishing a protocol with technology companies, organizations can be organized to inform company management about current solutions of data applications.

• Solutions can be offered to support the skills of all members in advanced Excel and macros.

• Implementation and introduction of new generation data applications based on artificial intelligence technologies and solutions for end users in line with plans.

REFERENCES

Ahmed Oussousa F.(2018) "Big Data Technologies: A Survey", Journal of King Saud University - Computer and Information Sciences; 30(4): 431-448.

AishaSiddiqaab, Hashem, I. A., and Yaqoob, İ. (2016) "A Survey of Big Data Management: Taxonomy And State-Of-The-Art", Journal of Network and Computer Applications;71(1): 151-166.

Al-sal, Z. A., Abdullah, R., and Husin, M. H. (2020) "Critical Success Factors For Big Data: A Systematic Literature Review", IEEE Access, 118940-118957.

Anshari, M., Alas, Y. and Lim, S. G. (2016) "Developing Online Learning Resources: Big data, Social Networks, And Cloud Computing To Support Pervasive Knowledge", Education and Information Technologies , 21 (6): 1663-1677.

Arıkan, R. (2018) "Anket Yöntemi Üzerinde Bir Değerlendirme", Haliç Üniversitesi Sosyal Bilimler Dergisi,1(1): 97-159.

Aycı, A. (2022) "Faaliyetlerinde Kullanılabilirliğine Yönelik Bir Araştırma: Türkiye'de Kolay İhracat Platformu ve İşletme Değerlendirme Raporu Örneği", ÖHD Üniversitesi İ.İ.B.F Dergisi, 15(3):523-537.

Bakshi, K. (2012) "Considerations For Big Data: Architecture and Approach", IEEE , Mountain Village-Colorado.

Chen, H., Chian, R. H. and Stor, V. C. (2012) "Business Intelligence and Analytics: From Big Data to Big Impact", MIS Quarterly, 36(4): 1165-1188.

Chmiliar, L. (2013) "Multiple-Case Designs", Encyclopedia of Case Study Research: Oaks: Sage 582-583.

Chuah, M. H. and Thurusamry, R. (2021) "Challenges Of Big Data Adoption In Malaysia Smes Based On Lessig's Modalities: A Systematic Review", Cogent Business & Management , 8: 1-8.

Coleman, S., Göb, R. and Manco, G. (2008) "How Can SMEs Benefit from Big Data? Challenges and a Path Forward", Quality and Reliability, 32(6): 2151-2164.

Couper, M. P. (2017) "New Developments in Survey Data Collection", Annual Reviews, 43:121-145.

Davenport, T. H. and Dyché, J. (2013) "Big Data in Big Companies", Portland: Institute, 1-31.

Delloite. (2020) "Doing Business In The Digital Age", https://ec.europa.eu › renditions › native (05.04.2020).

Gonzales, R., Wareham, J. and Serida, J. (2015) "Measuring the Impact of Data Warehouse and Business Intelligence on Enterprise Performance in Peru: A Developing Country", Journal of Global Information Technology Management, 18(3): 162-187.

Güven, A., Bozkurt, Ö. and Kalıpsız, O. (2007) "Veri Madenciliğinin Geleceği", IX. Akademik Bilişim, Dumlupınar Üniversitesi -Kütahya.

Harrison, G. (2015) "Next Generation Databases", New York, Appress.

Helena D. and Merceron, A. (2012) "Learning Analytics with Excel Pivot Tables", Moodle Research Conference, Heraklion-Crete-Greece.

Iqbal, M. and Kazmi, S. H. (2018) "A Study of Big Data for Business Growth in SMEs: Opportunities & Challenges", iCoMET 2018.Sukkur-Pakistan.

J.Mazzeia, M., and David Nobleb. (2017) "Big Data Dreams: A Framework For Corporate Strategy", Business Horizons; 60(3), 405-414.

Jin, X., B. W., Cheng, X., and Wang, Y. (2015) "Significance and Challenges of Big Data Research", Big Data Research; 2(2): 59-64.

Kaisler, S., Armour, F., Espinosa, J. A., and Money, W. (2013) "Big Data: Issues and Challenges Moving Forward", 46th International Conference on System Sciences, IEEE, Hawaii-USA.

Karim, S., Al-Tawara, A., Gide, E. and Sandu, R. (2017) "Is Big Data Too Big for SMEs in Jordan?", 8th International Conference on Information Technology (ICIT), IEEE, Amman.

Khan, N., Yaqoob, I., Hashem, I. A., and Inayat, Z. (2018) "Big Data technologies: A survey", The Scientific World Journal, 30(4): 431-448.

Kumar, R., Parashar, B. B. and Gupta, S. (2014) "Apache Hadoop, NoSQL and NewSQL Solutions of Big Data", IJAFRSE,10(33): 28-37.

Laney, D. (2022) "3D Data Management: Controlling Data Volume, Velocity, and Variety", https://studylib.net/doc/8647594/3d-data-management--controlling-data-volume--velocity--an.

Lydia, D., Laxmi, M. V., and Swarup, D. M. (2016) "A Literature Inspection on Big Data Analytics", IJIREM, 3(5): 422-431.

Massa, S. and Testa, S. (2009) "A Knowledge Management Approach To Organizational Competitive Advantage: Evidence From the Food Sector", ESCP-EAP, 27(2):129-141.

McAfee, A. and Brynjolfsson, E. (2022) "Big Data:The Management Revolution", http://tarjomefa.com:http://tarjomefa.com/wp-content/uploads/2017/04/6539-English-TarjomeFa-1.pdf.

McGuire, T. (2013) "Data Analytics: Three Key Challenges", https://www.mckinsey.com/: https://www.mckinsey.com/~/media/mckinsey/business%20functions/mckinsey%20digital/our%20insights/making%20data%20analytics%20work/advanced%20analytics%20transcripts_final_new.pdf?shouldIndex=false. (2013.10.10).

Oracle. (2022) "Top Big Data Analytics Use Cases", New York, Oracle.

Polkowski, Z. and Nycz, M. (2016) "Big Data Applications In SMES", Scientific Bulletin – Economic Sciences;(15): 1-16.

Saatçioğu, Ö. Y. (2020) "Lojistik Bilişim Sistemlerinde Güncel Konular", Eskişehir, Anadolu Üniversitesi Yayınları.

Sagiroglu, S. and Sinanç, D. (2013) "Big Data: A Review", IEEE ,San Diego.

SAS (2022) "Big DATA", https://www.sas.com/en_th/insights/big-data/what-is-big-data.html (2022, 5 30).

Sen, D., Ozturk, M. and Vayvay, O. (2016) "An Overview of Big Data for Growth in SMEs", Procedia, 235:159-167

Shah, S., Soriano, C. B., and Coutroubis, A. (2017) "Is Big Data for Everyone? The Challenges of Big Data Adoption in SMEs. Is Big Data For Everyone? The Challenges of Big Data Adoption In SMEs", IEEE: (803-808).

Singh, A. and Singh, P. (2012) "Synchronous Overloaded System for the Uplink of Cellular CDMA With Unequal Chip Delay Spreading (UCDS)", 2012 International Conference on Communication, Information & Computing Technology, IEEE, Mumbai-India

Sorokaa, A., Liub, Y., Hanc, L. and Haleemc, M. S. (2017) "Big Data Driven Customer Insights for SMEs in Redistributed Manufacturing", Procedia CIRP, 63: 692 – 697.

Subaşı, M. O. (2017) "Bir Araştırma Yöntemi Olarak Durum Çalışması", Atatürk Üniversitesi SBE Dergisi, 21(2): 419-426.

Targio, I. A., VictorChangb, H., BadrulAnuara, N. and KayodeAdewole. (2016) "The Role of Big Data In Smart City", International Journal of Information Managemen,;36(5) :748-758.

Targio, I. A., YaqoobaNor, I. and Anuara, N. B. (2015) "The Rise of "Big Data" on Cloud Computing: Review and Open Research Issues", Information Systems; 47(1): 98-115.

Thompson, P., Williams, R., and Thomas, B. (2014) "Are UK Smes With Active Web Sites More Likely To Achieve Both Innovation and Growth?", JSBED, 20(4): 934-965.

Vaccari, C. (2014) "Big Data in Official Statistics", PHD Thesis, University of Camrino.

Vecchio, P. D., Minin, A. D., and Petruzzelli, A. M. (2018) "Big Data For Open Innovation in SMEs and Large Corporations: Trends, Opportunities and Challenges", Creativity End Innovation Management, 27(1): 6-22.

Wang, S. and Wang, H. (2018) "Big Data For Small and Medium-sized Enterprises (SME): a Knowledge Management Model", Journal Of Knowledge Management, 24(4): 881-894.

Wee, J. C., and Chua, A. Y. (2013) "The Peculiarities Of Knowledge Management Processes in SMEs: The Case of Singapore", Journal Of Knowledge Management, 17(6): 958-972.

Wibowo, S., Suryana, Y., Sari, D., and Kaltum, U. (2021) "Value Creation With Big Data in Marketing: An Empirical Evidence on SMEs", Asian Journal of Business and Accounting, 14(2): 173-198.

Wolff, J. G. (2014) "Big Data and the SP Theory of Intelligence", IEEE Acesss, 2: 01-316.

Xiang, G. and Fang, W. (2017) "The Research of Data Integration and Business Intelligent Based on Drilling Big Data", ICIME, Barcelona.

Yaqooba, I., Hashema, I. A., Gania, A. and Mokhtar, S. (2016) "Big Data: From Beginning to Future", International Journal of Information Management, 36(6): 1231-1247.

Zhou, H. (2021) "Pivot Table Data Analysis", West Hartford: A press.

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