



Technical University of Crete



MASTER IN  
TECHNOLOGY &  
INNOVATION  
MANAGEMENT

School of Production Engineering & Management

*MASTER'S THESIS*

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B2B E-AUCTIONS AND THEIR ADOPTION BY PROCUREMENT  
PROFESSIONALS OF PRIVATE SECTOR IN GREECE

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*Supervisor*

Professor Matsatsinis Nikolaos

Chania, 2024





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*A thesis submitted in partial fulfillment of the requirements for the degree in Master in Technology  
and Innovation Management*

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Chania, 2024





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*'Wholeheartedly dedicated to my family'*





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## 1. Introduction

Business-to-Business electronic auctions have been in recent years at the forefront of organizations' procurement discussions and practices, withdrawn from the quiver of modern procurement toolkits. With a view to driving cost savings, accelerating and streamlining sourcing processes and enhancing transparency and operational efficiency throughout procurement lifecycle, organizations seek best practices utilizing emerging technologies. Through real-time online competitive bidding and negotiation, e-auctions revolutionize traditional ways of working, with the potential to achieve the above within few minutes and reap tangible benefits. Nevertheless, realizing these advantages depends on overcoming various challenges. Predisposition to conventional methods due to organizations' culture, concerns regarding the quality of goods and services purchased through e-auctions and the need for investment on robust technological infrastructure and skills are amongst the hurdles that procurement professionals must overcome.

In the light of this evidence, the adoption of e-auctions by procurement professionals has become increasingly significant worldwide. In Greece, even though the use of e-auctions has been more intense in the public sector for Government-to-Business transactions, the private sector has shown a gradual but noticeable interest in integrating this technology in companies' procurement strategies for Business-to-Business transactions. Besides, government initiatives related to e-auctions could influence businesses to modernize their processes in alignment with emerging standards and practices.

The exploration presented in this thesis delves into the dynamics surrounding the adoption of Business-to-Business electronic auctions by procurement professionals in the private sector of Greece. The purpose of this paper is twofold. First of all, by examining the literature and business world, a theoretical understanding on the topic of e-auctions is provided. This includes the presentation of different types, benefits, challenges, perceptions, influencing factors, as well as notable examples of leading Greek enterprises having adopted e-auctions, which showcase the transformative impact of embracing this state-of-the-art digital procurement methodology. In addition, the second part concerns the quantitative survey that aims at analysing the current state and prospects of e-auction adoption within the Greek private sector. All this information could stand as valuable insights for procurement professionals and stakeholders willing to deepen their knowledge in the evolving landscape of synchronous procurement practices.



## **2. Literature & Theoretical background**

### **2.1. B2B e-commerce**

The term of e-commerce, also known as electronic commerce or internet commerce, has been used since the early 1990s with several definitions across the years. According to Whinston, Choi and Stahl in 1997, e-commerce refers to the use of electronic means and technologies to conduct commerce (sale, purchase, transfer or exchange of products, services and / or information), while the delivery of product or service may occur over or outside of the Internet. The payment of the transaction and the invoice exchange may be also completed either online or physically. In general, e-commerce is associated with commercial transactions of companies, organizations and individuals carried out by electronic means, based on Information and Communication Technologies. The simplified and rather simplistic definition of e-commerce as “the online sale of goods” has been extensively criticized, especially during the last years, as it seems that it contains much more. Zhao Huang and Morad Benyoucef clarified in 2013 that e-commerce is more than “ordering” and “paying” for items online. E-commerce may also include steps before the online transaction, like online marketing, as well as the step of online customer service after the online transaction. That is to say that e-commerce does not concern only the purchase step, but all five stages of the buying process which may be completed in a digital way: need recognition, information search, options evaluation, purchase decision and post-purchase evaluation. In the light of this evidence, it could be stated that e-commerce is the end-to-end process of transacting business with customers over a computer network.

A main type of e-commerce based on the parties involved in the e-transaction is the Business-to-Business one, which stands for digital transactions between 2 or more businesses. In B2B e-commerce, transactions are of high value, making this category by far the largest globally, in comparison with the rest types of e-commerce (B2C – Business-to-Consumer, C2B – Consumer-to-Business, C2C – Consumer-to-Consumer, G2C – Government-to-Consumer, C2G – Consumer-to-Government, G2B – Government-to-Business, B2G – Business-to-Government and G2G – Government-to-Government). The Business-to-Business (B2B) model serves as the backbone of commerce, facilitating transactions and relationships between businesses across various industries. As reported by Valdeci Ferreira dos Santos, Leandro Ricardo Sabino, Greiciele Macedo Moraes and Carlos Alberto Gonçalves in 2017 in the International Journal of Business Administration, even



though B2C e-commerce is the one with the larger number of transactions, the transaction value of B2B e-commerce has been calculated to be higher than this of B2C, even with fewer transactions.

Undoubtedly, there are some key characteristics of B2B model in comparison with the B2C one. In the core of B2B model is the concept of volume and complexity. Transactions in the B2B space often entail larger volumes and more intricate purchasing processes compared to consumer transactions. Business transactions may involve customizations, competitive bidding processes, negotiations and contracts tailored to meet the specific needs and requirements of business customers. Additionally, B2B transactions typically rely on established relationships between buyers and sellers, built on trust, reliability and mutual understanding and benefit, making B2B transactions to be quite relationship-driven. Long-term partnerships are cultivated to foster ongoing collaboration and value creation (Doherty, McConnell & Ellis-Chadwick, 2013). Another defining characteristic of B2B transactions is the presence of multiple decision-makers within buying organizations. Purchasing decisions are seldom made in isolation; instead, they involve various stakeholders, such as buyers, procurement managers, business or operations heads, and executives, each with varying priorities and interests. As a result, B2B sales cycles tend to be more prolonged and complex, necessitating effective communication and relationship management throughout the process. Last but not least, B2B transactions are highly value-driven. That is to say buyers in companies prioritize value propositions such as cost savings, efficiency improvements and competitive advantages when making purchasing decisions.

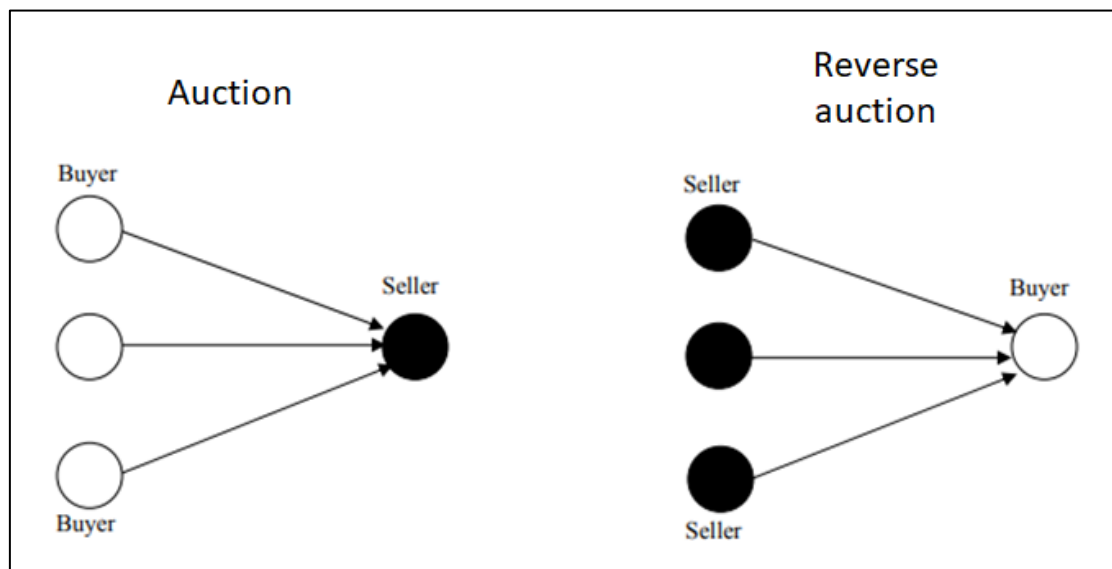
The B2B model serves as a cornerstone of modern commerce, facilitating transactions, relationships and value creation between businesses, offering significant opportunities for growth, innovation and collaboration in an increasingly interconnected global marketplace. By understanding and adapting to the dynamics of the B2B model, businesses can navigate challenges, capitalize on opportunities and drive sustainable success in the competitive business landscape (Johnson, 2011).

## **2.2. B2B e-auctions**

E-auctions, also known as electronic auctions, are transactions between a seller (auctioneer) and potential buyers (bidders) in an electronic marketplace. In an auction, the bid provider is the buyer. On the contrary, reverse e-auctions are transactions between a buyer (auctioneer) and potential sellers (bidders) who submit online bids to compete against each other. As a result, in a reverse



auction, the bid provider is changed from the buyer to the seller. In economics terminology, it is a monopsony, where there is one buyer and many suppliers (Tassabehji, Wallace & Tsoularis, 2006). Reverse e-auctions are actually bid events that happen in the business-to-business environment for a certain period of time, in which the auctioneer is the company with the need for a purchase that puts a request for good or service in an e-auction platform and the bidders are potential suppliers of the good or service auctioned that compete for the business. Actually reverse e-auctions serve the realization of B2B e-commerce. A graphical illustration of the 2 types of auctions is shown in figure 1, as created by Ching-Chung Kuo, Pamela Rogers and Richard E. White in 2004.



*Fig. 1: Auctions vs Reverse auctions*

In bibliography and procurement workplace, reverse e-auctions are mentioned with several terms, such as procurement auctions, B2B e-auctions, backward auctions, upside down auctions, reverse sourcing, eSourcing, electronically assisted negotiation, online reverse auctions (ORAs) or just e-auctions. It is worth noting that since this thesis concerns only Business to Business e-auctions, e-auctions mentioned in the whole thesis are only reverse ones.

E-auctions represent a pivotal advancement in procurement practices, particularly in the realm of B2B and B2G transactions, as they can be a valuable tool that enhances buyer's negotiation performance by raising the chance of obtaining better value of bids from vendors and optimizing the negotiation process (Emiliani ML, 2000). As mentioned by Doherty, McConnell & Ellis-Chadwick in 2013, these digital transactions have transformed the traditional bidding and negotiation processes among suppliers. This transformative approach to procurement is characterized by the utilization of



technology in order to facilitate competitive biddings, ultimately leading to enhanced transparency, cost-effectiveness and efficiency in modern supply chain management (Karabağ & Tan, 2019).

One of the primary advantages of e-auctions is the reduction of final price agreed for the goods auctioned, through the facilitation of competitive bidding amongst suppliers. At the core of organizations across industries lies the imperative to achieve cost efficiencies while maintaining quality standards and meeting strategic objectives. In fact, procurement function is one of the biggest contributors in the efforts of expenditure optimization and B2B e-auctions are a compelling solution for this, as they enable buyers to leverage the principles of supply and demand in a digital marketplace, driving down prices through competitive bidding and negotiation (Johnson, 2011). By providing a transparent and centralized platform for vendors to submit bids, e-auctions foster a dynamic environment where prices are driven down through real-time competition. This competitive dynamic often leads to significant cost savings for buyers, as suppliers are compelled to offer their most competitive pricing to win the event and secure contract. It is noteworthy that based on a report of Scanmarket, a source-to-contract software provider, e-auctions generally provide savings of above 10% compared to previously negotiated prices. Respectively, Procol, another e-auction software provider, has stated that companies running e-auctions in their platforms ultimately gain 2-10% cost savings. According to Emiliani and Stec (2002), the close-of-auction index is an interesting indicator of price efficiency that an e-auction brings. Specifically, the difference between the historical price paid and the lowest bid price in a given event gives the close-of-auction index.

Moreover, e-auctions streamline the entire procurement process, from initial bid submission to contract finalization, leading to increased productivity. Traditional procurement processes often suffer from inefficiencies, such as lengthy negotiation cycles, manual administrative work and limited supplier visibility. E-auctions streamline these processes by automating tasks such as bid solicitation, evaluation, negotiation and award. As a result, time and resources traditionally required for these activities are reduced, as decision-making is accelerated, cycles are reduced and administrative overhead is minimized. As Lu, Gupta, Ketter and Van Heck asserted in 2016, the digital nature of e-auctions enables round-the-clock access to procurement opportunities, transcending geographical barriers and fostering agility in supply chain operations. Additionally, e-auctions push buyers to structure and standardize also the process prior to the event in order to be able to run it successfully (Carter et al., 2004). This efficiency not only accelerates the procurement cycle but also frees up time from procurement professionals to focus on strategic decision-making and supplier relationship management.





Another key benefit of e-auctions is their ability to expand the supplier base and promote market competition. By lowering barriers to entry and providing a level playing field for suppliers, e-auctions encourage participation from a diverse range of vendors (Karabağ & Tan, 2019). This increased competition not only drives down prices but also fosters innovation as suppliers strive to differentiate themselves and offer value-added solutions.

However, despite their numerous advantages, e-auctions also present challenges that must be addressed for successful adoption. One significant hurdle is cultural resistance to digitalization, particularly in industries or regions where traditional procurement practices are deeply entrenched (Tassabehji, Wallace & Tsoularis, 2006). Overcoming this resistance requires comprehensive education and change management efforts to demonstrate the benefits and dispel misconceptions surrounding e-auctions. Additionally, concerns about the quality and reliability of goods and services obtained through e-auctions can hinder adoption. Buyers may worry that the emphasis on price competitiveness could compromise on factors such as product quality, reliability or after-sales support (Johnson, 2011). Addressing these concerns requires robust supplier control procedures, clear specifications from the beginning and performance metrics for supplier evaluation, to ensure that vendors meet the required standards. Last but not least, another challenge in e-auctions is for suppliers to be absorbed by the increased competition and the fast bidding resulting in underbidding in order to win the event. Suppliers participating in an e-auction need to be well-prepared prior to the event so as to know exactly the minimum price they can give remaining profitable.

The effective adoption of e-auctions necessitates a robust technological infrastructure capable of supporting these platforms securely and efficiently. This includes reliable internet connectivity, data security measures and user-friendly interfaces that enable seamless interaction for both buyers and suppliers. It is important to highlight that companies willing to incorporate e-auctions into their procurement practices do not need to create their own tools. There are several software companies that have created relevant platforms, the usage of which are sold to the interested parties as a service, sometimes in conjunction with an experienced consultant for electronic process implementation and technical support.

Supplier relationships management is key when using e-auctions. While e-auctions promote competition among suppliers, organizations must strike a balance between achieving cost savings and maintaining collaborative partnerships. Effective communication, transparency and fairness in e-auction processes are essential for building trust and fostering long-term relationships with suppliers.





Organizations that prioritize supplier engagement and provide support to suppliers in navigating e-auction platforms can maximize participation and extract greater value from procurement initiatives (Johnson, 2011).

### **2.3. Evolution of e-commerce and B2B e-auctions**

The evolution of e-commerce and the emergence of e-auctions in the Business to Business environment have reshaped the landscape of business transactions, facilitating efficiency, transparency and global reach. This evolution has been marked by significant milestones and paradigm shifts, driven by technological advancements, changing consumer behaviour and market dynamics.

The concept of e-commerce traces back to the 1960s with the development of electronic data interchange (EDI), enabling businesses to exchange documents electronically. However, it wasn't until the 1990s that the internet revolutionized commerce with the emergence of online marketplaces and storefronts. Companies like Amazon and eBay pioneered the consumer-facing aspect of e-commerce, offering a wide range of products accessible to anyone with an internet connection.

While B2C e-commerce gained rapid traction, B2B e-commerce was also quietly transforming industries in response to emerging trends and market dynamics. Businesses started leveraging online platforms to streamline procurement processes, manage supply chains and engage in electronic transactions with suppliers and partners. B2B e-commerce platforms provided functionalities tailored to the complex needs of businesses, including bulk ordering, custom pricing and integration with enterprise resource planning (ERP) systems. Digital transformation is reshaping B2B commerce, with businesses increasingly embracing digital technologies such as e-commerce platforms, e-auctions platforms, customer relationship management (CRM) systems and data analytics to drive efficiency and innovation and enhance customer engagement. It seems that there is a shift from traditional product-centric models towards service-oriented ones, offering value-added services such as consulting, maintenance and subscription-based solutions. Moreover, online B2B marketplaces are gaining prominence, providing businesses with access to a broader range of suppliers, streamlined procurement processes and enhanced visibility into pricing and product availability. Besides, there is a growing emphasis on sustainability and corporate social responsibility (CSR), driving demand for environmentally friendly products, ethical sourcing practices and transparent supply chains. The



focus on personalization and customer experience are among the key trends shaping the presence and the future of B2B commerce. Businesses are investing in personalized marketing strategies, customer relationship management and omni-channel experiences to differentiate themselves and attract and retain business customers.

As e-commerce matured, the concept of online auctions gained prominence. E-auctions, pioneered by companies like SAP Ariba, offered a dynamic and competitive platform for businesses to buy and sell goods and services driving cost reduction. Initially used for surplus inventory and distressed assets, B2B e-auctions quickly evolved to encompass strategic procurement, sourcing and contract negotiations. Already before 2003, large organizations such as Dell, Hewlett Packard, Palm, GlaxoSmithKline, Bechtel, Volkswagen and Metro Group had increased the use of reverse e-auctions to improve their acquisition process and lower component costs (Beall et al., 2003). The auction format introduced a level of transparency and efficiency previously unseen in traditional procurement methods. According to what Schoenherr & Mabert stated in 2008, several factors drove the evolution of e-commerce and B2B e-auctions:

- Technological Advancements: Innovations in internet infrastructure, mobile technology and data analytics have enhanced the capabilities and accessibility of e-commerce platforms. Cloud computing and artificial intelligence (AI) have enabled real-time data processing, personalized recommendations and predictive analytics, enhancing the user experience and driving efficiency.
- Changing Consumer Behaviour: Consumer expectations for convenience, choice and speed have influenced B2B commerce as well. Businesses now demand seamless digital experiences, self-service capabilities and on-demand access to product information and support.
- Globalization and Supply Chain Complexity: The globalization of markets has necessitated more agile and interconnected supply chains. E-commerce and e-auctions have facilitated cross-border trade, enabling businesses to source products globally, optimize inventory management and mitigate supply chain risks.
- Competitive Pressures: In an increasingly competitive marketplace, businesses are under pressure to reduce costs, improve operational efficiency and differentiate themselves from competitors. E-commerce and e-auctions offer opportunities to achieve these objectives through economies of scale, strategic sourcing and dynamic pricing mechanisms.



The evolution of e-commerce and B2B e-auctions is poised to continue driven by ongoing technological innovation and shifting market dynamics. The omni-channel commerce, the blockchain technology and smart contracts, AI-powered algorithms that enable hyper-personalized shopping experience and the sustainability and ethical sourcing are amongst the key trends and opportunities on this field. As technology continues to evolve, the future of B2B commerce promises unprecedented opportunities for growth, efficiency and value creation, with businesses embracing the digital transformation.

Undoubtedly, the numbers show this significant evolution. As mentioned by Precedence Research, the global business-to-business e-commerce market size reached USD 9.74 trillion in 2023 and is expected to hit around USD 44.88 trillion by 2032. The COVID-19 pandemic accelerated the growth of electronic commerce, electronic data interchanges and e-procurement channels, which grew about 10 times faster than total manufacturing and distributor sales in 2020 (Ibusuki, Jussani, Araújo & Koto, 2023). B2B sellers saw a significant increase the recent years in demand for digital commerce sales channels from B2B buyers, as traditional sales channels like distribution branches were shut down due to the pandemic in 2020. B2B e-auctions have also evolved, with businesses leveraging social commerce to reach and engage with their target audience more effectively (Cortez, Cabanelas & Charterina, 2023).

In summary, the evolution of e-commerce and B2B e-auctions has been significant, with the COVID-19 pandemic accelerating the growth of electronic commerce, electronic data interchanges and e-procurement channels.

## **2.4. Types of reverse e-auctions and end-to-end process**

There are multiple different types of reverse e-auctions, based on several characteristics. Kuo C., Rogers P. and White R. E. proposed in 2004 a remarkable classification of reverse e-auctions depending on 3 attributes:

- Transparency of information, meaning the visibility of bidding information to the bidders during the auction.
- Criteria for the end of auction, which should always be very clear to the participants before starting the event.



- Award criteria, meaning the criteria based on which the winner of the auction is decided. These should also be well-defined and shared clearly and fairly with all participants by the auctioneer from the beginning.

Based on the 1<sup>st</sup> characteristic, that of the transparency of information, e-auctions may be classified to 2 types:

- 1) **Open bid auctions.** In this type, information about the bid or the ranking of the bidders is revealed to all of them in real time. More precisely, either all bids, or the lowest bid or the bidder's own ranking are visible. This is the most common type out of the 2.
- 2) **Sealed bid auctions.** In this type, all bids are closed and cannot be changed. No information about bids or ranking is visible to any of the participants.

Based on the 2<sup>nd</sup> and the 3<sup>rd</sup> characteristic combined, those of the termination and award criteria, there are many e-auction types but the most prominent ones are the following:

- 1) **English or British or standard reverse auctions.** This is the most frequent e-auction type selected by most procurement professionals (Sollish & Semanik, 2012) due to the flexibility it offers. In this type, price may not be the only criterion of the auctioneer for selecting a supplier. Award criteria may be more than price (e.g. quality, delivery time, after-sales service), but they should be clearly explained at the beginning of the event, in conjunction with the importance weight of each of them. In case price is the only criterion of decision, then the item is purchased from the lowest bidder at its bid price. In case there are more criteria, then it is possible the item is purchased from the 2<sup>nd</sup> lowest bidder at its bid price, if the lowest bidder is inferior to the other criteria. English reverse auctions are held over a limited duration. This means that a certain period of time (usually no more than 60 minutes) is also shared by the auctioneer when starting the process and e-auction finishes when the time is up. It should be highlighted that the e-auction time is extended by a couple of minutes when a bid is submitted right before the auction is over, in order to give other participants the time to react, if they are willing to. The specific number of minutes to be granted as a time extension in this case is specified by the auctioneer at the beginning, when setting up the system to run the event. English reverse auctions are open bid, as all participants can see their ranking compared to the rest participants of the auction throughout the event. Concerning the process, participants start the auction with their starting price at which they are willing to sell the item or service to the buyer (usually provided by them in a 1<sup>st</sup> round of competitive



bidding). As the e-auction is running, each of them reduces the price by the bid decrement (amount or percentage) set up by the auctioneer, in an effort to higher their ranking and increase the chances to be selected by the buyer.

- 2) **Vickrey reverse auctions or second-price.** This type is similar to the English one, with some differences. First of all, Vickrey reverse e-auctions are sealed-bid ones, so information about bids or ranking is not visible. Apart from that, the auction is awarded to the seller that submitted the best price. However, the product or service auctioned is transacted at the second-best price. This type motivates strategically potential sellers to bid their true price reflecting the fair value of the item.
- 3) **Dutch reverse auctions.** This e-auction type is also a sealed-bid one. In Dutch reverse e-auctions, the auctioneer shares with the participants at the beginning a list of goods to be purchased along with the quantity needed, a starting price (opening bid), as well as a fixed interval (minimum price increment) to be used during the e-auction. When the event opens, bidders decide within a given time if they want to participate at the price specified and for which quantity. If no bidder participates or there is remaining quantity to continue being auctioned, the auctioneer sets an increased price (starting price plus the defined fixed interval). This continues until there are bidders that have accepted to provide the whole quantity of goods for the price set by the auctioneer. The auction ends immediately when the above is achieved. This means that in Dutch reverse auctions more than one sellers can be awarded, if the quantity of goods breaks to smaller groups. A characteristic of this type of e-auctions is that the buyer is in total control of the pricing. According to Procol, an e-auction software provider, the Dutch reverse option is usually used in the auction of raw materials, food products, IT services and medical supplies.
- 4) **Japanese reverse auctions.** This type is similar to the Dutch one, in the context that it is also sealed-bid, hence the only data visible to the bidders during the event are the price and the timer as set by the auctioneer. The logic behind which the e-auction runs is also similar to the Dutch one, with the difference that a price decrement is set by the auctioneer instead of price increment. This means that the event begins with the starting price (opening bid) placed by the auctioneer and then it is decreased by the fixed amount over a certain period of time, until price reaches the minimum acceptable by the buyer. Bidders decide to accept or reject each price given by the auctioneer. The last bidder to remain in the process is the company to which the event is awarded. In other words, Japanese reverse auctions are a process of elimination. With the logic that these auctions run, they are suitable when there is limited



expected participation from potential sellers – suppliers - bidders. It is interesting that this e-auction can run even with 1 supplier achieving self-competition for the lowest possible price, without the participant knowing that there is no competitor, as it is sealed-bid auction. Even though this is profitable for the auctioneer as the price goes down, discussions take place concerning how ethical it is to run the auction in this way. Nevertheless, when bidder accepts to participate in a Japanese reverse auction, it should be known that the possibility of self-competition exists.

- 5) **Yankee reverse auctions.** This type is a variation of the Dutch one, as the logic is exactly the same. What differentiates Yankee from Dutch B2B e-auctions is that after auction closure, a ranking of all bids is made from the lowest to the highest one and the good or service is awarded to the sellers of the list, until the quantity needed is covered.

Procurement professionals select specific e-auction type to run in each case based on the procurement need, objective and strategy decided for each spend, as well as the specific market pool existing in each case. In general, as Aloini, Dulmin & Mininno confirmed in 2012, the e-auction event is part of a more complex and extended e-sourcing process and the selection of e-auction type is just a step in it. The phases of the end-to-end purchasing process when e-auctions are used are mainly divided into 3: the pre-auction, the auction and the post-auction one. Relevant steps of each phase are proposed below.

1) Pre-auction phase

- a. A market overview should be done in order to define supply and demand, industry capacity and therefore procurement complexity.
- b. RFI (Request for Information) should be sent to multiple potential suppliers to collect information about product / service characteristics, value-added activities, supply capabilities and other important data, for investigation reasons in order to be able to define the specifications of the good.
- c. RFQ (Request for Quotation) should be then sent to multiple potential suppliers to set quantity needed, quality standards, delivery time and payment terms, collect start prices and prequalify suppliers.
- d. Based on all the above, a suitability analysis of e-auction should be done in order to decide if the procurement process will continue with an e-auction or not. If yes, the process continues with the next step.



- e. Reverse e-auction types should be evaluated and the most suitable one should be selected.
- f. Number of potential suppliers to be participated in the e-auction should be decided. Moser stated in 2002 that reverse e-auctions work better when there are five or more qualified suppliers with similar supply capabilities, while Davies mentioned in the same year that it is vital to have at least three qualified suppliers for the planned purchase when more sophisticated goods are involved. According to Scanmarket, there is an optimal range, typically up to seven or eight suppliers, where meaningful savings can be achieved. Beyond this point, adding more suppliers often does not result in significant cost reductions.

## 2) Auction phase

- a. The company organizing the event should notify potential suppliers that e-auction will take place. More details about training sessions as well as auction date and time should be shared with them.
- b. Auction rules should be set and based on them the event should be designed in the relevant platform. It is given that internal stakeholders of the company designing and running the event are already trained by the software provider, so they have the appropriate knowledge to carry through with all relevant tasks.
- c. Training sessions of potential suppliers should be conducted so they are all fully capable of participating in the event and making the most of it.
- d. It is time to run the e-auction event, in which the auctioneer monitors the real time bidding and manages potential questions from the participants. Ching-Chung Kuo, Pamela Rogers and Richard E. White proposed in 2004 that a bidder should be contacted if no action is taken for an extended period of time or if something does not look right (e.g. an unusually low bid). The buyer has the responsibility to stop the auction if any evidence of irregularity is suspected or witnessed, such as collusion, shill bidding or an auction ring (Prince, 1999).
- e. The e-auction ends with the rules governing the selected e-auction type.

## 3) Post-auction phase

- a. The awarded supplier should be contacted to be informed about winning the event and being selected as supplier. It is proposed rest participants not being selected to be contacted as well for a concise debriefing.





- b. E-auction results should be evaluated, possible savings should be calculated and benefits reaped should be identified.
- c. A short review meeting should take place with all procurement members of the company in order to share the lessons learnt and improve the process.
- d. Rest steps of purchase managing follow, like delivery, payment and any other post-purchase activities.

## **2.5. Theoretical frameworks and models relevant to B2B e-auctions adoption**

The adoption of B2B reverse e-auctions is influenced by various theoretical frameworks and models, which offer valuable insights and a holistic understanding of the factors driving organizations' decisions to embrace this innovative procurement method (Aloini, Dulmin & Mininno, 2013). Analyzing these frameworks provides understanding into the complexities and dynamics surrounding B2B e-auction adoption (Doherty, McConnell & Ellis-Chadwick, 2013).

### Technology Acceptance Model (TAM):

The TAM, originally proposed by Fred Davis in 1989, posits that an individual's intention to use a new technology is influenced by two primary factors: perceived usefulness and perceived ease of use. Applying this to B2B reverse e-auctions, TAM offers valuable insights into the decision making process of organizations considering the implementation of e-auction platforms in their procurement practices (Cabral, Ferreira & Dias, 2016). This model suggests that organizations are more likely to adopt e-auction platforms if they perceive them as beneficial for improving procurement efficiency, driving cost savings and enhancing supplier management processes. If buyers are convinced that this particular technology enhances their job performance or productivity, they will be more inclined to use it. Of course the perceived usefulness of e-auctions is further reinforced by success stories, case studies and industry best practices demonstrating tangible benefits achieved through e-auction adoption. Furthermore, if the e-auction platforms are user-friendly, easy to integrate with existing systems and processes and training requirements for using the platform are low, then adoption is more likely to occur (Timmers, 2003). As Cabral, Ferreira & Dias confirmed in 2016, e-auction platforms that are intuitive, user-friendly and seamlessly integrated with existing procurement systems are more likely to be perceived as easy to use by organizations. Effective training, communication, support mechanisms and change management provided by companies offering e-





auction platforms can mitigate user resistance and facilitate smoother adoption processes. Summing up, positive perceptions of usefulness and ease of use are likely to foster greater acceptance and adoption of e-auction platforms, leading to enhanced procurement practices and competitive advantages.

#### Innovation Diffusion Theory:

Introduced by Rogers in 1962, the Innovation Diffusion Theory explores the process through which new technologies or practices spread within a social system. In the context of B2B e-auctions adoption, this theory considers the roles of innovators, early adopters and laggards in driving or inhibiting the adoption process. Procurement professionals may be influenced by their peers, industry leaders, stakeholders within their network or external consultants who promote the adoption of e-auctions through knowledge sharing, training programs or success stories. Understanding the diffusion dynamics of e-auctions can help organizations identify key influencers and adopt strategies to accelerate adoption rates among procurement professionals (Mithas & Jones, 2007). As Schoenherr and Mabert noted in 2008, early adopters of e-auctions could serve as opinion leaders, facilitating the diffusion of this innovation across industries.

#### Institutional Theory:

Institutional Theory focuses on how organizations respond to external pressures and institutional norms in their organizational behaviour and decision making processes. Businesses may adopt B2B reverse e-auctions in response to external pressures from industry standards, regulatory requirements or competitive forces. Moreover, the legitimacy conferred by adopting e-auction platforms can enhance an organization's reputation and stakeholders' perception within the industry, driving adoption to align with prevailing institutional norms and expectations in the procurement field (Doherty, McConnell & Ellis-Chadwick, 2013).

#### Transaction Cost Economics (TCE):

TCE, developed by Williamson in the 1970s, provides insights into how organizations choose governance mechanisms to minimize transaction costs in their interactions. In the framework of B2B reverse e-auctions, TCE suggests that organizations adopt e-auction platforms to minimize transaction costs compared to traditional procurement methods. E-auctions can reduce information asymmetry, facilitate price reduction and simplify supplier selection, thereby lowering transaction



costs related to negotiation, monitoring and enforcement (Aloini, Dulmin & Mininno, 2012). By aligning e-auction adoption with transactional characteristics, organizations can optimize their procurement strategies and achieve cost efficiencies in supplier relationships.

#### Resource Dependence Theory:

This theory focuses on how organizations leverage their internal resources, relationships and capabilities to gain competitive advantage and achieve their goals. Applied to B2B reverse e-auctions, this perspective highlights the role of inter-organizational dependencies and power dynamics in shaping procurement decisions. It suggests that organizations with the necessary human capital and organizational capabilities are better positioned to adopt and exploit e-auction platforms effectively. Moreover, organizations may develop unique competencies in e-auction strategy formulation, supplier relationship management and data analytics, enabling them to create sustainable competitive advantage in procurement practices and enhance organizational resilience (Doherty, McConnell & Ellis-Chadwick, 2013).

#### Organizational Learning Theory:

Organizational Learning Theory focuses on how organizations acquire, interpret and apply knowledge to improve their performance over time. In the context of B2B e-auction adoption, this theory emphasizes the importance of learning processes, knowledge sharing and feedback mechanisms in facilitating organizational change. Procurement professionals may engage in training programs, workshops or collaborative forums to develop competencies in e-auction strategy formulation, supplier relationship management and negotiation tactics. Organizational learning processes can foster a culture of innovation and continuous improvement, driving successful e-auction adoption and implementation initiatives.

In summary, theoretical perspectives such as Technology Acceptance Model, Innovation Diffusion Theory, Institutional Theory, Transaction Cost Economics, Resource Dependence Theory and Organizational Learning Theory offer valuable insights into the drivers and mechanisms of B2B e-auctions adoption. By stepping on these theoretical frameworks and understanding the complex interplay of factors influencing organizational decisions, stakeholders can develop effective strategies to promote and facilitate the successful implementation and utilization of e-auction platforms in procurement processes (Karabağ & Tan, 2019).



## **2.6. Factors influencing adoption of B2B e-auctions**

The adoption of B2B e-auctions is influenced by many factors that shape organizational decisions in embracing this innovative procurement method. Understanding these factors is crucial for businesses seeking to leverage e-auctions effectively within their procurement strategies.

### Cost Reduction Need:

One of the primary drivers for B2B e-auction adoption is the pursuit of cost reduction. Organizations are constantly under pressure to optimize costs across their supply chains and reverse e-auctions offer a mechanism to achieve significant savings through competitive bidding processes. By enabling real-time price discovery, causing a battle between suppliers for the lowest price and fostering a transparent marketplace, e-auctions empower buyers to negotiate better terms and secure favourable pricing from suppliers (Emiliani, 2005).

### Efficiency and Process Streamlining:

Efficiency plays a pivotal role in influencing the adoption of B2B e-auctions. Traditional procurement processes can be time-consuming and prone to errors. E-auctions streamline these processes by automating supplier selection, bid evaluation and contract management, thereby reducing cycle times and administrative overhead. The ability to conduct auctions online facilitates round-the-clock transactions, eliminating geographical barriers and accelerating decision-making (Karabağ & Tan, 2019). The need of businesses for more effective end-to-end processes in order to save time and be able to focus to more strategic tasks may lead them to evaluate the possibility to adopt e-auctions for their B2B purchases.

### Organizational Readiness and Capabilities:

The readiness and capabilities of an organization play a critical role in determining its ability to adopt and leverage B2B e-auctions effectively. Factors such as technological infrastructure, data analytics capabilities and organizational culture influence the readiness to embrace e-auction platforms. Organizations with robust IT systems, experienced and skilled procurement teams and a culture of innovation are better positioned to capitalize on the benefits of e-auctions and drive successful adoption initiatives (Jap & Mohr, 2002).

### Perceived Role of Procurement in the Organization:



The schism between whether the role of procurement in an organisation is perceived to be administrative or strategic was found to be a major factor in the effectiveness and proficiency of professionals to do their jobs (Tassabehji and Moorhouse, 2008). Therefore, in companies which consider procurement as a core function with major strategic role, management may support the investment needed for e-auction adoption. Specifically, as stated by Rana Tassabehji in 2010, when the organizational role of procurement is perceived to be strategic, it was found to influence motivation for e-auction use in order to optimize price and build relationships with suppliers.

#### Regulatory and Compliance Considerations:

Regulatory requirements and compliance standards can influence the adoption of B2B e-auctions, particularly in regulated industries such as healthcare, finance and government contracting. Organizations must ensure that e-auction processes adhere to legal frameworks, industry regulations and ethical guidelines governing procurement practices. Compliance with data security, privacy regulations and anti-corruption laws is paramount to mitigating risks and maintaining organizational integrity.

#### Market and Competitive Dynamics:

Market forces and competitive pressures also shape the adoption of B2B e-auctions. Organizations operating in highly competitive industries or facing disruptive and innovative market trends may turn more easily to e-auctions as a strategic tool to gain a competitive edge. E-auctions enable organizations to access a broad pool of suppliers, leverage market intelligence and respond swiftly to changing market conditions, thereby enhancing agility and resilience in the face of competition (Karabağ & Tan, 2019).

#### Well-defined specifications:

Even when organizations are willing and ready to adopt e-auctions, they can do so for purchases in which specifications can be defined very well by the procurement professional. That is to say that the auctioneer should be able to explain clearly the requirements that the auctioned good or service should meet in order to run an auction successfully. This may depend on the purchase category, as some spend categories are complex, thus it is very difficult to define specifications based on which suppliers will provide their offer, as well as on the skills and experience of the procurement professional.



In conclusion, the adoption of B2B e-auctions is influenced by a complex interplay of factors spanning from cost and process efficiency considerations to organizational capabilities and perceptions, regulatory compliance and competitive dynamics. By comprehending these factors and addressing potential barriers proactively, organizations can harness the transformative potential of e-auctions to drive value, innovation and sustainable growth in their procurement operations.

## **2.7. Adoption of B2B e-auctions in different industries and countries**

The adoption of Business-to-Business (B2B) e-auctions varies across industries and countries, influenced by a combination of factors such as market dynamics, regulatory environment, technological infrastructure and cultural norms. While some industries and countries have embraced e-auctions as a strategic procurement tool, others may exhibit slower adoption rates due to challenges or barriers to entry.

Industries such as manufacturing and retail have been early adopters of B2B e-auctions due to their complex supply chain networks and emphasis on cost efficiency. It seems that manufacturers leverage e-auctions to source raw materials, components and machinery from global suppliers, driving down procurement costs and optimizing inventory management. Likewise, retailers use e-auctions to negotiate pricing and terms with suppliers, ensuring competitive pricing and product availability for consumers.

In addition, the healthcare industry, characterized by stringent regulatory requirements and complex procurement processes, has shown increasing interest in B2B e-auctions recently. Hospitals, clinics and healthcare providers utilize e-auctions to procure medical supplies, equipment and pharmaceuticals, enabling cost savings and streamlining supply chain operations. However, adoption may be slower in regions with regulatory hurdles or concerns regarding data security and patient privacy.

The construction and infrastructure sector is another industry where B2B e-auctions are gaining traction. Construction companies leverage e-auctions to procure materials, equipment and subcontractor services, facilitating project cost management and timeline adherence. Infrastructure developers utilize e-auctions for sourcing construction materials, machinery and engineering services, driving efficiency and competitiveness in project execution.



Apart from the above, even though services are often considered ineligible for auctions due to the difficulty for defining clear specifications in comparison with goods, they were the dominant category in 2020, 2021 and 2022 based on the Global eAuction Index (GEI), in terms of e-auction volumes globally, for events that were executed on the Scanmarket platform. Specifically, the leading services categories were cleaning and security. One explanation for this is that such services are a common need for the operation of almost all organizations globally, so the chances of running e-auction events for them are increased. Apart from that, specifications for these purchases can be defined clearly and the competition in the market is robust. Based on Scanmarket, the result of running reverse e-auctions for services is significant in terms of cost reduction or cost avoidance, as it was pointed out that a remarkable saving of 4,83% was achieved from all e-auctions run in their platform for services in 2022, in a year marked by rising prices.

In addition to the above, B2B e-auctions are also utilized in the financial services sector for procuring technology solutions, back-office services and outsourcing partnerships. Banks, insurance companies and financial institutions leverage e-auctions to source software, hardware and IT services, driving innovation and cost optimization. However, adoption may vary across countries depending on regulatory constraints and security concerns related to financial transactions.

Governments and public sector organizations worldwide are increasingly exploring B2B e-auctions too, as a means to improve procurement transparency, efficiency and cost-effectiveness. Public procurement agencies utilize e-auctions to procure goods, services and infrastructure projects, promoting competition among suppliers. Of course adoption may be influenced by bureaucratic hurdles, regulatory compliance and resistance to change within government agencies. Nevertheless, it is worth highlighting that European Union has included in the European Community (EC) directives the reverse electronic auctions as new competitive bidding procedure on public procurement since 2004.

Internationally, the adoption of B2B e-auctions varies, depending on factors such as technological infrastructure, economic development and cultural attitudes towards digital commerce. Developed economies with robust internet connectivity and advanced digital capabilities tend to exhibit higher adoption rates compared to emerging markets with limited technological infrastructure and regulatory constraints (Cabral, Ferreira & Dias, 2016). However, globalization and the proliferation of e-commerce platforms are driving increased adoption of B2B e-auctions across borders, enabling businesses to access global supply chains and capitalize on international sourcing opportunities.



Concerning geographical disparities in e-auction adoption, Henrik Balslev explained in 2023 in the webinar “Harnessing the Power of Procurement: How Integrating Automated Negotiations with eAuctions Can Drive Operational Optimization” that there is difference among the continents on how they use e-auctions. Specifically, he reported that in Europe and the United States e-auctions commonly run for high spends, while in China more e-auctions run but often with smaller spends. This is also proved by the data shared by Scanmarket in 2023 regarding volumes of procurement electronic auction events in 2022 by region, as shown in figure 2.

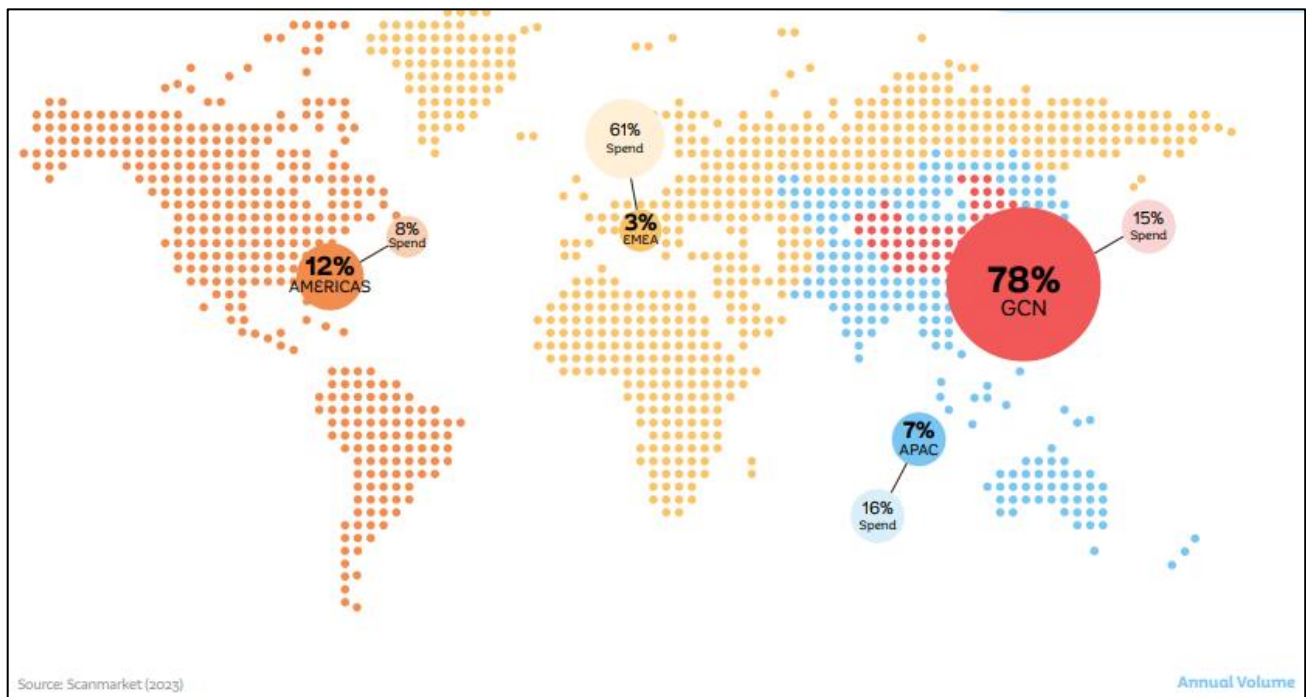


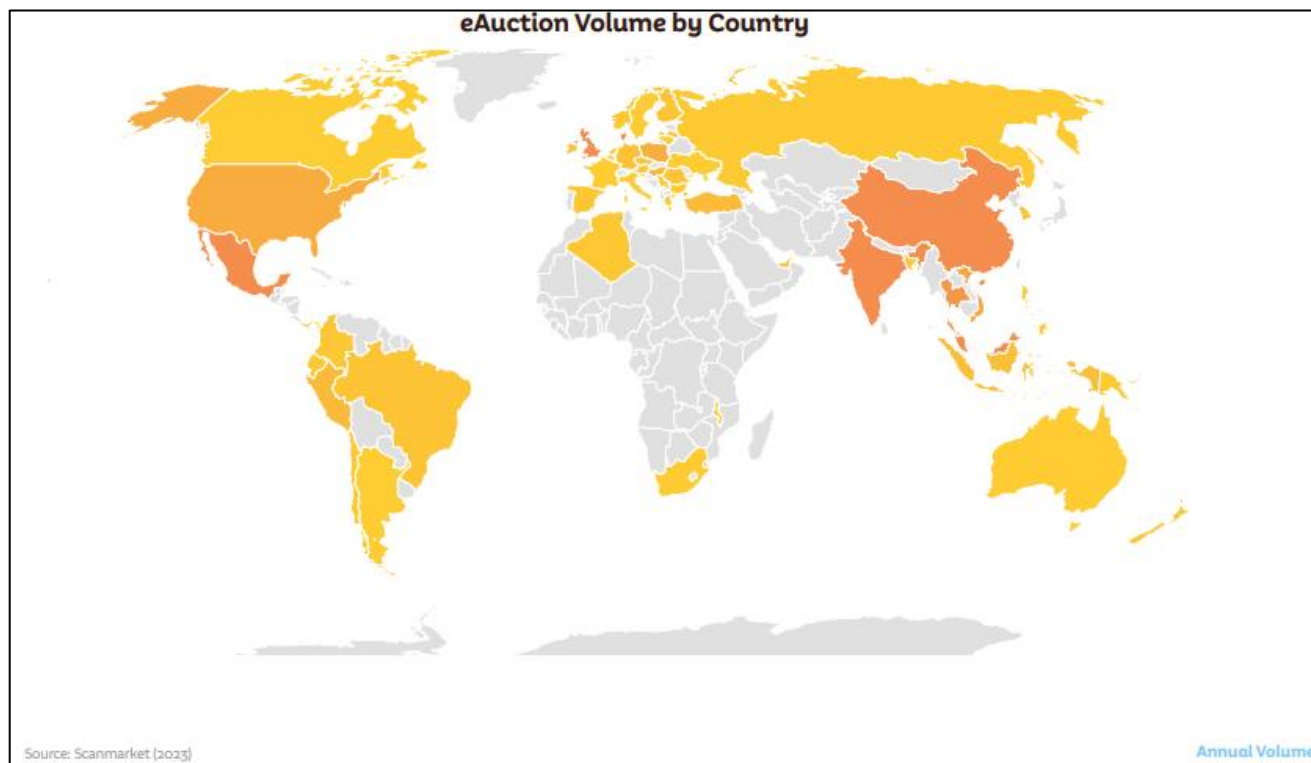
Fig. 2: B2B e-auction volume and spend globally 2022

Based on it, Greater China held the 1<sup>st</sup> position among regions with the vast majority of the global e-auctions volumes (78%), but only the 3<sup>rd</sup> position in e-auctioned spend (15%). On the other hand, EMEA region (Europe, the Middle East and Africa) had minimal share in number of events executed in 2022 (3%), albeit this region attributed the 61% of the overall spend. Last but not least, the Americas and APAC region (rest Asia-Pacific) accounted for 12% and 7% respectively of e-auctions run in 2022, with 24% of global e-auctioned spend together. It is worth stating that regardless of the region, procurement professionals achieved globally an average of 4.83% in savings in 2022 (compared with the initial price of that year) using Scanmarket eAuctions.





As for specific countries, in accordance with the same data, China represented a significant share of e-auction activity due to its large manufacturing and outsourcing activity in 2022. The UK, India and Mexico all posted strong volumes as well, while Malaysia was amongst top countries in 2021.



*Fig. 3: B2B e-auction volume by country 2022*

In summary, the adoption of B2B e-auctions is influenced by industry-specific requirements, regulatory considerations and technological maturity. While certain industries and countries have embraced e-auctions as a strategic procurement tool, others are still in the early stages of adoption, presenting opportunities for further growth and innovation in the evolving landscape of B2B commerce.

## **2.8. Adoption of B2B e-auctions in the Greek private sector: current status and trends**

The adoption of Business-to-Business (B2B) e-auctions in the Greek private sector has been gaining momentum, driven by the increasing recognition of the benefits they offer in procurement processes. However, the current status and trends in B2B e-auction adoption in Greece exhibit a mixed picture,





influenced by factors such as economic conditions, technological readiness and organizational culture.

In recent years, there has been a growing awareness amongst Greek businesses about the potential advantages of B2B e-auctions in optimizing procurement processes and driving cost efficiencies. Large enterprises, particularly those operating in sectors such as manufacturing, retail, construction and telecommunications, with multinational operations or exposure to international markets have been at the forefront of adopting e-auction platforms to source raw materials, components and services from suppliers. In addition, Greek companies involved in supply chain partnerships with multinational corporations seem to embrace reverse e-auctions to align with the procurement practices of their partners. This can be seen in sectors such as automotive manufacturing and pharmaceuticals. These companies recognize the competitive advantages of e-auctions in negotiating favorable terms, streamlining supplier selection and achieving cost savings (Cabral, Ferreira & Dias, 2016).

However, the adoption of B2B e-auctions among small and medium-sized enterprises (SMEs) in Greece remains relatively low. SMEs often face challenges related to limited resources, technological capabilities and resistance to change, which may hinder their uptake of e-auction platforms. Additionally, cultural factors and traditional business practices prevalent in the Greek private sector may contribute to slower adoption rates among certain segments of businesses. Lastly, like in other countries, also in Greece there are concerns among buyers regarding the quality of goods and services obtained through e-auctions due to the focus on low prices, leading to hesitancy in adoption.

Despite the challenges, several trends indicate the growing importance of B2B e-auctions in the Greek private sector:

- **Increased Digitalization Efforts:** The Greek private sector is undergoing a gradual shift towards digitalization, driven by technological advancements and changing consumer expectations. Businesses are recognizing more the need to embrace digital tools and platforms to remain competitive in an increasingly interconnected global economy. This trend is expected to accelerate the adoption of B2B e-auctions as organizations seek to modernize their procurement practices and capitalize on digital opportunities.
- **Emphasis on Cost Optimization:** Economic uncertainties and market volatility have heightened the focus on cost optimization and operational efficiency among Greek



businesses. As described in the above chapters, B2B e-auctions offer a strategic approach to achieving cost savings through competitive bidding processes, dynamic pricing mechanisms and supplier rationalization. As companies strive to navigate challenging economic conditions, the adoption of e-auction platforms is likely to gain momentum as a means of driving bottom-line results.

- **Integration with Supply Chain Management:** B2B e-auctions are increasingly being integrated into broader supply chain management strategies in the Greek private sector. Businesses are recognizing the value of e-auctions in optimizing inventory management, reducing lead times and enhancing supply chain visibility. As organizations seek to build more agile and resilient supply chains, the adoption of e-auction platforms is expected to become more prevalent as a strategic tool for supply chain optimization.
- **Focus on Sustainability and Ethical Sourcing:** There is a growing emphasis on sustainability and ethical sourcing practices in the Greek private sector, driven by consumer demand, regulatory requirements and corporate social responsibility initiatives. B2B e-auctions can play a role in promoting sustainability by facilitating transparent supplier selection processes, encouraging environmentally friendly practices and ensuring compliance with ethical standards. As sustainability considerations gain prominence, the adoption of e-auction platforms that support responsible sourcing is likely to increase among Greek businesses.
- **Consulting and Technology Firms:** Consulting and technology firms in Greece provide 360° solutions and support for e-auction implementation. They offer services such as training, software customization and ongoing technical support to facilitate the adoption of e-auctions by private-sector procurement professionals.
- **Government Initiatives and Regulations:** Government initiatives promoting digitalization and e-procurement in Greece can indirectly influence the adoption of e-auctions in the private sector. For instance, policies aimed at enhancing transparency and efficiency in public procurement may encourage private companies to adopt similar practices. On the other hand, regulations may also limit the usage of some e-auction types for ethical reasons concerning very high price reduction.

In fact, e-auctions have seen significant adoption within the public sector, driven by government initiatives to promote transparency as well as efficiency in procurement processes the last years. However, their integration into the private sector has been more gradual, reflecting broader challenges related to digital transformation and cultural readiness.



Nonetheless, there are examples of companies in Greece leveraging e-auctions to optimize their procurement practices, particularly in industries with international exposure or high levels of competition. These companies recognize the potential of e-auctions to drive cost savings, enhance efficiency and foster strategic supplier relationships. Some striking examples of companies are OPAP SA, Elin Oil and Nestlé Hellas SA.

OPAP uses e-auctions since 2016 for the purchase of betting slips and thermal paper rolls. Based on data of Be24.gr, the e-auction platform provider of OPAP, a 30% reduction in the price of their supplies has been achieved compared to the starting price set per tender in 2016. In 2018, they managed to have savings of almost 440.000€ by purchasing these materials through e-auctions. According to the same e-auctions platforms company, Elin Oil has renovated its oil and gas stations and company's sites all over Greece since 2014 by purchasing relevant materials, equipment and services through e-auctions too. More than 130 electronic tenders have taken place for this project and the total saving has exceeded 12%.

Based on an interview done with the strategic buyers of Nestlé Hellas SA, first e-auctions ran in 2022 on a trial basis, but they converted to a basic procurement negotiation tool for the company soon. B2B e-auctions are used mainly for time-saving, the instant market's feedback that is taken and the savings that are generated. 10 e-auction events have already been executed for both services and tangible goods and 7 more have been scheduled to run within 2024. Their results are considered significant by the company. To be more specific, there have been events for factory equipment which brought savings of 11%, 5,5% and 14% respectively in just 20 minutes for each one, while in events for administrative services, cost was reduced by 26% and 22% respectively in each one in just 15 minutes. It is undeniable that in all e-auctions, competition between potential suppliers is high until the event is over and these results are reached. In figure 4, the evolution of an English reverse e-auction run by Nestlé is presented through a chart.

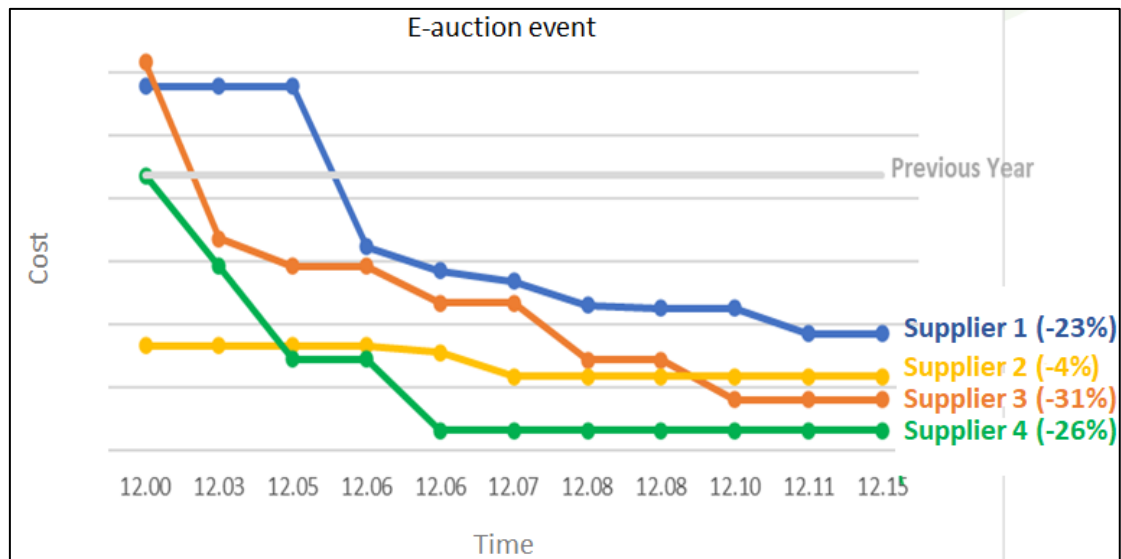


Fig. 4: English B2B e-auction by Nestlé Hellas

The initial price of each supplier in the e-auction is the price offered by each of them in the 1<sup>st</sup> round of the competitive bidding. As it is clearly presented by the chart, potential suppliers compete with each other by lowering their prices, within the limit that each of them has set. Supplier 1, 3 and 4 seem to have given quite high price with high profit margin for them in the 1<sup>st</sup> round of the competitive bidding, allowing them to achieve a remarkable decrease during the e-auction. On the other hand, supplier 2 offered the lowest price in the 1<sup>st</sup> round, leading to low reduction in the e-auction. As described by the buyers, even though savings are one of the top priorities for them, suppliers with huge price reduction during the e-auction may be considered as untrustworthy. The reason for this is that through the e-auction it is realized by the auctioneer that the potential supplier had overpriced their good or service during the 1<sup>st</sup> round of competitive bidding.

In conclusion, while companies in Greek private sector consider seriously the relevant challenges and the adoption of B2B e-auctions is still evolving, there are clear indications of growing interest and uptake among businesses, particularly larger enterprises with international exposure. As organizations continue to prioritize cost optimization, digital transformation and supply chain resilience and with the right technological support, education and regulatory environment, the adoption of e-auction platforms is expected to become more widespread, driving efficiency, competitiveness and sustainability in Greek procurement practices. Integrating e-auctions into procurement strategies will be essential for Greek businesses to remain competitive and resilient in an increasingly digital economy. This will require concerted efforts to overcome adoption barriers,



educate stakeholders and leverage the full potential of e-auction platforms to drive value and innovation in procurement processes.

## **2.9. Development of a conceptual framework for successful B2B e-auctions adoption in the Greek private sector**

Following the theoretical models relevant to B2B e-auctions as discussed in section 2.5 and considering Greek environment, the necessity of a conceptual framework development that captures the main characteristics of reverse electronic auctions in Greece arises. In other words, factors facilitating the decision of companies in the Greek private sector whether to adopt B2B e-auctions or not are discussed below. Furthermore, the framework may work as a checklist, assisting organizations to implement successfully this negotiation tool.

### Technological readiness:

Technological readiness encompasses the readiness of organizations to adopt and integrate e-auction platforms into their existing procurement processes. This involves assessing the adequacy of existing IT infrastructure, including hardware, software and network capabilities to support e-auction implementation. Additionally, organizations need to evaluate the digital literacy and technical skills of purchasing experts to ensure they can effectively utilize new e-auction platforms. Lastly, compatibility with existing systems such as the company's ERP is crucial for seamless integration and data interoperability if needed. Of course it is essential for procurement teams to evaluate several e-auctions platforms before deciding which one to adopt, in order to find the most user-friendly and suitable one for their case.

### Evaluation of benefits:

The benefits expected to be reaped from B2B e-auctions are critical drivers of adoption decisions amongst Greek businesses. Procurement professionals should assess the potential benefits of B2B e-auctions on value creation through cost savings, process efficiency and strategic sourcing opportunities. Especially years after the Greek financial crisis and the economic challenges that the Covid era and the recent wars have caused, there are definitely competitive pressures within the companies. Therefore, it is more than necessary for them to optimize procurement costs and reverse e-auctions seem to work as a driver for this. Organizations may also consider more intangible



benefits of e-auctions such as enhanced decision-making capability and agility in responding to market changes.

#### Organizational culture and leadership:

Organizational culture and leadership play a pivotal role in shaping attitude towards change and innovation in Greek businesses. Strong leadership support, vision and commitment to digital transformation are important for driving initiative concerning e-auctions adoption. Leaders must widespread the strategic perspective of e-auctions, align organizational goals with adoption efforts and allocate resources effectively to support the e-auctions implementation. Besides, fostering a general culture of innovation and continuous improvement is critical in order to overcome resistance to change and be able to have a supportive environment for e-auction adoption within the company.

#### External factors:

External pressures and institutional factors can influence B2B e-auctions adoption. Regulatory frameworks like public procurement regulations from the Greek government as well as relevant directives of European Union may present e-auctions as best practice for compliance and transparency. Thus, it is highly advisable for companies to follow all new legislations in order to be securely informed on the topic. Industry associations and market competitors also play a role in shaping organization's decisions to adopt e-auction platforms to remain competitive and within industry standards. Besides, it is also the global business trends that may create a momentum towards e-auctions even in Greece.

#### Supplier relationships:

Relationships between the buyer company and their suppliers are crucial considerations in B2B e-auction adoption. Organizations must ensure that e-auction process promotes transparency, fairness and trust among suppliers to encourage participation and foster long-term partnerships. Clear communication, mutual understanding of expectations, fair treatment of suppliers and consistency in supplier selection criteria are critical for maintaining positive supplier relationships throughout the e-auction process. Buyer companies should always consider suppliers' perspectives, preferences and capabilities when designing e-auction strategies to ensure alignment with mutual interests and objectives.

#### Learning and Adaptation



These are fundamental aspects of e-auction adoption processes in the Greek private sector. Organizations need to establish mechanisms for continuous learning, knowledge sharing and feedback collection to facilitate improvements in e-auctions practices. Undoubtedly, companies should be open to feedback from the platform users, suppliers and stakeholders to identify areas for improvement and refine e-auction processes over time. By fostering a culture of learning and adaptation, capabilities can be enhanced, implementation challenges can be overcome and sustainable e-auction outcomes can be driven.

#### Monitoring of performance and outcomes:

When implementing new tools and processes, it is necessary to evaluate the outcomes through relevant Key Performance Indicators. In the context of e-auction adoption, Greek companies should define the criteria based on which e-auctions would be considered as successful for them and create the relevant KPIs. In this way, insights into the effectiveness and return on investment of adoption efforts can be provided. Moreover, assessing the progress towards strategic objectives can make the companies identify areas for improvement for the next e-auction events. Performance metrics also serve as benchmarks within the industry and demonstrate the value of e-auction adoption to internal and external stakeholders, driving the momentum of e-auctions in both the company and industry.

In the light of this evidence, this conceptual framework provides a comprehensive understanding of the key elements influencing B2B e-auction adoption in the Greek private sector, emphasizing the interconnections of technological, organizational, relational and regulatory factors shaping decisions and outcomes. By considering these components holistically as a checklist, procurement teams can plan their strategy in a way that ensures a successful adoption of B2B e-auctions, improve their performance and gain competitive advantage in the Greek business landscape.



### 3. Quantitative Research

Since there are insufficient statistical data for the adoption of B2B e-auctions in Greece as a negotiation tool of private sector companies with their suppliers for the purchase of materials/services, a quantitative survey was decided to be done in order to measure the adoption in 2024. The steps of the research process that were followed are the below:

1. Target & hypotheses formulation
2. Research type selection
3. Decision on target population, sampling frame and sample selection
4. Questionnaire design, pilot study and redesign
5. Filling out the questionnaire
6. Data entry in SPSS and recheck
7. Statistical analysis and description of results

Each one of the steps is analysed further below.

#### 3.1 Target & hypotheses formulation

The use of e-auctions as a method of competitive bidding and negotiation between private companies and their potential suppliers has increased in recent years in Greece, as seen in the literature and as perceived by the business world. However, there is still area for further adoption in our country, thus in the survey, non-adopters are expected to be more than the adopters. In addition, the decision of a company to start running e-auctions or not probably depends on some characteristics of the company. These company details may be the company size, the industry in which it operates, the region in which it is based, the experience level of the company's buyers and if it is multinational or not. More specifically, it is assumed that:

- Bigger companies in terms of turnover and number of employees may tend more to adopt e-auctions than smaller ones.
- Companies with more experienced buyers may tend more to adopt e-auctions than the ones with less experienced buyers.
- Multinational companies may have adopted e-auctions more than the local ones.





- Companies from bigger regions like Attica and Macedonia may have adopted e-auctions more than companies in areas of the province.
- Companies operating in industries that are related to technology may have adopted e-auctions more than companies operating in other industries.

For the companies that have adopted e-auctions, it is expected that they started using them the recent years, but they have already reaped their benefits, as e-auctions offer immediate advantages when running them. Moreover, it is guessed that e-auctions are used for purchasing tangible goods and services too. Last but not least, level of agreement of e-auctions adopters with specific traditional perceptions about the practice is going to be measured and it is expected to be low.

As for the non-adopters of e-auctions, it is expected that they have not started using the practice because they do not even know what e-auctions are, or if they do, they face difficulties with the technology and the platform needed to be used, or they have internal challenges that do not let them adopt the new practice, or they purchase specific spend categories that are not considered suitable for e-auctions, or the Greek legislative framework is considered an obstacle. Additionally, specific perceptions about e-auctions may have been a barrier to companies' adoption.

In general, the primary objective of the research is to identify the percentage of companies with the main legal forms in Greece having adopted B2B electronic auctions as a negotiation tool with their suppliers for the purchase of materials or services. Apart from this, it is crucial to find also the correlations between company details and the decision to adopt e-auctions. Additionally, it is aimed at discovering the main benefits of e-auctions as perceived by the adopters and the main barriers for the non-adopters.

### **3.2. Research type selection**

It is decided the research to be quantitative, focusing on the collection of measurable data concerning B2B electronic auctions and the application of statistical techniques for their analysis. In order to gather the quantitative data, a structured method should be used. Hence, the research instrument in this case is a questionnaire that should be designed and filled out by companies of the relevant sample, before performing data analysis. It is important to mention that each respondent of the questionnaire will represent his/her company and not himself/herself as a person. The questionnaire will be created and sent electronically, so the survey will be online. Since the research is related to



the professional field of the respondents, it is more than needed to ensure their convenience, so as to participate when they have time and at their own pace. This is the main reason why web-based survey was chosen. In addition, conducting the questionnaire through the internet is low cost and time saving. Last but not least, with the online questionnaire, there is absence of the researcher influence to respondents, gathering more honest feedback. On the other hand, without the interviewer being directly involved in the process of questionnaire filling, it is not possible for respondents to get direct clarifications when needed, so probably data received are less reliable. In order to handle this difficulty, clear instructions about the questionnaire and its topic are given to respondents before their participation to the survey, in conjunction with the full contact details of the researcher, so they are able to contact me whenever needed.

### **3.3. Decision on target population, sampling frame and sample selection**

Population, denoted by  $N$ , is defined as the entire group of elements for which conclusions are to be drawn. First of all, it should be highlighted that in this research population does not refer to people as usually but to companies. Based on this, population in this case is all active companies in Greece. According to data retrieved from the General Trade Registry (ΓΕΜΗ) of the Central Association of Chambers of Greece (Κεντρική Ένωση Επιμελητηρίων Ελλάδος) on 31/03/2024, the total population of active companies in Greece is 946.905. In table 1, the analysis of companies per legal form is presented.



TOTAL ACTIVE BUSINESSES GREECE - 31/03/2024			
General Trade Registry (ΓΕΜΗ) of the Central Association of Chambers of Greece (Κεντρική Ένωση Επιμελητηρίων Ελλάδος)			
<a href="https://statistics.businessportal.gr/demography/active">https://statistics.businessportal.gr/demography/active</a>			
Legal form - Greek	Legal form - English	Number	Percentage
Ατομική	Sole proprietorship - Sole trader	635.456	67,11%
Ιδιωτική Κεφαλαιουχική Εταιρεία (ΙΚΕ)	Private Capital Company	88.365	9,33%
Ομόρρυθμη Εταιρεία (ΟΕ)	General Partnership	86.108	9,09%
Ετερόρρυθμη Εταιρεία (ΕΕ)	Limited Partnership	57.376	6,06%
Ανώνυμη Εταιρεία (ΑΕ)	Société Anonyme - S.A.	44.226	4,67%
Εταιρεία Περιορισμένης Ευθύνης (ΕΠΕ)	Limited Liability Company - LLC	23.540	2,49%
Αστική Εταιρεία 784 Α.Κ.	Civil Law Partnership	4.261	0,45%
Κοιν.Σ.Επ.	Social Cooperative Enterprise	1.669	0,18%
Κοινοπραξία	Joint Venture	1.595	0,17%
Ενεργειακή κοινότητα	Energy Community	1.527	0,16%
Λοιπών υπόχρεων	Other obligees	1.019	0,11%
ΣυνΠΕ	Limited Liability Cooperative	696	0,07%
Κοινωνία	Society	682	0,07%
Συνεταιρισμός	Partnership	281	0,03%
ΚΟΙ.Σ.Π.Ε.	Limited Liability Social Cooperative	40	0,00%
Ένωση Προσώπων	Association of persons	33	0,00%
Συνεταιρισμός Εργαζομένων	Association of employees	13	0,00%
Ευρωπαϊκός όμιλος οικονομικού σκοπού	European Economic Interest Grouping (EEIG)	9	0,00%
Ευρωπαϊκή Συνεταιριστική Εταιρεία (SCE)	European Cooperative Society (SCE)	5	0,00%
Ευρωπαϊκή εταιρεία (SE)	European Company (SE)	3	0,00%
ΕΕ κατά μετοχές	EU by shares	1	0,00%
TOTAL		946.905	100%

Table 1: Active companies per corporate form | Greece | 31/03/2024

The study population is a subset of the population from which the sample is actually selected. As shown in the above table, the first 6 types of companies (Sole trader, Private Capital Company, General Partnership, Limited Partnership, Société Anonyme - S.A. and Limited Liability Company – LLC) constitute 98,75% of the active businesses in Greece. Hence, the rest corporate forms as provided by the General Trade Registry (Civil Law Partnership, Social Cooperative Enterprise, Joint Venture, Energy Community, Other Obligees, Limited Liability Cooperative, Society, Partnership, Limited Liability Social Cooperative, Association of persons, Association of employees, European Economic Interest Grouping, European Cooperative Society, European Company and EU by shares) are going to be excluded from the study population due to their very limited number. In addition, it is decided sole traders to be excluded as well, despite their large number in Greece. The rationale behind this is that they are handled only by one natural person, so they are always very small companies and as occurred from the bibliography, such type of companies does not use electronic auctions. As a result, due to their very large number compared to the rest corporate forms, they would destroy the analysis and the results if they were included in the study population and the sample. Therefore, the study population consists of all active Private Capital Companies, General Partnerships, Limited Partnerships, Société Anonyme and Limited Liability Companies all around



Greece, which are 299.571, based on data retrieved from the General Trade Registry of the Central Association of Chambers of Greece on 31/03/2024.

After study population, the sampling frame should be decided. Sampling frame is defined as the list of survey population, in which all possible sampling units are included. In this research, the sampling frame is the list of companies that is provided online by General Trade Registry (ΓΕΜΗ) at <https://publicity.businessportal.gr/>. In this website, it is possible to filter data in order to appear only the list of active Private Capital Companies, General Partnerships, Limited Partnerships, Société Anonyme and Limited Liability Companies in each region of Greece.

After having selected the sampling frame, it is time to define the sample of the survey. The primary use of sampling in quantitative research is to create a representative sample by selecting specific sample elements from the sampling frame, which replicate behaviours or represent characteristics of interest in a larger group of cases, meaning the study population. The way these elements are selected is the sampling strategy, which mainly falls into two categories: random or probability sampling, where each sample has equal chance of being selected, and non-random or non-probability sampling, where convenience, judgment and researcher's experience are main factors of sample elements selection. In order to have unbiased sampling in this research, random sampling is selected as a strategy, like in the majority of quantitative researches. As this research concerns the entire country, adequate representation of companies from all regions should be ensured. Hence, the method of random sampling that is decided to be followed is the proportional stratified one. In stratified sampling, population is divided into strata, from each of which samples are selected with simple random sampling. Simple random sampling is succeeded in this case by selecting the companies appeared in the report of General Trade Registry each time that is run, given the fact that the results appear always in random order. With the stratified sampling being proportional, number of units chosen from each stratum-region is proportional to the population size of each stratum-region. Based on the analysis that is provided by the Central Association of Chambers of Greece, numbers of companies per region and per corporate form are presented in table 2. Additionally, percentages of companies per region compared to the total number of companies in Greece are calculated in the last column.



Number of companies in Greece based on data of the General Trade Registry on 31/03/2024							
	Private Capital Companies (IKE)	General Partnership (OE)	Limited Partnership (EE)	Société Anonyme - S.A. (AE)	Limited Liability Company - LLC (ΕΠΕ)	Total	Percentage of companies per region compared to the total number of companies in Greece
Attica	45.204	27.277	28.416	23.339	14.568	138.804	46%
Macedonia & Thrace	16.482	18.967	9.364	7.229	3.188	55.230	18%
Crete	4.844	7.582	2.868	3.350	1.038	19.682	7%
Western Greece	3.649	5.055	2.311	1.351	778	13.144	4%
Aegean islands	4.624	7.507	4.542	2.602	923	20.198	7%
Thessaly	3.729	4.955	2.371	1.577	708	13.340	4%
Peloponnese	2.716	4.536	2.974	1.244	660	12.130	4%
Central Greece	2.855	3.861	1.650	1.320	788	10.474	3%
Ionian islands	2.476	3.385	1.412	1.396	617	9.286	3%
Epirus	1.742	2.983	1.468	818	272	7.283	2%
<b>Total</b>	<b>88.321</b>	<b>86.108</b>	<b>57.376</b>	<b>44.226</b>	<b>23.540</b>	<b>299.571</b>	<b>100,00%</b>

Table 2: Study population per region and corporate form | Greece | 31/03/2024

Last but not least, sampling is decided to be without repositioning, meaning that each element of the population can be selected only once.

As for the sample size, 3 factors are important to be considered.

1. Desired level of precision or sampling error
2. Confidence level
3. Degree of variability.

The strategy chosen for determining sample size is relying on published tables, which provide the sample size for given combinations of precision, confidence level and variability. Based on table 3, for a chosen confidence level of 95% and maximum variability degree that may be reached ( $p=0,5$ ), for size of population above 100.000 which is the case in this research, sample size should be:

- 1.111 companies for precision  $\pm 3\%$ ,
- 400 companies for precision  $\pm 5\%$ ,
- 204 companies for precision  $\pm 7\%$ , and
- 100 companies for precision  $\pm 10\%$ .

Size of Population	Sample Size (n) for Precision (e) of:			
	$\pm 3\%$	$\pm 5\%$	$\pm 7\%$	$\pm 10\%$
500	a	222	145	83
600	a	240	152	86
700	a	255	158	88
800	a	267	163	89
900	a	277	166	90
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

a = Assumption of normal population is poor (Yamane, 1967). The entire population should be sampled.

Table 3: Sample size per desired precision level



Given the fact that a precision level above  $\pm 10\%$  is not satisfactory, the minimum sample size should be *100 companies*. After this point, it can be marked that the more companies the better, as more precise results are achieved.

### 3.4. Questionnaire design, pilot study and redesign

The questionnaire is designed based on the targets of the research and the hypotheses that are formulated from the beginning. The questionnaire is built in Greek, as the research concerns companies in Greece, so clear understanding of the language from all potential participants has to be ensured.

First of all, there is an introduction with all the necessary information for the sample to know. This information includes:

- The main target of the research (“The following questionnaire aims at studying the use or non-use of electronic auctions in Greece, as a negotiation tool of private sector companies with their suppliers for the purchase of materials/services.”)
- A definition and a few information about business to business e-auctions, so there is a common understanding among all participants (“In order to have a common understanding by all participants, I would like to highlight the following: *A business-to-business electronic auction, or reverse electronic auction, is a commercial process that takes place over the internet between a buyer and multiple potential sellers. The buyer sets the specifications of the material or service needed to be purchased, while potential sellers compete with each other on a specific online platform, submitting their bids in real time.* For simplification reasons, the above process will be mentioned in the questionnaire as **E-auction**.”)
- Clarifications about answers and anonymity (“It is important to answer all questions with honesty, representing the company you are working at. The questionnaire is anonymous and the data will only be used for research purposes in the context of the thesis for the Masters in Technology & Innovation Management of the Technical University of Crete.”)
- Average duration of survey completion (“Thank you in advance for your time to complete the questionnaire, which will take between 5 and 15 minutes.”)

After the introduction, the questions start. The content of questions is defined based on the bibliographic review, previous researches, a focus group with procurement employees of Nestle Hellas and lots of brainstorming and investigative efforts. Questions are put in such way so the





respondent confusion is avoided, keeping in mind interviewee's perspective. In particular, the first question is the basic one about e-auction adoption or not. Based on the answer on this first question, respondents are separated to companies having adopted e-auctions and to those that have not. Each of these two groups has then a different set of questions. The first set concerns e-auction adoption and appears only to companies having stated that they have run even one e-auction, while the second set of questions concerns non adoption of e-auctions and appears only to companies having stated that they have never run any event. Questions in each set are put in an order according to their relevance, so the questionnaire is clear and easy for the respondents. In the end, there are questions about key company demographics, meaning the company details.

Response options of all questions are carefully selected, so as not to be overlapping, incomplete or unclear, but comprehensible, mutually exclusive and balanced between positive and negative options. Almost all questions are closed-ended, while only one is open-ended. The scales mostly used in this quantitative research questionnaire are ordinal, while the types of scales used in total are various:

- Dichotomous scales
- Simple choice scales
- Multiple choice scales
- Likert scales
- Likert-type scales
- Significant differentiation

Last but not least, there is the response option "I do not know / I do not answer" in specific questions in which it is deemed necessary, due to the sensitivity of the question (e.g. company's turnover) or because there may be unawareness of the respondents on a topic, so it is preferred not to prompt them to answer.

After the initial design of the questionnaire, a testing was performed to 5 procurement professionals of a multinational company with face to face interviews. The reason for this is to discuss and identify ambiguities and incomprehensible terms that would make it difficult for respondents to answer. This helps minimize response errors. In fact, the pilot application of the questionnaire is critical for the research, since this is the only way to test it in real environment conditions. Based on the feedback from the pilot study, questions were adapted and the final questionnaire was then created online, using Google Forms, indicating all relevant questions as mandatory to be answered, in order to avoid



non-response errors in specific parts of the survey. The online questionnaire can be found in the link <https://forms.gle/2JDywdLZEXejfrKZ6> , while the Word version can be found in the appendix. Right after the questionnaire creation, all questions were also created as variables and entered in the variable view in SPSS.

### **3.5. Filling out the questionnaire**

After final design of the questionnaire, it is time to send it to the sample companies. Since the survey concerns a procurement practice, the questionnaire should be filled by procurement employees or, if there is no dedicated procurement department in the company, by people acting as buyers for the company. In this way, errors due to ignorance are minimized.

Since the online report of General Trade Registry (ΓΕΜΗ) does not have the functionality of data extraction, the technique that was followed is the below:

- 1) Run the report for specific region each time
- 2) Enter in each company's details
- 3) Find contact details of each company. For companies not having contact details there, procurement person of the company was found in LinkedIn.
- 4) Send email to companies (or message in LinkedIn in cases for which procurement contact was found there), including information about:
  - the research (topic, master thesis survey, researcher),
  - the way their contact was found,
  - link of the questionnaire,
  - who from the company should fill in the questionnaire (buyer),
  - deadline for filling in the questionnaire,
  - duration of questionnaire completion,
  - use of data collected (strictly only for academic purposes),
  - anonymity,
  - full contact details of the researcher so as to be contacted for queries.

The survey ran from 19/06/2024 until 06/07/2024 and the email was sent to more than 1400 companies. The questionnaire was finally completed by 121 companies (sample size=n=121), so the





response rate was about 8,6%, which could be characterized as a decent rate. The feedback taken from several companies was that they participated in the survey because they found the initial email sent to them as well as the introduction of the questionnaire quite explanatory, comprehensive and trustworthy. Given the sample size (121 companies) and the allocation of study population per region, the target number of companies per region that should have participated in the research is calculated and is presented in the table 4, in conjunction with the number of companies per region that participated finally in the research.

	<b>Sample of the research</b>	
	<b>Target number of companies per region to participate in the research if n=121</b>	<b>Number of companies per region participated in the research</b>
<b>Attica</b>	56	58
<b>Macedonia &amp; Thrace</b>	22	22
<b>Crete</b>	8	6
<b>Western Greece</b>	5	5
<b>Aegean islands</b>	8	5
<b>Thessaly</b>	5	4
<b>Peloponnese</b>	5	6
<b>Central Greece</b>	4	9
<b>Ionian islands</b>	4	2
<b>Epirus</b>	3	4
<b>Total</b>	<b>121</b>	<b>121</b>

*Table 4: Participants per region – Target vs Real*

As shown in table 4, the number of companies from each region having participated finally in the research is almost proportional – with slight differences – to the number of companies existing in each region.

### **3.6. Data entry in SPSS and recheck**

After the completion of the questionnaire from the sample, responses were downloaded from Google forms and checked for any consistency errors in the responses in order for data to be cleared. No inconsistent responses were found, probably due to the completion of the questionnaire by professionals who were careful with their responses. Afterwards, responses were entered in the Data View in SPSS with the relevant codification as created in each variable. SPSS file is provided in the



appendix. Non-responses in questions that concerned specific groups of companies (either only e-auction adopters or only non-adopters) were left blank in SPSS to be considered as missing values. In this step, it is deemed necessary to recheck multiple times the data entered in SPSS, in order to avoid administration errors in this phase related to variable coding or response coding during typing of responses. In this case, a couple of such post-survey errors were caught during the recheck and corrected before proceeding to any data analysis.

### 3.7. Statistical analysis and description of results

Analysis of data collected and description of the results is the final part of the survey in order to transform raw data to useful information. SPSS was the tool used for this process of statistical methods application. The use of statistical methods depends mainly on the nature and the type of each variable to be measured. The types of statistical analyses that were applied are univariate and bivariate ones. SPSS output file with all analyses can be found in the appendix, while description of results can be found below.

From the 121 companies having participated in the research, 33 of them have run even 1 reverse e-auction for purchasing goods or services, while 88 of them have never run any (table 6). Relevant percentages are shown in figure 5. This question was a mandatory one in the questionnaire for all respondents, so no missing values exist (table 5).

Statistics		
Even 1 e-auction run		
N	Valid	121
	Missing	0

Table 5: Adoption question | Valid answers

Even 1 e-auction run					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	27,3	27,3	27,3
	No	88	72,7	72,7	100,0
Total		121	100,0	100,0	

Table 6: Adoption question | Frequencies & Percentages

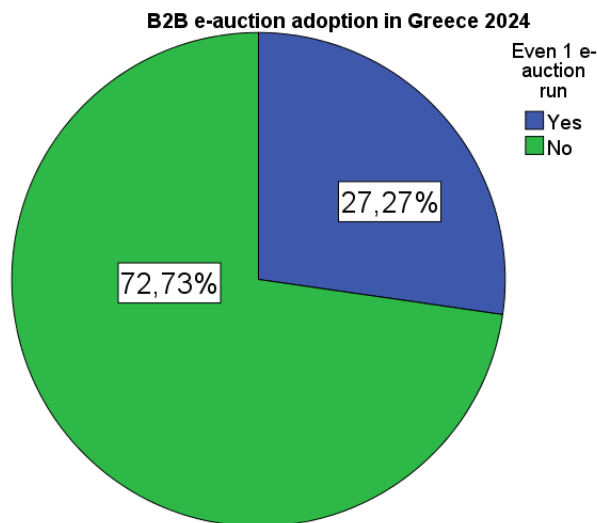


Fig. 5: B2B e-auction adoption Greece 2024

$$d = z_{1-\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

Given the type for level of precision and the following data:

- $n=121$
- Answer yes=33
- Answer no=88
- Degree of variability ( $p$ ) = 0,273
- $1-p = 0,727$
- Estimating the percentage of companies having adopted reverse e-auctions for their purchases at a 95% confidence level ( $\alpha=0,05$ ),

it can be calculated that level of precision ( $d$ ) is 0,079. Therefore, the estimated percentage of active Private Capital Companies, General Partnerships, Limited Partnerships, Société Anonyme and Limited Liability Companies in Greece having adopted reverse e-auctions is  $27,3\% \pm 7,9\%$ . By finding that 27,3% of companies in the sample have adopted reverse e-auctions with precision level  $\pm 7,9\%$ , it can be concluded that between 19,4% and 35,2% of companies with the specific corporate forms in the population of these companies in Greece have adopted reverse e-auctions.



### Participants' company data

Before analyzing further participant's answers about e-auctions, it is worth checking participants' company profile. The variables describing companies' profile in the questionnaire were 6. Specifically:

- If the company is multinational or not.
- Company's industry.
- Company's size in terms of number of employees.
- Company's size in terms of annual turnover (average annual turnover of the last 3 years).
- Company's buyers' average number of years as experience in purchasing / procurement.
- Company's region in Greece.

Statistics							
		Comp_Multi national	Comp_Industry	Comp_Number of employees	Comp_Average annual turnover of the last 3 years	Comp_Buyers' average number of years as experience in purch/proc	Comp_Re gion in Greece
N	Valid	121	121	121	108	121	121
	Missing	0	0	0	13	0	0

Table 7: Demographic data | Valid answers

All 6 questions were mandatory in the questionnaire for all respondents. However, there are 13 missing values in the variable about company's turnover (table 7). Due to the sensitivity of the question, there was one more option-answer "I do not know / I do not answer". As this variable is ordinal, I chose to treat the "I do not know / I do not answer" answers as missing ones, so as to be able to keep the variable ordinal and not be forced to make it nominal just because of this answer.

From frequencies analysis, it seems that the majority of companies – almost 82% – participating in the research were purely Greek and not multinational ones (figure 6).

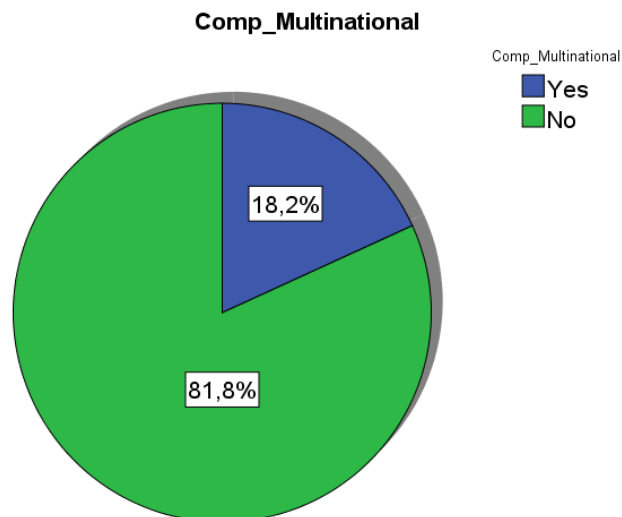


Fig. 6: Demographic data - Multinationality

The participants being part of a multinational company are mainly big enterprises in terms of employees and turnover, as shown in tables 8 and 9.

**Comp\_Multinational \* Comp\_Number of employees Crosstabulation**

Count

		Comp_Number of employees				Total
		1 – 10 employees	11 – 50 employees	51 – 250 employees	>251 employees	
Comp_Multinational	Yes	0	1	9	12	22
	No	51	21	12	15	99
Total		51	22	21	27	121

Table 8: Demographic data / Crosstab Multinationality & Size

**Comp\_Multinational \* Comp\_Average annual turnover of the last 3 years Crosstabulation**

Count

		Comp_Average annual turnover of the last 3 years							Total
		Below 100.000€	100.001€ - 500.000€	500.001€ - 1.000.000€	1.000.001€ - 5.000.000€	5.000.001€ - 10.000.000€	10.000.001€ - 50.000.000€	Above 50.000.000€	
Comp_Multinatio	Yes	0	0	0	2	3	2	8	15
nal	No	18	23	7	17	4	14	10	93
Total		18	23	7	19	7	16	18	108

Table 9: Demographic data / Crosstab Multinationality & Turnover



Apart from the variable of multinationality, all the rest show that the sample is quite diverse, as there is representation from many different industries, sizes and regions and companies with various buyers' experience, as depicted in the below graphs. Concerning industries, it is obvious from figure 7 that the answers are shared among almost all available options, with the most frequent ones being engineering – architecture – building & construction, food & beverage industry, other, IT & technology, tourism & entertainment and banking – business administration – finance – accounting – legal – consulting & insurance.

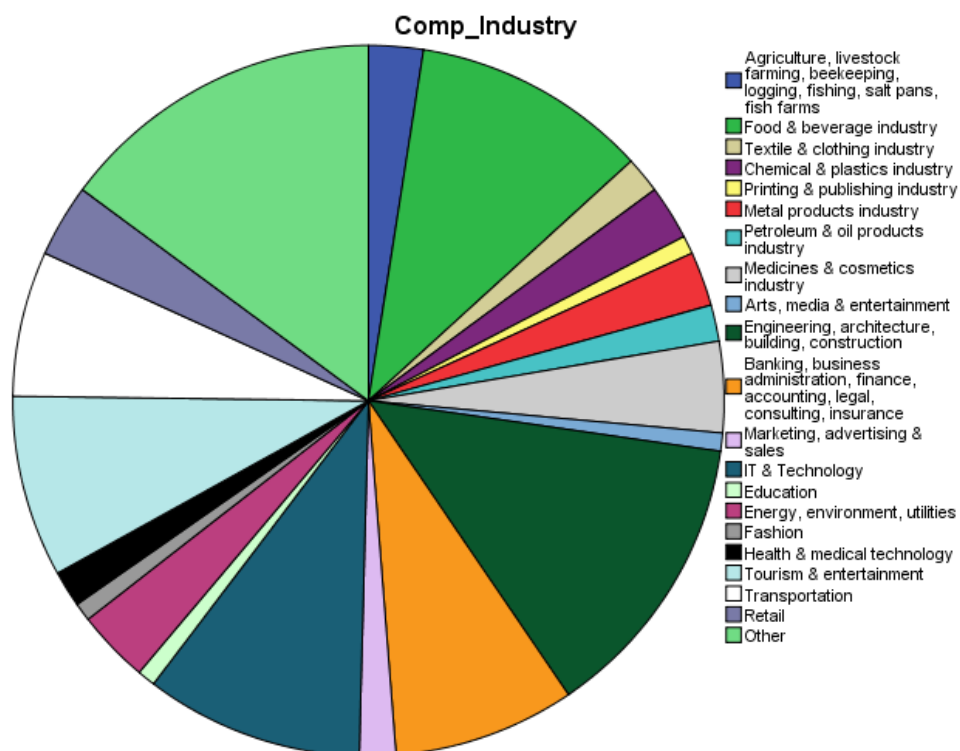
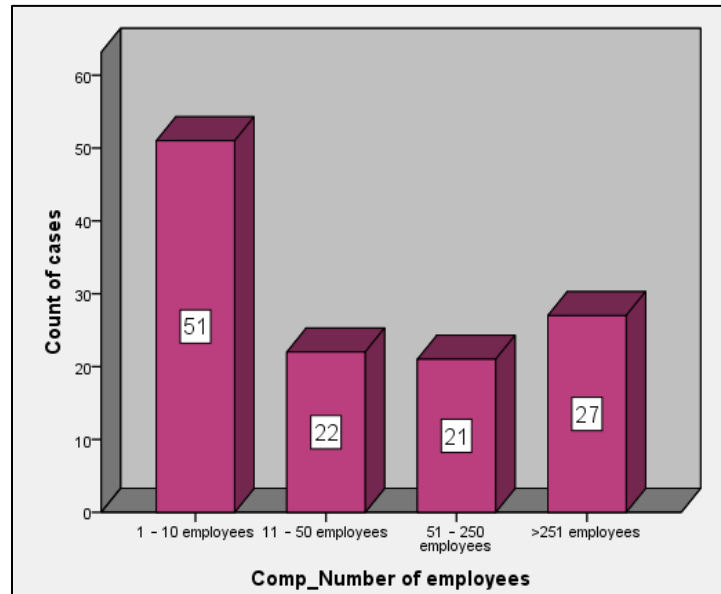


Fig. 7: Demographic data – Industry

As for the number of employees, a bit less than the half of the sample are very small companies with 1-10 employees (this option is the mode) and then small (11-50 employees), medium-sized (51-250 employees) and large enterprises (above 251 employees) are similarly shared in the sample (figure 8).

*Fig. 8: Demographic data - Size*

Concerning the size of companies in terms of their recent turnover, 23 of the participants stated that the company they work for has an average gross revenue between 100.001€ and 500.000€ the last 3 years. This was the most frequent answer, thus the mode, while options of below 100.000€, 1 – 5 million euros, 10 – 50 million euros and above 50 million euros shared similar number of answers. Additionally, there were 7 companies with turnover between 500k and 1 million euros and other 7 ones between 5 million and 10 million euros. The median is option 4, meaning that if putting all turnovers in an ascending order, half of the responses are reached within the group 1 million to 5 million euros and other half of the participants have income from 1 million and above. Last but not least, 13 companies were not willing to answer this question and these answers are considered as missing ones (table 10).

#### Statistics

Comp\_Average annual turnover  
of the last 3 years

N	Valid	108
	Missing	13
Median		4,00
Mode		2

*Table 10: Demographic data | Turnover*

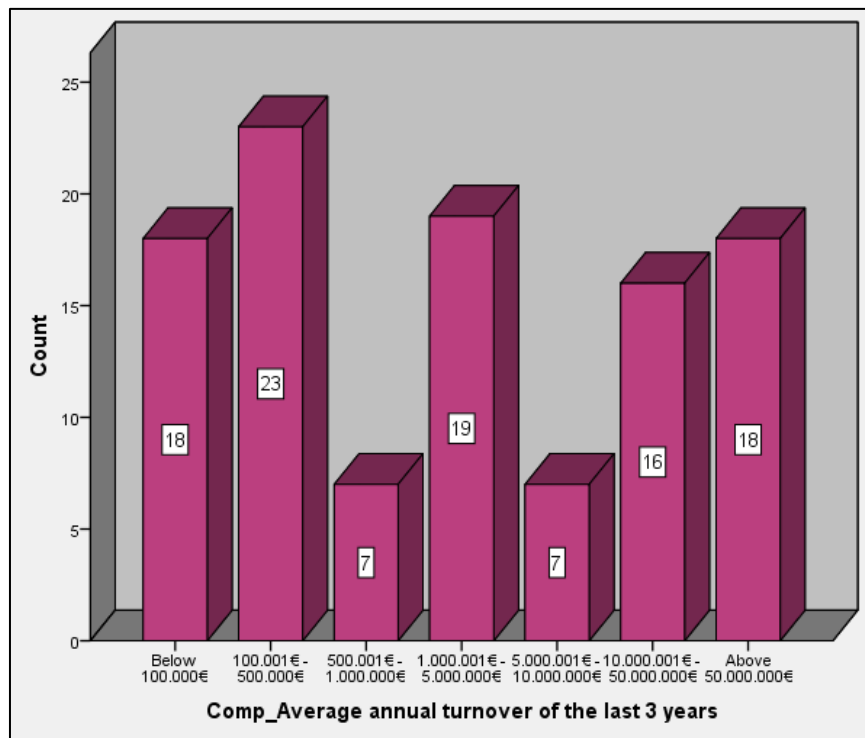


Fig. 9: Demographic data - Turnover frequencies

The sample constitutes of companies from various regions all over Greece, covering the whole country as shown in figure 10. Mode is option 1, which is Attica.

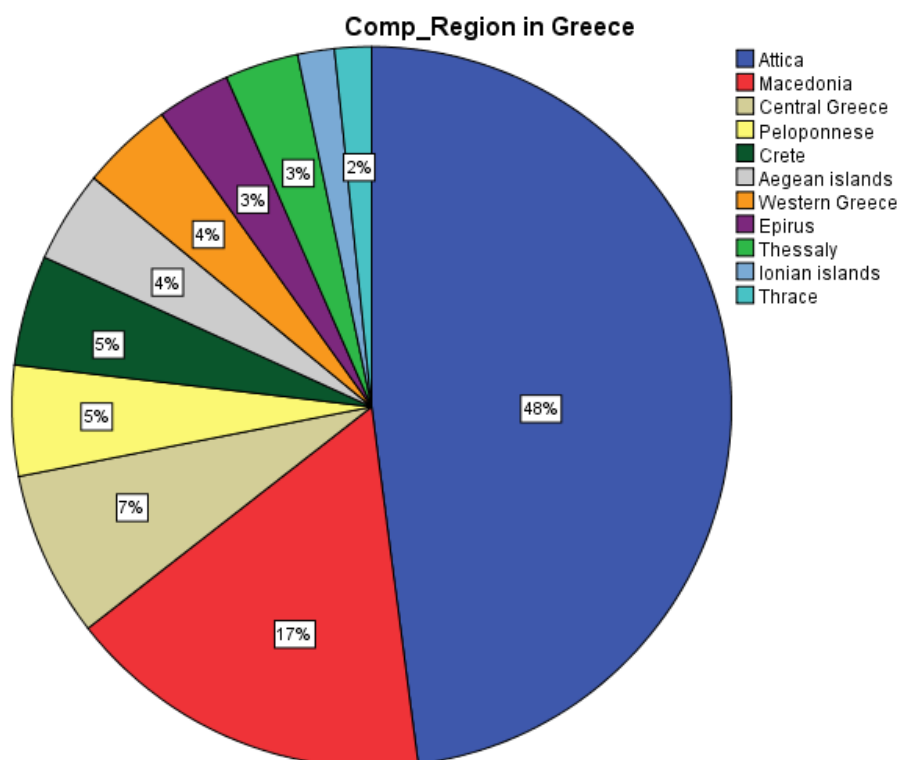


Fig. 10: Demographic data | Region percentages





Given the fact that the research concerns whole Greece and not specific regions, it is essential there is enough and proportional representation of companies from all regions in the sample, as explained in the relevant chapter. The number of companies from each region having participated finally in the research is almost proportional – with slight differences – to the number of companies existing in each region, based on data retrieved from the General Trade Registry (ΓΕΜΗ) of the Central Association of Chambers of Greece (Κεντρική Ένωση Επιμελητηρίων Ελλάδος) on 31/03/2024 and presented in table 11. Therefore, it can be argued that the sample represents whole Greece and the results of the research can be generalized to the entire country, with the given level of precision as calculated before.

	Number of companies in Greece based on data of the General Trade Registry on 31/03/2024							Sample of the research		
	Private Capital Companies (IKE)	General Partnership (OE)	Limited Partnership (EE)	Société Anonyme - S.A. (AE)	Limited Liability Company - LLC (ΕΠΕ)	Total	Percentage of companies per region compared to the total number of companies in	Target number of companies per region to participate in the research if n=121	Number of companies per region participated in the research	Percentage of companies per region participated in the research compared to the total number of companies participated in the
Attica	45.204	27.277	28.416	23.339	14.568	138.804	46%	56	58	48%
Macedonia & Thrace	16.482	18.967	9.364	7.229	3.188	55.230	18%	22	22	18%
Crete	4.844	7.582	2.868	3.350	1.038	19.682	7%	8	6	5%
Western Greece	3.649	5.055	2.311	1.351	778	13.144	4%	5	5	4%
Aegean islands	4.624	7.507	4.542	2.602	923	20.198	7%	8	5	4%
Thessaly	3.729	4.955	2.371	1.577	708	13.340	4%	5	4	3%
Peloponnese	2.716	4.536	2.974	1.244	660	12.130	4%	5	6	5%
Central Greece	2.855	3.861	1.650	1.320	788	10.474	3%	4	9	7%
Ionian islands	2.476	3.385	1.412	1.396	617	9.286	3%	4	2	2%
Epirus	1.742	2.983	1.468	818	272	7.283	2%	3	4	3%
Total	88.321	86.108	57.376	44.226	23.540	299.571	100,00%	121	121	100%

Table 11: Active companies per region per corporate form / Population vs sample

Based on the graph in figure 11, it seems that the most companies from Attica participating in the research are large ones, whereas the most participants from Macedonia are very small companies. Participants from Attica, Macedonia and Central Greece are various in terms of size, meaning that there is representation from all sizes of companies located in these specific regions, while participants from all other regions belong to maximum 2 size categories.

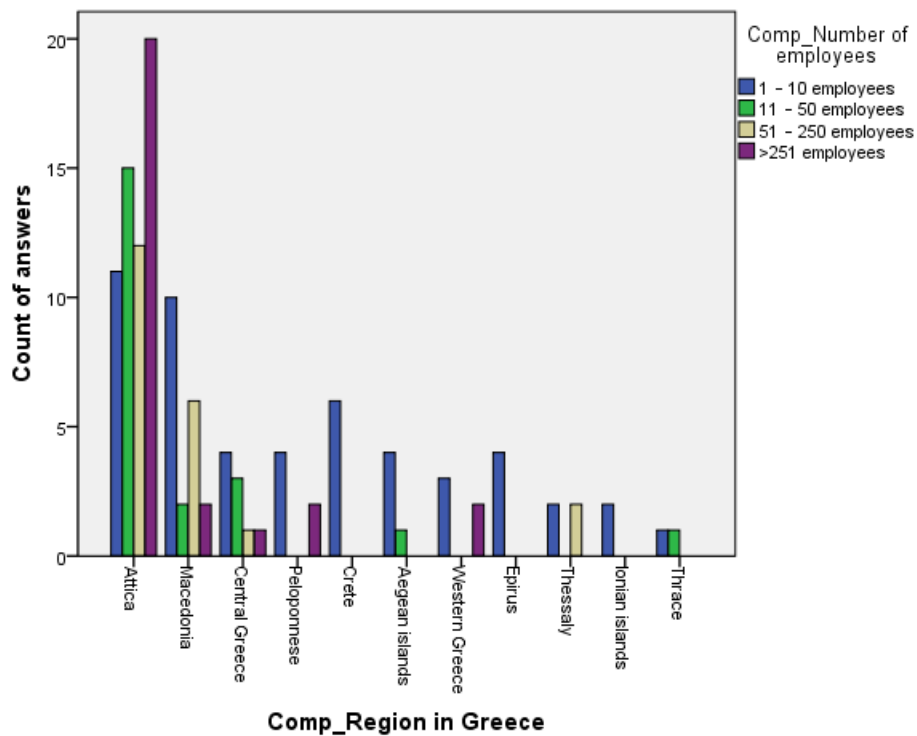


Fig. 11: Demographic data – Size per region

Respectively, there are participants from Attica, Macedonia, Central Greece and Western Greece with many different levels of turnover, while all the rest regions have representatives of 1 up to maximum 4 different levels of income. Since most participants from Attica are large enterprises as discussed before, it can be logical that most of them have income above 50 million Euros, while the most frequent answer from participants of Macedonia is turnover 100-500k Euros (figure 12).

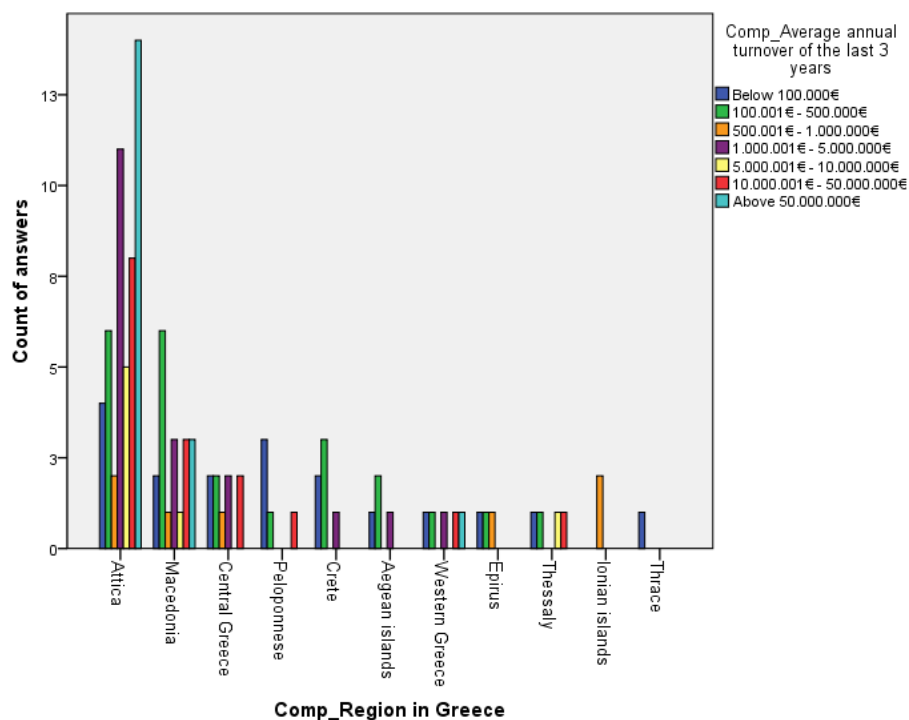


Fig. 12: Demographic data | Turnover per region



Last but not least, it is clear from the graph in figure 13 that the sample has quite experienced buyers in their companies, as only 1,7% stated that the average experience of buyers in purchases is below 1 year. It is remarkable that 85% of the companies that participated in the research have buyers with experience in average above 6 years. Mode is option 3, which means that the most frequent answer is experience of 6-10 years.

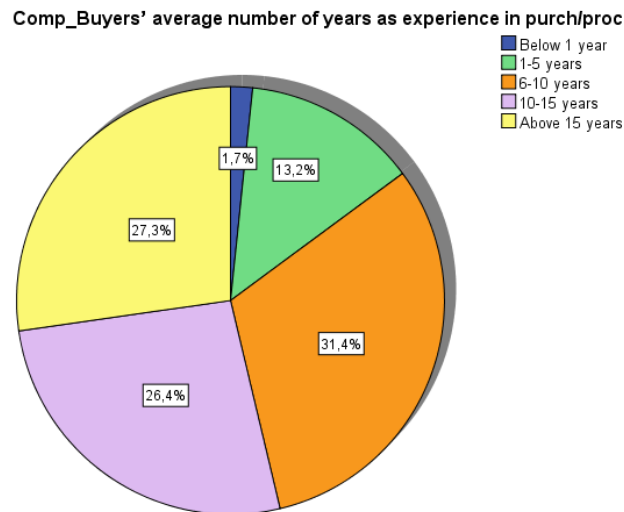


Fig. 13: Demographic data | Experience of buyers

#### Analysis of e-auction adoption in terms of company profile

It is interesting to examine if the decision to adopt e-auctions is correlated to the companies' details. Let's take the 6 variables of company's details one by one to check the correlation with the variable of e-auction adoption.

##### ***Variable 1 of company's profile: If the company is multinational or not***

The hypotheses are the following:

- $H_0$ : No correlation between the variable of multinationality and e-auction adoption. In other words, the 2 variables are independent of each other.
- $H_1$ : There is correlation between the variable of multinationality and e-auction adoption. In other words, the 2 variables are not independent of each other, but related.

Since both variable 1 and variable about e-auction adoption are nominal and dichotomous ones, the most suitable correlation measure to calculate is Phi coefficient ( $\phi$ ).



### Even 1 e-auction run \* Comp\_Multinational

#### Crosstabulation

Count		Comp_Multinational		Total
		Yes	No	
Even 1 e-	Yes	13	20	33
auction run	No	9	79	88
Total		22	99	121

Table 12: Crosstab / Adoption – Multinationality

#### Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,337	,000
	Cramer's V	,337	,000
N of Valid Cases		121	

Table 13: Phi coefficient for association check / Adoption – Multinationality

First of all, approximate significance (p-value) is 0, which means that the deviation from the null hypothesis is statistically significant and therefore, null hypothesis should be rejected. Therefore, the 2 variables are not independent of each other. Since Phi is positive but not close to 1, it can be argued that there is a weak positive correlation between the 2 variables. As both variables are binary, the matrix is 2x2 and thus, it is logical that Cramer's V value is identical with Phi value.

### Variable 2 of company's profile: Company's industry

The hypotheses are the following:

- $H_0$ : No correlation between the company's industry and e-auction adoption. In other words, the 2 variables are independent of each other.
- $H_1$ : There is correlation between the company's industry and e-auction adoption. In other words, the 2 variables are not independent of each other, but related.

Since both variable 2 and variable about e-auction adoption are nominal ones,  $\chi^2$  can be calculated as an independence test (table 14).

#### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33,356 <sup>a</sup>	20	,031
Likelihood Ratio	36,530	20	,013
Linear-by-Linear Association	4,904	1	,027
N of Valid Cases	121		

a. 35 cells (83,3%) have expected count less than 5.

The minimum expected count is ,27.

Table 14: Chi square as independence test / Adoption - Industry



Given the fact that there are many combinations of industry & e-auctions adoption with less than 5 answers, it is critical to apply a simulation method in order to be able to have the relevant calculation. Hence, Chi square test is performed again, with Monte Carlo simulation (table 15).

Chi-Square Tests									
	Value	Df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	95% Confidence Interval		Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	33,356 <sup>a</sup>	20	,031	,018 <sup>b</sup>	,015	,020			
Likelihood Ratio	36,530	20	,013	,027 <sup>b</sup>	,024	,030			
Fisher's Exact Test	30,910			,013 <sup>b</sup>	,011	,015			
Linear-by-Linear Association	4,904 <sup>c</sup>	1	,027	,028 <sup>b</sup>	,025	,031	,016 <sup>b</sup>	,014	,019
N of Valid Cases	121								

a. 35 cells (83,3%) have expected count less than 5. The minimum expected count is ,27.

b. Based on 10000 sampled tables with starting seed 2000000.

c. The standardized statistic is 2,215.

Table 15: Chi square as independence test with Monte Carlo simulation / Adoption – Industry

Since the p-value ( $p=0,013$ ) is less than the chosen significance level ( $\alpha=0,05$ ),  $H_0$  can be rejected.

As a result, there is an association between e-auction adoption and company's industry.

If analyzing the responses concerning e-auction usage per industry, it seems that the main industries having contributed in the sample for reaching the result of the 33 companies that have adopted e-auctions are:

- IT (5 companies),
- Food & beverage industry (5 companies), and
- Medicines & cosmetics industry (4 companies).

If checking the allocation of companies in the sample per industry to the ones having used e-auctions and to others that have not, it seems that the higher percentages of adoption belong to:

- Petroleum & oil products industry (2 out of 2 companies in the sample use e-auctions – 100%),
- Medicines & cosmetics industry (4 out of 5 companies in the sample use e-auctions – 80%),
- Chemical & plastics industry (2 out of 3 companies in the sample use e-auctions – 66,6%),
- Metal products industry (2 out of 3 companies in the sample use e-auctions – 66,6%),



- Marketing, advertising & sales (1 out of 2 companies in the sample use e-auctions – 50%),
- Health & medical technology (1 out of 2 companies in the sample use e-auctions – 50%),
- Retail (2 out of 4 companies in the sample use e-auctions – 50%).

**Variable 3 of company's profile: Company's size in terms of number of employees**

The hypotheses are the following:

- $H_0$ : No correlation between the company's size and e-auction adoption. In other words, the 2 variables are independent of each other.
- $H_1$ : There is correlation between the company's size and e-auction adoption. In other words, the 2 variables are not independent of each other, but related.

Since one variable is ordinal (company's size) and the other one is nominal (e-auction adoption),  $\chi^2$  can be calculated as an independence test (table 17).

**Even 1 e-auction run \* Comp\_Number of employees Crosstabulation**

Count		Comp_Number of employees				Total
		1 – 10 employees	11 – 50 employees	51 – 250 employees	>251 employees	
Even 1 e-auction run	Yes	5	7	4	17	33
	No	46	15	17	10	88
Total		51	22	21	27	121

Table 16: Crosstab / Adoption – Size

**Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26,131 <sup>a</sup>	3	,000
Likelihood Ratio	25,518	3	,000
Linear-by-Linear Association	19,968	1	,000
N of Valid Cases	121		

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 5,73.

Table 17: Chi square as independence test / Adoption - Size

In this case, there is no group of answers in the matrix with less than 5 responses, so there is no reason to perform any simulation calculation. Since the p-value ( $p < 0,001$ ) is less than the chosen significance level ( $\alpha = 0,05$ ),  $H_0$  can be rejected for this test as well, concluding that there is a



significant association between company's size and the company's behavior to adopt e-auctions or not.

From the crosstab table 16 showing the e-auction usage per company size, it is clear that big companies (>251 employees) have contributed the most in the sample for reaching the result of the 33 companies that have adopted e-auctions. Specifically, 17 out of 33 companies are big ones. Additionally, 63% of companies that participated in the survey having more than 251 employees stated that they are e-auction adopters (17 out of 27 companies).

#### ***Variable 4 of company's profile: Company's size in terms of turnover***

The hypotheses are the following:

- $H_0$ : No correlation between the company's turnover and e-auction adoption. In other words, the 2 variables are independent of each other.
- $H_1$ : There is correlation between the company's turnover and e-auction adoption. In other words, the 2 variables are not independent of each other, but related.

Similarly with the previous test, since one variable is ordinal (company's turnover) and the other one is nominal (e-auction adoption),  $\chi^2$  can be calculated as an independence test (table 19).

**Even 1 e-auction run \* Comp\_Average annual turnover of the last 3 years Crosstabulation**

		Comp_Average annual turnover of the last 3 years							Total
		Below 100k €	100.001€ - 500.000€	500.001€ - 1.000.000€	1.000.001€ - 5.000.000€	5.000.001€ - 10.000.000€	10.000.001€ - 50.000.000€	Above 50m €	
Even 1 e-auction run	Yes	0	3	2	2	5	6	12	30
	No	18	20	5	17	2	10	6	78
Total		18	23	7	19	7	16	18	108

*Table 18: Crosstab / Adoption – Turnover*

#### **Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	33,204 <sup>a</sup>	6	,000
Likelihood Ratio	36,187	6	,000
Linear-by-Linear Association	23,982	1	,000
N of Valid Cases	108		

a. 3 cells (21,4%) have expected count less than 5. The minimum expected count is 1,94.

*Table 19: Chi square as independence test / Adoption - Turnover*



Faulty groups (meaning groups with less than 5 answers) are 3 (more than the expected 1,94 ones), so simulation Monte Carlo needs to be done in this case (table 20).

Chi-Square Tests

	Value	df	Asymp. Sig. (2- sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	95% Confidence Interval		Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	33,204 <sup>a</sup>	6	,000	,000 <sup>b</sup>	,000	,000			
Likelihood Ratio	36,187	6	,000	,000 <sup>b</sup>	,000	,000			
Fisher's Exact Test	32,416			,000 <sup>b</sup>	,000	,000			
Linear-by-Linear Association	23,982 <sup>c</sup>	1	,000	,000 <sup>b</sup>	,000	,000	,000 <sup>b</sup>	,000	,000
N of Valid Cases	108								

a. 3 cells (21,4%) have expected count less than 5. The minimum expected count is 1,94.

b. Based on 10000 sampled tables with starting seed 624387341.

c. The standardized statistic is -4,897.

Table 20: Chi square as independence test with Monte Carlo simulation / Adoption - Turnover

Since the p-value ( $p < 0,001$ ) is less than the chosen significance level ( $\alpha = 0,05$ ),  $H_0$  can be rejected for this test too, concluding that there is a significant association between company's turnover and the company's decision to adopt e-auctions or not.

From the crosstab table 18 showing the e-auction usage per company's turnover, it is clear that bigger companies in terms of income have contributed the most in the sample for reaching the result of the 30 companies that have adopted e-auctions and have replied in the question of turnover. Specifically, 18 out of the 30 companies have income above 10 million €. If checking the allocation of companies in the sample per income to the ones having used e-auctions and to others that have not, it seems that the higher percentages of adoption belong to companies with turnover:

- 5-10 million € (5 out of 7 companies in the sample use e-auctions – 71,4%),
- Above 50 million € (12 out of 18 companies in the sample use e-auctions – 66,6%).

#### **Variable 5 of company's profile: Buyers' experience years**

The hypotheses are the following:





- $H_0$ : No correlation between the buyers' experience years in purchasing and e-auction adoption. In other words, the 2 variables are independent of each other.
- $H_1$ : There is correlation between the buyers' experience years in purchasing and e-auction adoption. In other words, the 2 variables are not independent of each other, but related.

Similarly with the previous tests, since one variable is ordinal (experience years) and the other one is nominal (e-auction adoption),  $\chi^2$  can be calculated as an independence test (table 22).

**Even 1 e-auction run \* Comp\_Buyers' average number of years as experience in purch/proc Crosstabulation**

Count		Comp_Buyers' average number of years as experience in purch/proc					Total
		Below 1 year	1-5 years	6-10 years	10-15 years	Above 15 years	
Even 1 e-auction run	Yes	1	4	12	13	3	33
	No	1	12	26	19	30	88
Total		2	16	38	32	33	121

Table 21: Crosstab / Adoption – Experience

**Chi-Square Tests**

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,294 <sup>a</sup>	4	,054
Likelihood Ratio	10,300	4	,036
Linear-by-Linear Association	2,485	1	,115
N of Valid Cases	121		

a. 3 cells (30,0%) have expected count less than 5. The minimum expected count is ,55.

Table 22: Chi square as independence test / Adoption – Experience

Faulty groups (meaning groups with less than 5 answers) are 3 (more than the expected 0,55 ones), so simulation Monte Carlo needs to be done in this case too (table 23).

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)		Monte Carlo Sig. (1-sided)	
				Sig.	95% Confidence Interval		Sig.
					Lower Bound	Upper Bound	
Pearson Chi-Square	9,294 <sup>a</sup>	4	,054	,047 <sup>b</sup>	,043	,052	
Likelihood Ratio	10,300	4	,036	,039 <sup>b</sup>	,035	,043	
Fisher's Exact Test	10,250			,025 <sup>b</sup>	,022	,028	



Linear-by-Linear Association	2,485 <sup>c</sup>	1	,115	,127 <sup>b</sup>	,120	,133	,066 <sup>b</sup>	,061	,071
N of Valid Cases	121								

a. 3 cells (30,0%) have expected count less than 5. The minimum expected count is ,55.

b. Based on 10000 sampled tables with starting seed 2048628469.

c. The standardized statistic is 1,576.

Table 23: Chi square as independence test with Monte Carlo simulation / Adoption – Experience

Since the p-value ( $p=0,025$ ) is less than the chosen significance level ( $\alpha=0,05$ ),  $H_0$  can be rejected. As a result, there is an association between e-auction adoption and company's buyers' experience. From the crosstab table 21 showing the e-auction usage per buyers' experience, it is clear that companies with buyers with medium experience have contributed the most in the sample for reaching the result of the 33 companies that have adopted e-auctions. Specifically, 25 out of 33 companies have buyers with experience between 6 and 15 years. On the contrary, only 5 out of 33 companies have buyers with experience below 6 years (not quite experienced buyers), while only 3 out of 33 companies have buyers with experience above 15 years (very experienced buyers).

#### Variable 6 of company's profile: Company's region

The hypotheses are the following:

- $H_0$ : The 2 variables are independent of each other. In other words, knowing company's region does not help predict the outcome of the variable of e-auction adoption.
- $H_1$ : The 2 variables are dependent of each other. In other words, knowing company's region helps predict correctly if the company has adopted e-auction adoption or not.

Since both variables are nominal, coefficient lambda ( $\lambda$ ) could be calculated as a prediction test between the 2 variables (table 24).

Directional Measures						
			Value	Asymp. Std. Error <sup>a</sup>	Approx. T <sup>b</sup>	Approx. Sig.
Nominal by Nominal	Lambda	Symmetric	,000	,000	. <sup>c</sup>	. <sup>c</sup>
		Even 1 e-auction run Dependent	,000	,000	. <sup>c</sup>	. <sup>c</sup>
		Comp_Region in Greece Dependent	,000	,000	. <sup>c</sup>	. <sup>c</sup>



Goodman and Kruskal tau	Even 1 e-auction run Dependent	,089	,024		,388 <sup>d</sup>
	Comp_Region in Greece Dependent	,012	,006		,167 <sup>d</sup>
Uncertainty Coefficient	Symmetric	,056	,014	3,822	,098 <sup>e</sup>
	Even 1 e-auction run Dependent	,113	,027	3,822	,098 <sup>e</sup>
	Comp_Region in Greece Dependent	,038	,009	3,822	,098 <sup>e</sup>

- a. Not assuming the null hypothesis.
- b. Using the asymptotic standard error assuming the null hypothesis.
- c. Cannot be computed because the asymptotic standard error equals zero.
- d. Based on chi-square approximation
- e. Likelihood ratio chi-square probability.

Table 24: Coefficient lambda as prediction test / Adoption – Region

Given the fact that the dependent variable would be e-auction adoption, the correct value to check on the table is the yellow one. By finding  $\lambda=0$  means that the independent variable (company's region) does not help predict the dependent variable of e-auction adoption. To put it in another way, these 2 specific variables are not related to each other. Of course the same output would derive from calculating  $\chi^2$  as an independence test. Since there are a few regions with less than 5 answers, it is logical that there will be groups in the relevant matrix with less than 5 answers, so Monte Carlo simulation can be used from the beginning in order to have valid results from  $\chi^2$  test (table 26).

Even 1 e-auction run \* Comp\_Region in Greece Crosstabulation

Count		Comp_Region in Greece											Total
				Central		Pelopo			Aegean	Ionian		Western	
		Attica	Thessaly	Greece	Epirus	nnese	Macedonia	Thrace	islands	islands	Crete	Greece	
Even 1 e-	Yes	19	1	3	1	0	8	0	0	0	0	1	33
auction run	No	39	3	6	3	6	12	2	5	2	6	4	88
Total		58	4	9	4	6	20	2	5	2	6	5	121

Table 25: Crosstab / Adoption – Region



Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)	Monte Carlo Sig. (2-sided)			Monte Carlo Sig. (1-sided)		
				Sig.	95% Confidence Interval		Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound		Lower Bound	Upper Bound
Pearson Chi-Square	10,709 <sup>a</sup>	10	,381	,381 <sup>b</sup>	,372	,391			
Likelihood Ratio	16,057	10	,098	,179 <sup>b</sup>	,172	,187			
Fisher's Exact Test	9,076			,475 <sup>b</sup>	,465	,484			
Linear-by-Linear Association	3,333 <sup>c</sup>	1	,068	,075 <sup>b</sup>	,069	,080	,037 <sup>b</sup>	,033	,040
N of Valid Cases	121								

a. 17 cells (77,3%) have expected count less than 5. The minimum expected count is ,55.

b. Based on 10000 sampled tables with starting seed 957002199.

c. The standardized statistic is 1,826.

Table 26: Chi square as independence test with Monte Carlo simulation / Adoption – Region

Since the p-value ( $p=0,475$ ) is higher than the chosen significance level ( $\alpha=0,05$ ),  $H_0$  is confirmed. As approved by coefficient lambda ( $\lambda$ ) too, there is no association between e-auction adoption and company's region.

### Analysis of participants having adopted B2B e-auctions

Since there were different questions in the questionnaire for companies having adopted B2B e-auctions and for those that have not, it is worth analyzing the answers of each of these 2 groups.

Let's focus first on the 33 adopters of e-auctions. The rest 88 participants who stated that they have never run any e-auction in their company are considered as missing values in all questions that concern only the adopters.

Based on tables 27 and 28 and pie in figure 14, it is clear that almost half of the companies have adopted e-auctions during the most recent years. Specifically, 48,5% of e-auctions' adopters revealed that they started conducting e-auctions within the period 2021 to 2024. It is logical that this was the most frequent answer of the 33 respondents (mode: 4). Following the above, median is 3, meaning that option 3 (2016 – 2020) is the value below of which 50% of the answers are observed. Given that e-auctions are a tool that is not fully utilized yet, especially in Greece, as described in the theoretical part of the thesis, in conjunction with the results of this research concerning number of companies having adopted e-auctions, it was expected that the adopters would have started using this new



practice recently. What is more interesting is that approximately 24% of the companies started using e-auctions before 2010, which is quite early for our country.

Y\_When started running e-auctions

N	Valid	33
	Missing	88
Median		3,00
Mode		4
Percentiles	25	1,50
	50	3,00
	75	4,00

Table 27: Adoption time

Y\_When started running e-auctions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Before 2010	8	6,6	24,2	24,2
	2011 – 2015	4	3,3	12,1	36,4
	2016 – 2020	5	4,1	15,2	51,5
	2021 – 2024	16	13,2	48,5	100,0
	Total	33	27,3	100,0	
Missing	System	88	72,7		
Total		121	100,0		

Table 28: Adoption time / Frequencies & Percentages

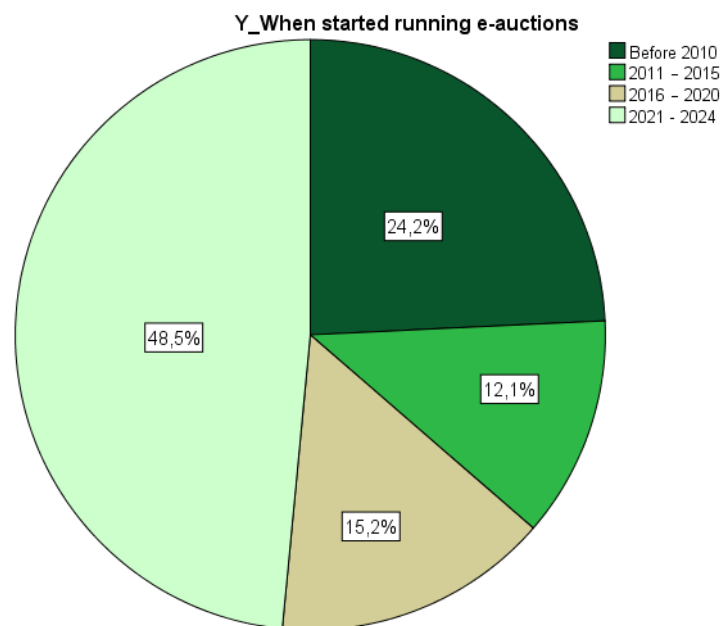


Fig. 14: Adoption time - percentages

As for the usage level of e-auctions from the companies-adopters, it is examined in the research how many e-auction events were conducted by each company the last 12 months. Data in tables 29 and 30 show that almost 80% of the respondents have run less than 8 e-auctions during the last 12 months, while approximately half of the respondents have run only 4 (median=4). Additionally, almost  $\frac{1}{4}$  of the companies have run only 2 electronic auction events the past year, which is the most frequent answer (mode=2). Mean is 7,61 due to outliers of 30 and 48 e-auctions by 2 companies. It seems that the majority of companies are not using e-auctions for many of their purchases. Hence it could be



assumed that companies in Greece are increasingly experimenting with e-auctions as a procurement tool but they have not considered them yet as a basic tool for all their purchases.

**Statistics**

Y\_Number of e-auctions run during the last 12 months

N	Valid	33
	Missing	88
Mean		7,61
Std. Error of Mean		1,717
Median		4,00
Mode		2
Std. Deviation		9,861
Variance		97,246
Skewness		2,749
Std. Error of Skewness		,409
Kurtosis		8,618
Std. Error of Kurtosis		,798
Range		48
Minimum		0
Maximum		48
Percentiles	25	2,00
	50	4,00
	75	7,00

*Table 29: Number of e-auctions***Y\_Number of e-auctions run during the last 12 months**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	,8	3,0	3,0
	1	2	1,7	6,1	9,1
	2	8	6,6	24,2	33,3
	3	3	2,5	9,1	42,4
	4	3	2,5	9,1	51,5
	5	3	2,5	9,1	60,6
	6	5	4,1	15,2	75,8
	8	1	,8	3,0	78,8
	11	1	,8	3,0	81,8
	12	1	,8	3,0	84,8
	18	1	,8	3,0	87,9
	20	2	1,7	6,1	93,9
	30	1	,8	3,0	97,0
Missing	48	1	,8	3,0	100,0
	Total	33	27,3	100,0	
	System	88	72,7		
Total		121	100,0		

*Table 30: Number of e-auctions / Frequencies & Percentages*

Since  $\text{mean} > \text{median} > \text{mode}$ , the distribution is asymmetrical, as shown in the relevant histogram in figure 15 as well. To be more accurate, the distribution is characterized as positively skewed (skewness = 2,749), as more than 50% of the observations are found on the left side of the symmetry axis. Moreover, kurtosis is above 0 (kurtosis = 8,618), hence the distribution is leptokurtic with high degree of peakedness on 2 e-auctions. The distribution is of course single-peaked too, since there is only one mode.

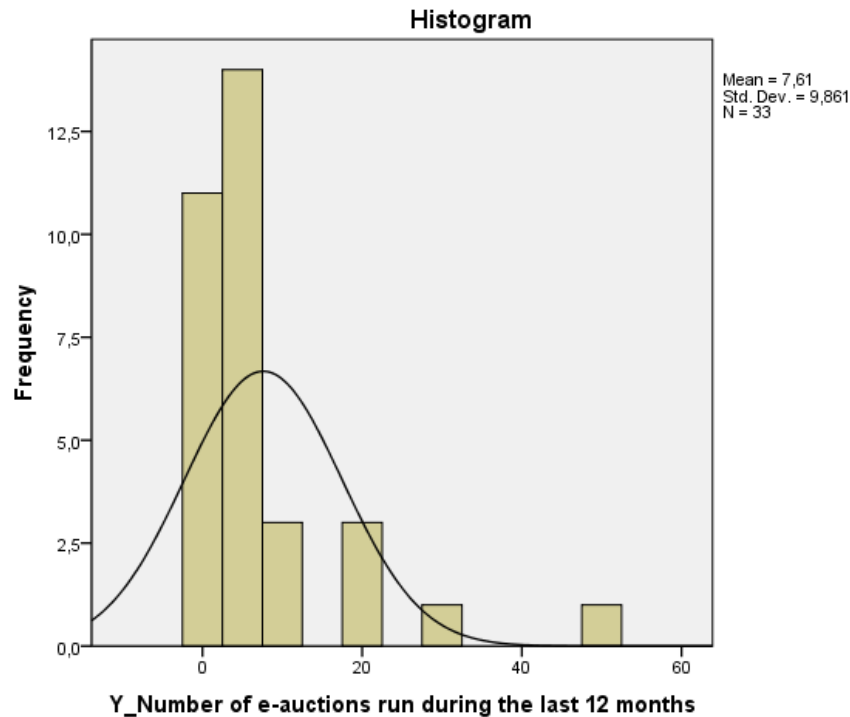


Fig. 15: Histogram / Number of e-auctions

The next 2 questions for the adopters concerned the types of e-auctions used more often as well as the spend categories for which companies have selected their suppliers through an e-auction event. In these 2 questions participants were allowed to select multiple options, if applicable. So in order to be able to analyze the data of these 2 variables, it was mandatory firstly to define a set of multiple responses for each of them (figure 16).

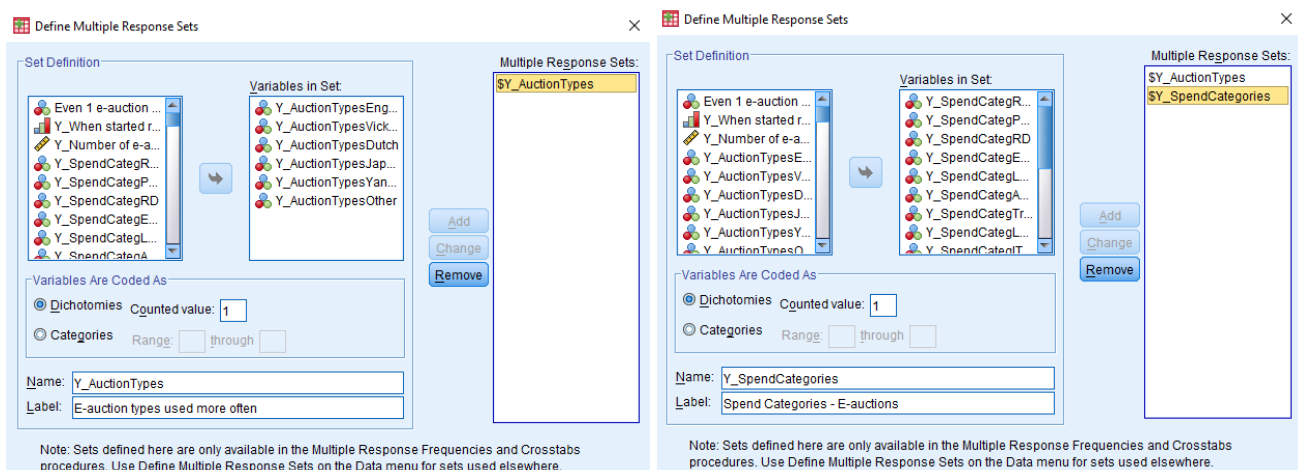


Fig. 16: Sets of multiple responses in SPSS

After that, it is possible to analyze the frequencies. Beginning with e-auction types, it is clear from table 31 that English / standard reverse e-auction is by far the prominent one, used by 26 out of 33



adopters, which is the 78,8% of the total answers. The rest types have very few answers, while the Yankee one is not being conducted by any company of the sample. As emerges from the bibliography and mentioned in the theoretical part of the thesis, English e-auction is the type selected by most procurement professionals due to the flexibility it offers. This is also confirmed by the result of this survey as well.

**\$Y\_AuctionTypes Frequencies**

		Responses		Percent of Cases
		N	Percent	
E-auction types used more often <sup>a</sup>	Y_AuctionTypesEnglish	26	74,3%	78,8%
	Y_AuctionTypesVickrey	1	2,9%	3,0%
	Y_AuctionTypesDutch	2	5,7%	6,1%
	Y_AuctionTypesJapanese	1	2,9%	3,0%
	Y_AuctionTypesOther	5	14,3%	15,2%
Total		35	100,0%	106,1%

a. Dichotomy group tabulated at value 1.

*Table 31: E-auction types | Frequencies*

As for the spend categories for which procurement professionals choose to run e-auctions in order to negotiate the price and choose their supplier, the top ones are raw and packaging materials, IT and other technology-related spend as well as purchases concerning the workplace, as shown in table 32. From all the answers it is understood that e-auctions are not only used for purchasing tangible goods (even if they are preferred for them) but also for services.

**\$Y\_SpendCategories Frequencies**

		Responses		Percent of Cases
		N	Percent	
Spend Categories - E-auctions <sup>a</sup>	Y_SpendCategRawMaterials	10	13,3%	30,3%
	Y_SpendCategPackMaterials	10	13,3%	30,3%
	Y_SpendCategEquip	4	5,3%	12,1%
	Y_SpendCategLandBuildConstrRS	5	6,7%	15,2%
	Y_SpendCategTradeAssets	2	2,7%	6,1%
	Y_SpendCategLogistics	5	6,7%	15,2%
	Y_SpendCategIT	9	12,0%	27,3%
	Y_SpendCategMarketingMedia	2	2,7%	6,1%
	Y_SpendCategHRAdmin	5	6,7%	15,2%
	Y_SpendCategMobility	2	2,7%	6,1%
	Y_SpendCategEnergyUtilitiesEnviron	3	4,0%	9,1%





Y_SpendCategWorkplace	8	10,7%	24,2%
Y_SpendCategFinancialServ	2	2,7%	6,1%
Y_SpendCategOtherMaterials	3	4,0%	9,1%
Y_SpendCategOtherServices	5	6,7%	15,2%
Total	75	100,0%	227,3%

a. Dichotomy group tabulated at value 1.

Table 32: E-auction spend categories | Frequencies

Continuing with the benefits reaped from reverse e-auctions by the companies using them, the following 5 main benefits are assessed.

1. Simplification of the company's procurement process
2. Cost savings
3. Improvement of transparency in the company's procurement transactions
4. Increase of speed of the procurement process
5. Increase of efficiency of the company's negotiations with suppliers

Given the coding I have given to the answers in SPSS, which is from 1 to 5 with 1 being the most positive and 5 the most negative in terms of agreement, it seems from table 33 that all these benefits as occurred from the bibliography are really considered as benefits from the companies participated in the research. Specifically, mode is either 1 or 2 in each variable – benefit, revealing that the most frequent answers of the respondents are positive in terms of agreement (either “agree” or “tend to agree”). The same applies for median too, revealing that in some of the benefits (cost savings, transparency) 50% of the cases are observed in “Agree” answer, while in some others (process simplification, speed, negotiation efficiency) 50% of the cases are reached in “Agree” and “Tend to agree” answers.

Statistics

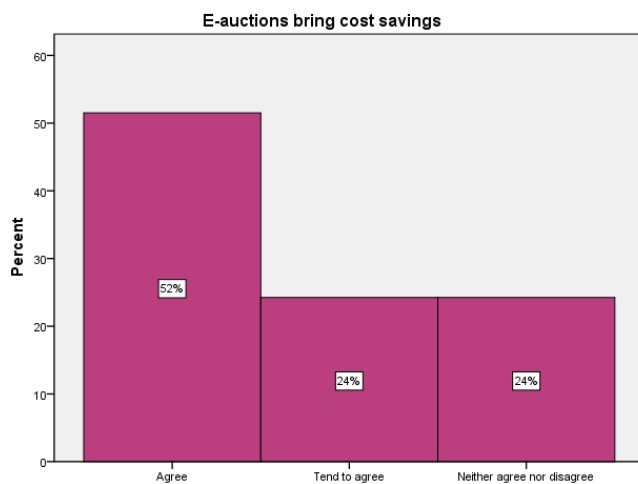
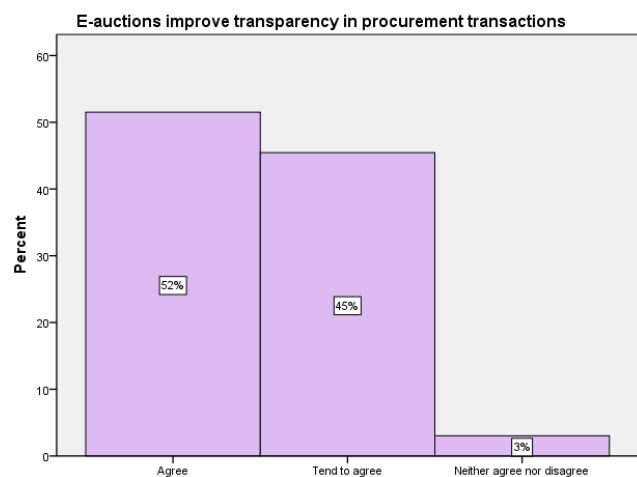
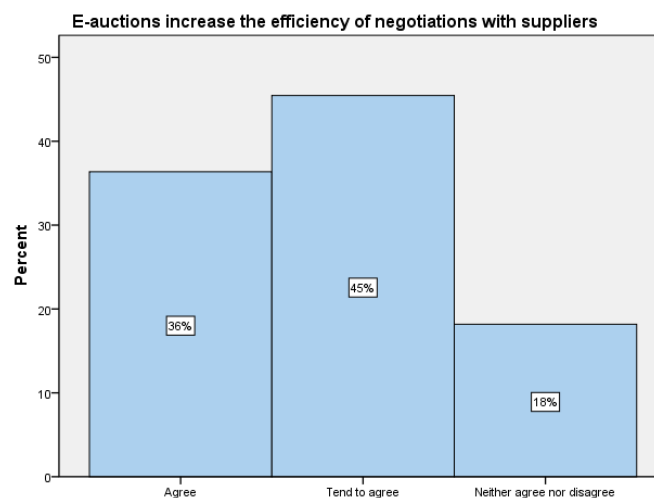
		E-auctions simplify procurement process	E-auctions bring cost savings	E-auctions improve transparency in procurement transactions	E-auctions increase the speed of the procurement process	E-auctions increase the efficiency of negotiations with suppliers
N	Valid	33	33	33	33	33
	Missing	88	88	88	88	88
Median		2,00	1,00	1,00	2,00	2,00
Mode		2	1	1	1	2
Range		4	2	2	4	2



Percentiles	25	1,50	1,00	1,00	1,00	1,00
	50	2,00	1,00	1,00	2,00	2,00
	75	3,00	2,50	2,00	3,00	2,00

*Table 33: Benefits from e-auctions*

From the bar charts shown in figures 17, 18 and 19, it is obvious that there was no company in the sample disagreeing or tending to disagree with the claims that e-auctions bring cost savings to the company, improve transparency in procurement transactions and increase efficiency of negotiations with the suppliers. Particularly, 76% of the companies that participated in the research agree or tend to agree that reverse electronic auctions bring cost savings to the company, while the respective percentage for transparency reaches 97% and for negotiation efficiency 81%.

*Fig. 17: Cost savings | Percentages**Fig. 18: Transparency | Percentages**Fig. 19: Negotiations efficiency | Percentages*



On the other hand, as it is obvious from figures 20 and 21, there are a few respondents that disagree or tend to disagree with the assertion that e-auctions simplify procurement process (6%) and that they increase the speed of the procurement process (12%), even though positive answers are high for these benefits too (69% in each of the 2 variables for answers “Agree” and “Tend to agree” in total).

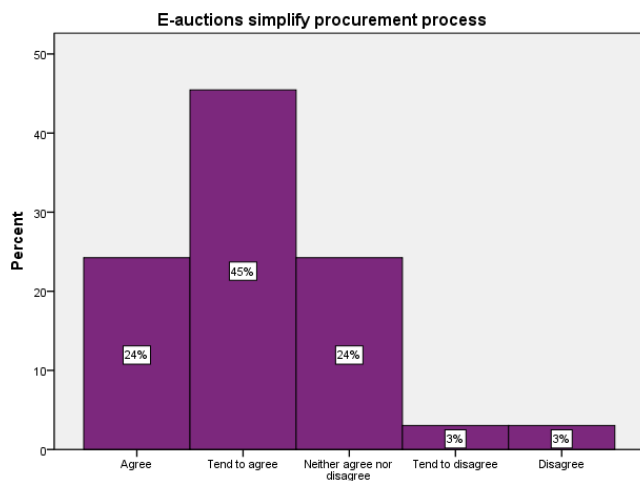


Fig. 20: Process simplification | Percentages

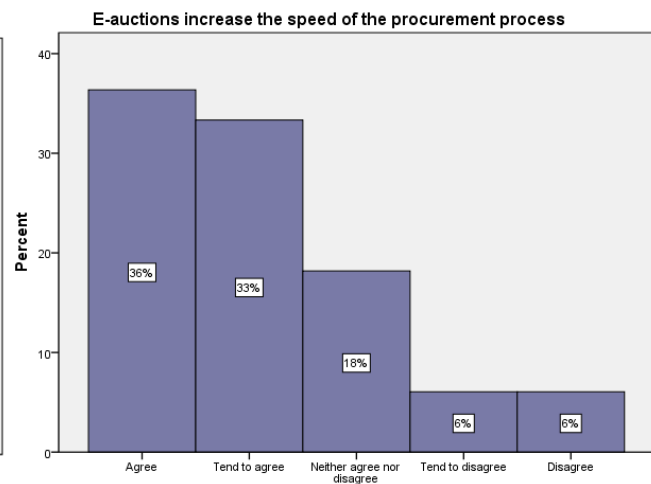


Fig. 21: Process speed | Percentages

The next variable concerns the active monitoring and evaluation of effectiveness of the e-auctions that the company runs. As shown from the bar chart in figure 22, there is no company in the sample not evaluating the e-auction effectiveness at all (0 answers in “Disagree” option). Just a few of the companies in the sample (6%) tend to disagree with the statement, while other 18% of them neither agree nor disagree. Based on that, I assume that these companies may evaluate e-auctions results but not in an often basis or not actively, meaning that not so many actions for the future occur from their evaluations. The other  $\frac{3}{4}$  of the sample seem to be active in this last part of the e-auction process, as they stated that they either agree or tend to agree with the specific sentence. It is interesting to highlight that the mode in this case is option 2 (“tend to agree”). Active monitoring and evaluation of effectiveness after the adoption of a new practice is essential, mainly for 3 reasons: 1) For the management to assess if the investment really did worth it, 2) For the management to decide if the new practice is going to continue being used or not, and 3) For procurement to share within the team what works well when running e-auctions, in order to apply it in the future events too and what does not work well, in order to avoid it in the future events, based on which a standard best practice for all buyers to follow arises. Based on the frequency results of this variable, it could be said that there is still area for improvement in this part of the process for the 67% of companies that participated in the research and have adopted B2B e-auctions.

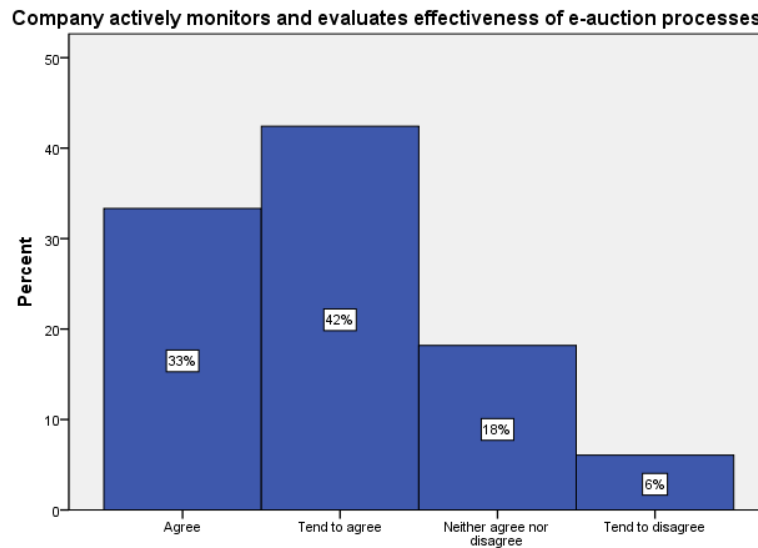


Fig. 22: Effectiveness monitoring and evaluation | Percentages

It would be exciting to assess if there is any correlation between the time that the company started running e-auctions and the level of active monitoring and evaluation of their effectiveness, as probably companies that adopted this practice many years ago could neglect more the evaluation compared to companies that have just adopted this new practice. Since both variables are ordinal, Spearman's rho ( $r_s$ ) can be calculated. From table 33 below, it is obvious that there is no correlation between these 2 variables, so the above hypothesis is rejected.

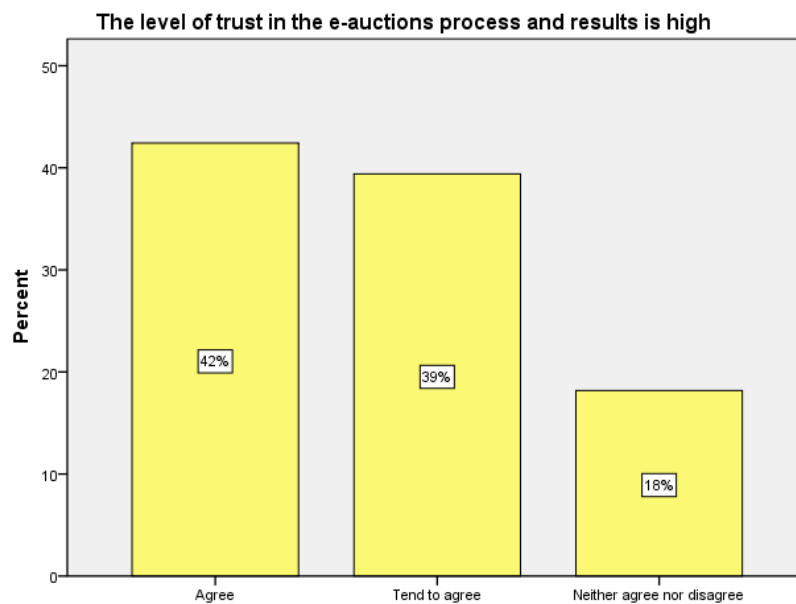
Correlations				
			Y_When started running e-auctions	Company actively monitors and evaluates effectiveness of e-auction processes
Spearman's rho	Y_When started running e-auctions	Correlation Coefficient	1,000	,021
		Sig. (2-tailed)	.	,909
		N	33	33
	Company actively monitors and evaluates effectiveness of e-auction processes	Correlation Coefficient	,021	1,000
		Sig. (2-tailed)	,909	.
		N	33	33

Table 33: Spearman's rho correlation check | Adoption time – Active monitoring

By analyzing the next variable, it is found that companies in the sample have high level of trust in the e-auctions process and results, as 42% of the participants agree with the statement and 39% tend to

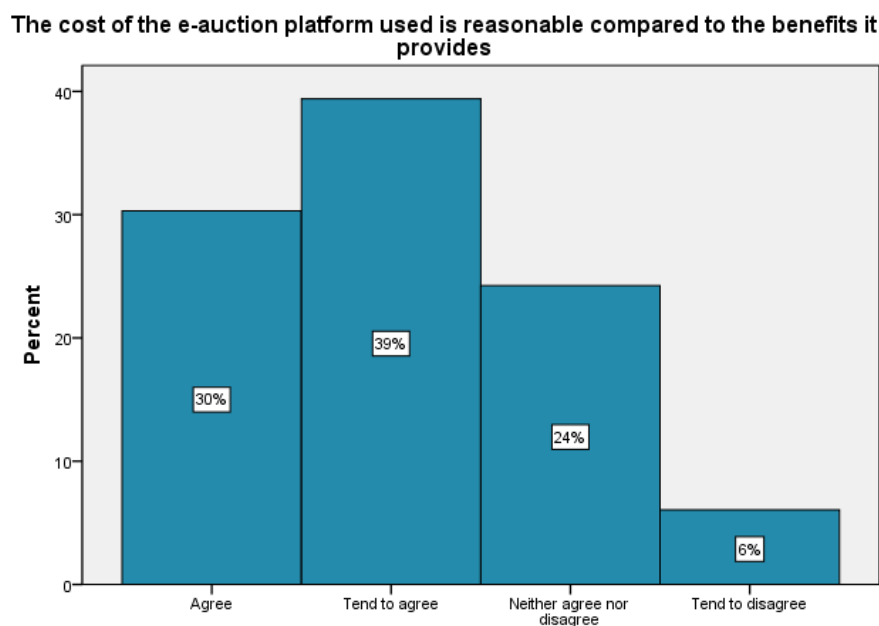


agree. Moreover, there is no response in the sample stating that the company does not trust the e-auctions process and results (figure 23).



*Fig. 23: Trust in e-auction process and results | Percentages*

As for the cost for using the e-auction platform, 69% of the companies agree or tend to agree that the cost is reasonable compared to the benefits it offers to the companies, while 24% remain neutral on that. Only 6% of the companies tend to believe that the cost is not reasonable, but there is no respondent of the questionnaire strongly disagreeing with the relevant statement (figure 24).



*Fig. 24: Reasonable platform cost | Percentages*



A correlation check between this variable and the one describing the benefit of e-auctions concerning cost savings could be done. Since both variables are ordinal, Spearman's rho ( $r_s$ ) can be calculated in this case too. From table 34 it seems that there is medium increasing monotonic correlation between the two variables ( $r_s=0,452$ ). This means that as the agreement with the statement "E-auctions bring cost savings to the company" is high, agreement with the statement "The cost of the e-auction platform used is reasonable compared to the benefits it provides" tend to be high as well. As e-auctions bring savings to the company, it is logical the cost needed for the platform in order to be able to run these e-auctions, to be considered as reasonable.

Correlations				
			E-auctions bring cost savings	The cost of the e-auction platform used is reasonable compared to the benefits it provides
Spearman's rho	E-auctions bring cost savings	Correlation Coefficient	1,000	,452**
		Sig. (2-tailed)	.	,008
		N	33	33
	The cost of the e-auction platform used is reasonable compared to the benefits it provides	Correlation Coefficient	,452**	1,000
		Sig. (2-tailed)	,008	.
		N	33	33

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 34: Spearman's rho correlation check | Cost savings – Platform cost

Continuing with the next variable, 42% of the companies in the sample consider the technical support of their e-auction platform provider quite satisfactory, as they tend to agree with the relevant statement, while other 36% agree clearly on that (figure 25). Only 2 companies are dissatisfied with the provider's technical support, as 1 answered that tends to disagree and 1 that disagrees with the statement. In general, it seems that e-auction platform providers do not only provide a system to the companies to use, but they offer a more holistic service to their customers, as described in the bibliography as well.

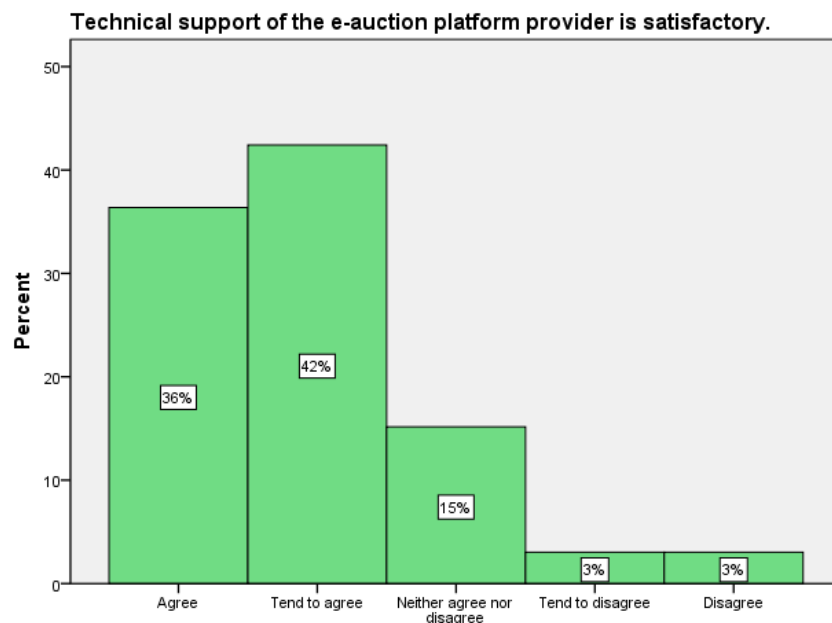


Fig. 25: Satisfactory technical support | Percentages

Since the previous 2 variables both concern the e-auctions platform providers, they could probably be related with each other in terms of their monotony. Since both variables are ordinal, Spearman's rho ( $r_s$ ) can be calculated in this case too. From table 35 below it is clear that there is strong increasing monotonic correlation between the two variables ( $r_s=0,660$ ). This means that as companies are satisfied from the technical support they are provided with, they tend to believe that the amount of money they give to their providers is reasonable.

#### Correlations

			The cost of the e-auction platform used is reasonable compared to the benefits it provides	Technical support of the e-auction platform provider is satisfactory.
Spearman's rho	The cost of the e-auction platform used is reasonable compared to the benefits it provides	Correlation Coefficient	1,000	,660**
		Sig. (2-tailed)	.	,000
		N	33	33
	Technical support of the e-auction platform provider is satisfactory.	Correlation Coefficient	,660**	1,000
		Sig. (2-tailed)	,000	.
		N	33	33

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 35: Spearman's rho correlation check | Platform cost – Technical support



Moreover, e-auction platform providers seem to offer a quite user-friendly system to their customers as 85% of the companies in the sample agree or tend to agree with the phrase “The interface of the platform used by the company for running e-auctions is user-friendly” (figure 26). If combining this with the analysis of the previous variable, it appears that e-auction providers have customer centricity in the core of their approach.

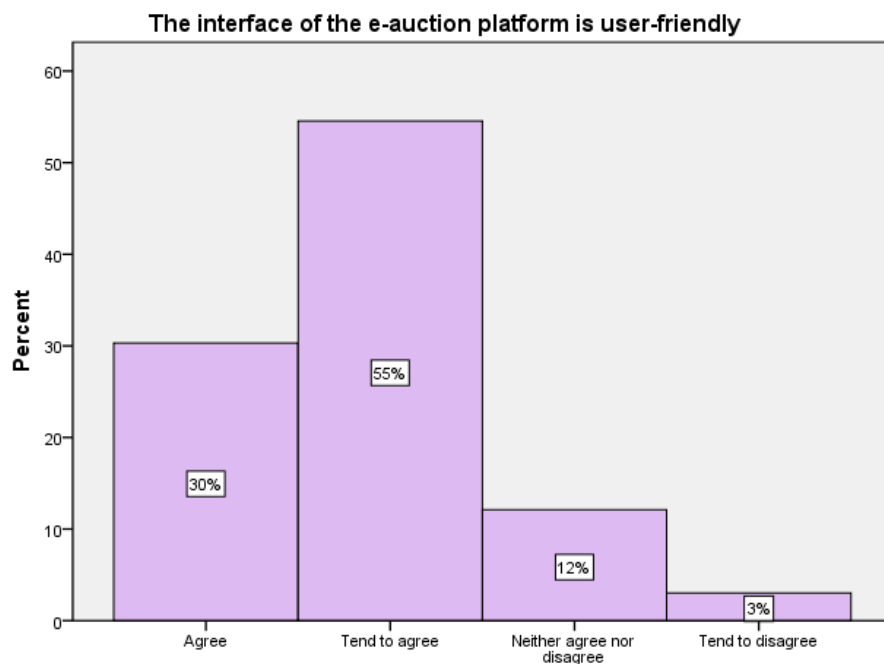


Fig. 26: User-friendly e-auction platform | Percentages

The next 3 variables concern more the adoption process of e-auctions from the companies that have believed in the effectiveness of this procurement practice. In particular, through the next 2 questions of the questionnaire, it is evaluated if companies invest enough in proper training of employees running e-auctions and of potential suppliers – sellers participating in each e-auction event. In both variables mode is 1, which means that the most frequent answer of participants is that they agree on the adequate investment of their company for training to both groups (employees and sellers). If summing all positive answers (“Agree” and “Tend to agree”) the percentages reach 72% for employees and 66% for potential suppliers. However, 15% and 12% of companies tend to disagree and disagree with the statement about sufficient investment in training to employees and sellers respectively (figures 27 and 28).



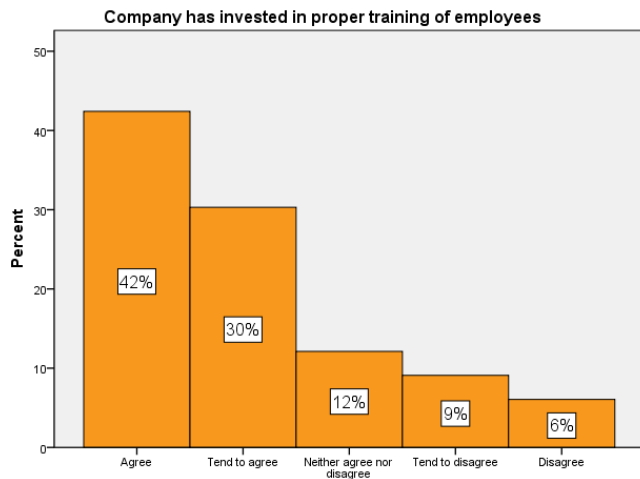


Fig. 27: Employees Training | Percentages

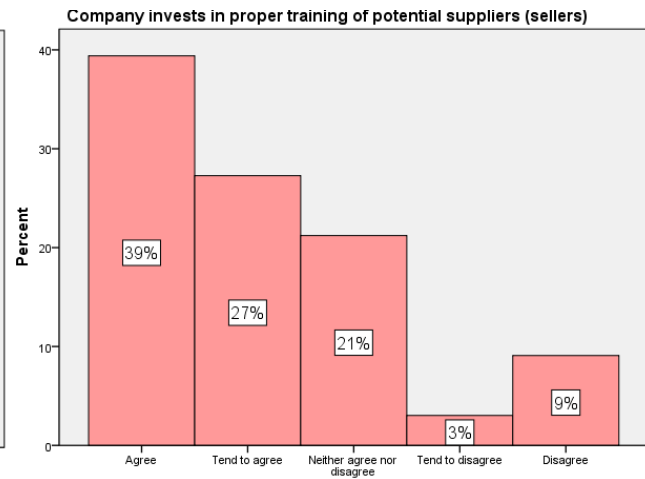


Fig. 28: Sellers Training | Percentages

By Spearman's rho correlation coefficient (table 36), it seems that companies investing in training to employees usually invest in training to potential suppliers as well, as there is a strong positive monotony between the 2 variables ( $r_s=0,721$ ).

#### Correlations

			Company has invested in proper training of employees	Company invests in proper training of potential suppliers (sellers)
Spearman's rho	Company has invested in proper training of employees	Correlation Coefficient	1,000	,721**
		Sig. (2-tailed)	.	,000
		N	33	33
	Company invests in proper training of potential suppliers (sellers)	Correlation Coefficient	,721**	1,000
		Sig. (2-tailed)	,000	.
		N	33	33

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Table 36: Spearman's rho correlation check | Employees training – Sellers training

The 3<sup>rd</sup> variable that is related to the process of implementation of e-auctions as a procurement practice concerns the initial resistance from employees in the company. As shown in the bar chart in figure 29, mode is 2, which in this case means that the most frequent answer (for the 27% of companies in the sample) is that they tend to agree that the company has experienced resistance from internal stakeholders during adoption of e-auctions. However, answers on this question are quite balanced among all options.

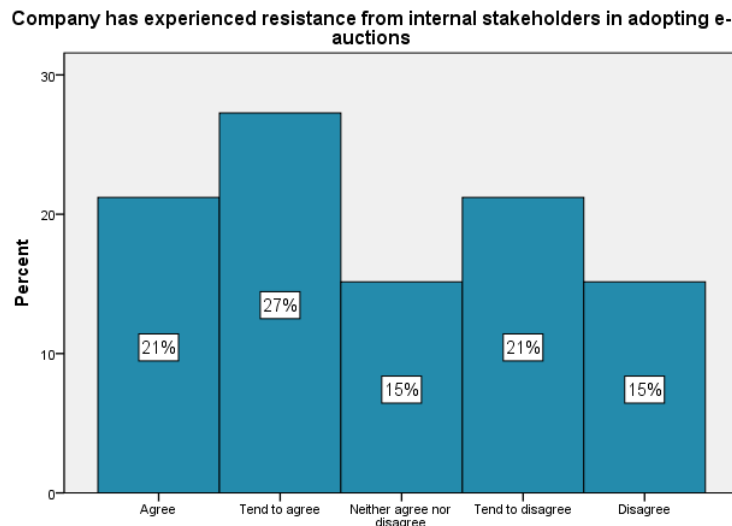


Fig. 29: Internal resistance | Percentages

It would be interesting to assess a possible correlation between sufficient training to employees and initial resistance to change. It is assumed that probably companies investing in proper training of employees may face less resistance when it comes to the change. By calculating Spearman's rho ( $r_s$ ), it is found that the above hypothesis is not confirmed, as  $r_s$  is very close to 0 ( $r_s=0,009$ ), leading to the conclusion that there is no correlation between these 2 variables (table 37).

Correlations

			Company has invested in proper training of employees	Company has experienced resistance from internal stakeholders in adopting e-auctions
Spearman's rho	Company has invested in proper training of employees	Correlation Coefficient	1,000	,009
		Sig. (2-tailed)	.	,959
		N	33	33
	Company has experienced resistance from internal stakeholders in adopting e-auctions	Correlation Coefficient	,009	1,000
		Sig. (2-tailed)	,959	.
		N	33	33

Table 37: Spearman's rho correlation check | Employees training – Internal resistance

The next question in the questionnaire concerns the legal and regulatory framework in Greece concerning e-auctions. The target of this question is twofold: 1) To understand if companies conducting e-auctions are aware of the relevant legal and regulatory framework. 2) For those that are aware, to understand if they find it supportive for the use of e-auctions. Thus, in this question, there



was one more possible answer for respondents which is “I do not know”. In order to have a clear view on the above, this question is separated to 2 variables in SPSS. The 1<sup>st</sup> one separates companies to those being aware and to those not, while the 2<sup>nd</sup> one focuses only on the ones being aware of the relevant framework, analyzing their view on how supportive they find it.

First of all, it is important to mention that the 36,4% of the companies having adopted B2B e-auctions as a procurement practice do not really know about the relevant legal and regulatory framework of the country concerning this topic (figure 30). From my point of view, this finding could stand as an area for improvement for companies in the future. That is to say that the task to check the legal framework before adopting such a practice could be added in companies’ checklist during the project implementation.

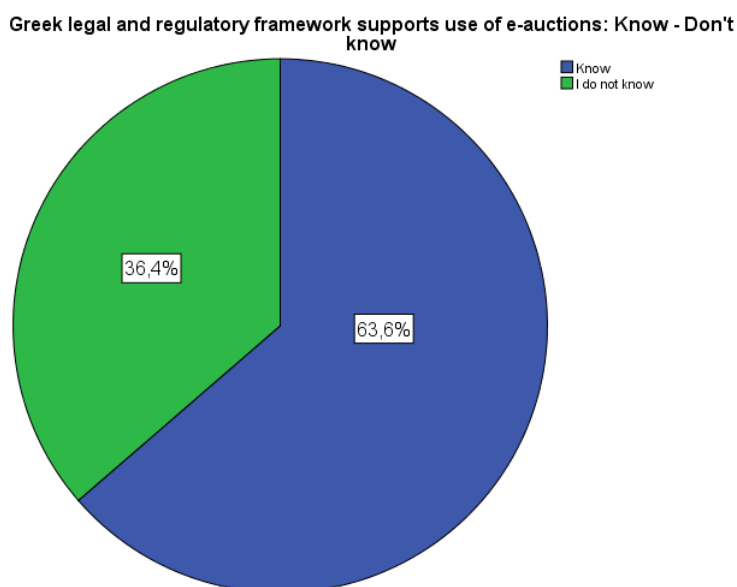


Fig. 30: Know legal & regulatory framework | Percentages

From the 21 companies (63,6%) who have assessed the relevant legal and regulatory framework about e-auctions, 13 of them believe or tend to believe that it supports the usage of this kind of competitive biddings (table 38). Mode in this case is 2, meaning that the most frequent answer of respondents in this question is that they tend to agree with the statement “The current legal and regulatory framework in Greece sufficiently supports the adoption and use of e-auctions”. There is no company disagreeing with this sentence, but there is only 1 company tending to disagree, meaning probably that this company finds some points of the framework quite challenging for the use of e-auctions, despite the adoption from their side.

**Greek legal and regulatory framework supports use of e-auctions: Agree – Disagree**

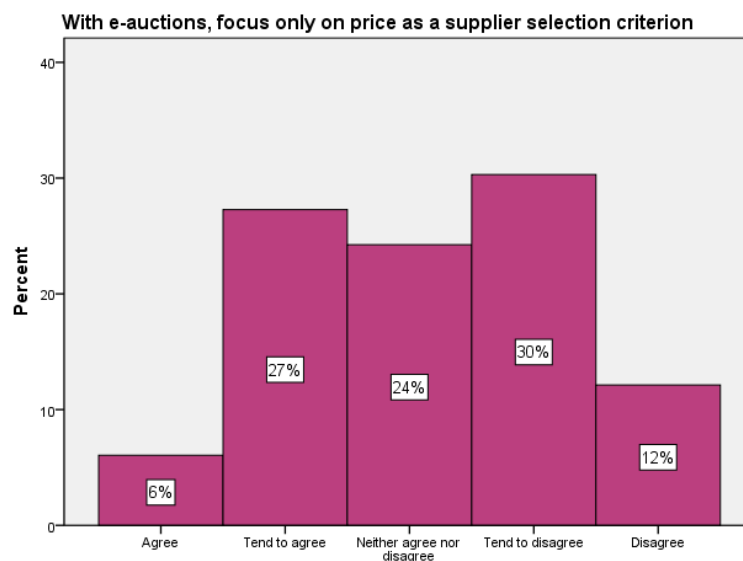
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	2	1,7	9,5	9,5
	Tend to agree	11	9,1	52,4	61,9
	Neither agree nor disagree	7	5,8	33,3	95,2
	Tend to disagree	1	,8	4,8	100,0
	Total	21	17,4	100,0	
Missing	System	100	82,6		
Total		121	100,0		

*Table 38: Supportive legal & regulatory framework | Frequencies*

The next 5 questions aim at measuring the opinion of e-auction adopters on some perceptions that exist about e-auctions. In particular, it was requested by the companies that use e-auctions to express their level of agreement with 5 statements, in order to check if:

- They focus only on price as a supplier selection criterion when running e-auctions.
- There is satisfactory level of competition amongst e-auctions participants (potential suppliers).
- Their suppliers are dissatisfied with the use of e-auctions.
- E-auctions are suitable for all or at least the most spend categories of the company.
- E-auctions can be used for the purchase of services too and not only of tangible goods.

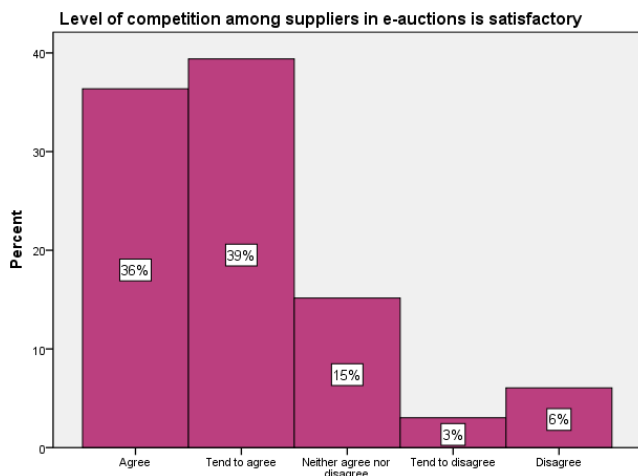
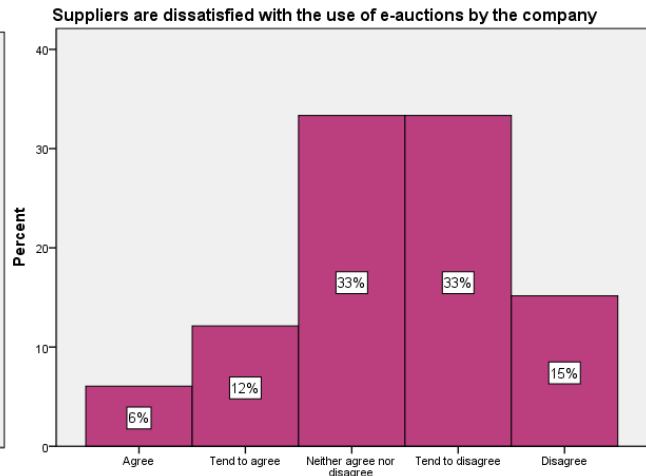
Companies in the sample have several different opinions concerning supplier selection criteria when using e-auctions, as all 5 possible options of answers have been selected as shown in figure 31.

*Fig. 31: Price as only selection criterion | Percentages*

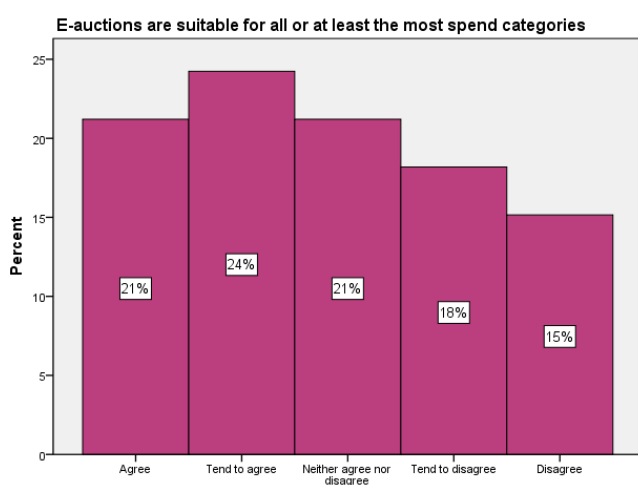
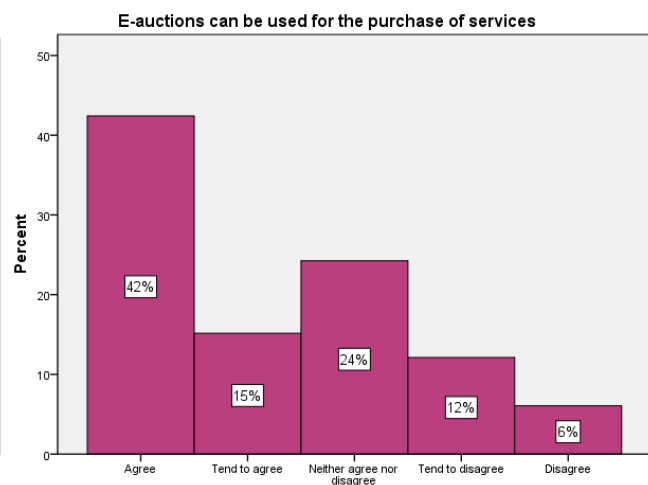


33% of the companies have selected positive answers (“agree” & “tend to agree”) in terms of agreement with the statement that they consider only price as selection criterion, 24% are more neutral, while 42% selected “tend to disagree” and “disagree”. Apparently, the perception that flexibility of supplier selection criteria is compromised with e-auctions because the focus is turned only to price, is being altered. This inference is consistent with the e-auction type that companies declared to be the most commonly used, which was by far the English one. As described in the theoretical part, in English / standard reverse e-auction the buyer sets specific supplier selection criteria along with their weights at the beginning and therefore does not award directly the lowest bidder. Hence, it is an e-auction type that allows buyers to take into account more supplier selection criteria and not only price.

Concerning suppliers’ reaction to e-auctions, it seems from the answers of companies in the sample that sellers do not usually share complaints with the buyers, despite the tough real time competition which may put pressure on them to drop their price so as to be competitive (figures 32 and 33). The vast majority of companies find the competition among suppliers in e-auctions satisfactory, which leads to lower prices and consequently, to cost savings for the company running the event, as analyzed before through the benefits variables. Even though tough competition is positive for the buyers, it could be a hurdle for the sellers to participate in the e-auction. However, 48% of companies expressed that they tend to disagree or disagree with the statement “Suppliers are dissatisfied with the use of e-auctions by the company”, in contrast to the above hypothesis. In this case there were 2 modes, as there were 2 most frequent options, with 11 answers each. These 2 are “Neither agree nor disagree” and “Tend to disagree”. Only 2 companies stated clearly that their suppliers complain to them about e-auctions, while other 4 companies tend to agree with this. Nevertheless, it should be clarified that from this question, it cannot be clearly understood if suppliers are really dissatisfied or not with e-auctions, since the answers in the survey are given by the companies running the e-auction (buyers) and not by the potential suppliers participating in it (sellers). Complaints of sellers received by the companies could be an indication of their disappointment with the practice, but definitely not a clear statement.

*Fig. 32: Satisfactory competition | Percentages**Fig. 33: Dissatisfied suppliers | Percentages*

As for the spend categories for which e-auctions can be used, answers are very balanced between all options (figure 34). 45% of the companies in the sample believe or tend to believe that electronic auctions can be conducted for all or at least the most spend categories of the company, 33% disagree or tend to disagree with this, while 21% are neutral. Given the fact that most companies do not run many e-auction events per year, it could be assumed that they are experienced only with a few specific spend categories in terms of this practice. As a result, probably they have not even assessed yet the suitability of e-auctions for each and every category and thus, there is this 63% that is not quite sure in this question (answers “tend to agree”, “neither agree nor disagree” and “tend to disagree”). Another perception that exists is that e-auctions are not as suitable for services as for tangible goods because it is more difficult to set clear specifications when buying services. Nevertheless, 42% of companies in the sample are sure that e-auctions can be used for the purchase of services too, while only 6% totally disagree with this (figure 35).

*Fig. 34: All spend categories | Percentages**Fig. 35: Purchase of services | Percentages*



The last 3 questions to companies having adopted the procurement practice that is under review in this thesis concern their evaluation on this decision they have made. From their answers, it is obvious that there is a positive momentum towards e-auctions from the companies that have tried them. To be more specific, as shown in the bar charts in figures 36 and 37, the vast majority of companies is satisfied or very satisfied with the adoption of e-auctions and is going to continue using them for future purchases. In satisfaction measure, mode is option 4 which is “Satisfied” selected by 52% of the respondents, while in the variable concerning the intention for the future, mode is option 1 which is “Agree that we are going to continue running e-auctions in the future” selected by 61% of the respondents.

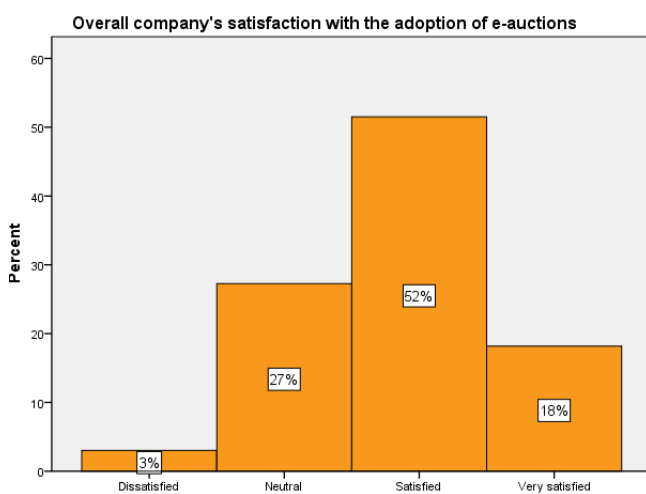


Fig. 36: Satisfaction with e-auctions | Percentages

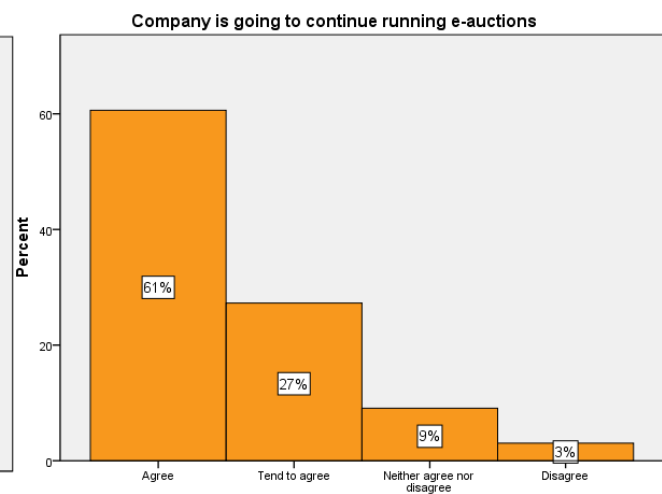


Fig. 37: Continue running e-auctions | Percentages

Despite their satisfaction and their intention to continue using them, it seems that most companies are not completely sure that e-auctions are an integral part of the organization's procurement strategy. The tendency is positive, as only 9% of companies are sure that e-auctions are not one of the most important parts of their procurement strategy, but the most frequent answer given by 45% of the companies is option 2 “Tend to agree”. Considering that half of the companies have adopted this practice during the last 3-4 years and that almost 80% of the companies have run less than 8 e-auctions during the last 12 months, the finding that only 24% of companies clearly see e-auctions as an integral part of their strategy is absolutely logical. This procurement practice is still quite fresh in Greece and companies that have tried it are still experimenting with it, but it seems to have a very positive tendency on becoming a significant part of companies' purchases.

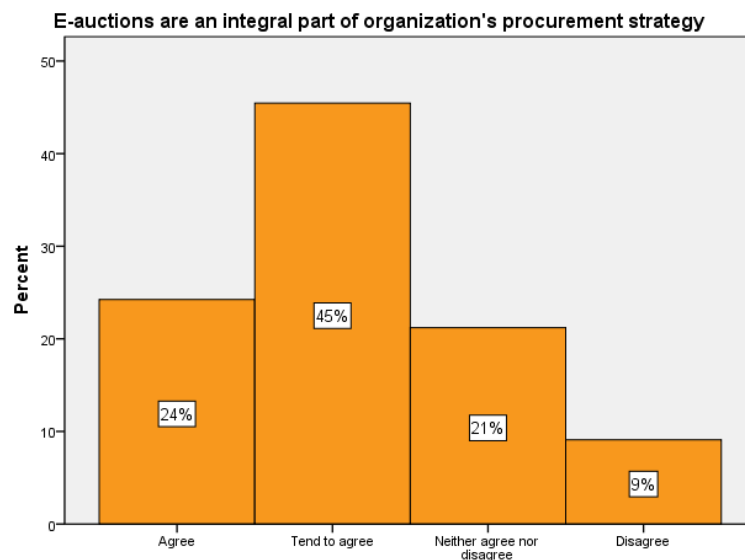


Fig. 38: E-auctions as integral part of the strategy | Percentages

#### Analysis of participants not having adopted B2B e-auctions

Let's focus now on analyzing the second subset; the subset of the 88 respondents who stated that they have never run any e-auction in their company. The rest 33 companies that are adopters of e-auctions are considered as missing values in all questions that concern only the non-adopters.

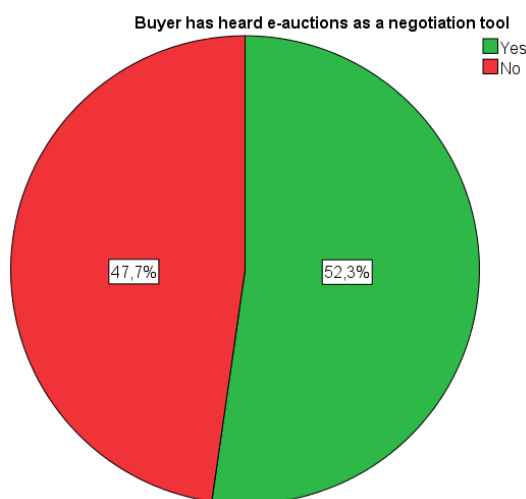


Fig. 39: Heard e-auctions | Percentages

First of all, it is possible that some companies have not run any e-auction because they do not even know the existence of this practice. Hence, the first variable that concerns companies not having adopted e-auctions measures their allocation to those that have heard B2B e-auctions and to those that are not aware of their existence at all. As depicted in the pie in figure 39, answers are quite balanced between the 2 options. Nonetheless, companies that have heard B2B e-auctions even though they have not used them are slightly more than the ones that have not even heard them (52,3% and 47,7% respectively, of the companies that have not used the practice).

Considering the total sample, summing the 46 companies that have heard B2B e-auctions even though they have not used them, with the 33 e-auction adopters who would answer "Yes" in this question, it could be concluded that 79 out of 121 companies of the sample have heard of e-auctions.





This means that 65% of the respondents in the whole sample of the research are aware of the existence of e-auctions as a negotiation tool for their purchases. It seems that there is still area for raising awareness to companies about e-auctions and e-auction platform providers could utilize this information.

For non-adopters that are not even aware of e-auctions, there is no point to evaluate any other further reason of non-adoption. As a result, further questions continued only for companies that have heard of e-auctions. The next variable concerns possible benefits of B2B e-auctions and the possibility of having been evaluated by the 46 companies that are aware of the tool but have not used it. It seems from the table 39 that only 19,6% of the relevant subset has considered the advantages of the practice in their companies. The rest 80,4% of the relevant subset have not evaluated how the company could be affected by utilizing the practice, even though they are aware of its existence.

Statistics						
Company has considered the advantages of e-auctions.						
N	Valid	46	Valid	Yes	9	7,4
	Missing	75		No	37	30,6
Mode		2		Total	46	38,0
			Missing	System	75	62,0
			Total		121	100,0

Table 39: Non-adopters having evaluated e-auctions benefits | Frequencies

The next variables help us understand the reasons why the 46 companies have not tried e-auctions in spite of knowing them as a practice. Specifically, the factors that are evaluated as possible barriers are the following:

- Technology
- Internal challenges
- Spend category suitability
- Greek legislation

All 4 factors were examined in different questions in the questionnaire with possible answers “No barrier”, “Low barrier” and “High barrier”, while legislation barrier had also “I do not know” as a possible answer for covering also respondents who have not checked the legal framework and are not aware of it. As this variable is ordinal, I chose to treat the “I do not know” answers as missing ones, so as to be able to keep the variable ordinal and not be forced to make it nominal just because of this answer.



Statistics

		Technology as a barrier to e-auctions adoption	Internal factors as a barrier to e-auctions adoption	Spend category suitability as a barrier to e-auctions adoption	Greek legislation as a barrier to e-auctions adoption
N	Valid	46	46	46	16
	Missing	75	75	75	105
Median		1,00	2,00	2,00	2,00
Mode		1	1	2	2
Percentiles	25	1,00	1,00	1,00	1,00
	50	1,00	2,00	2,00	2,00
	75	2,00	2,00	3,00	2,00

Table 40: Barriers for non-adopters

It is interesting that technology needed to run an e-auction event is not considered as an obstacle by the 63% of the companies, while it is considered as a barrier, either high or low, only from the 37% of the relevant subset (figure 40). All other factors that are being examined seem to be higher barriers for companies than technology. Concretely, 57% of companies that have not run any e-auction even though they know them as a practice believe that there are internal factors that constitute obstacles, while the rest 43% do not declare internal factors as challenges preventing them from using e-auctions (figure 41). Moreover, percentage of companies considering that the spend categories they handle are not suitable for e-auctions reaches 74% (figure 42), while percentage of companies considering that Greek legislation does not favor them to adopt the practice reaches 63% (figure 43). From companies finding all these factors as barriers, most of them characterize them as low barriers. In other words, the percentage of companies finding them as insurmountable obstacles is relatively low, with the exception of spend category suitability, which presents the highest percentage of companies having answered “High barrier” in comparison to all other factors.

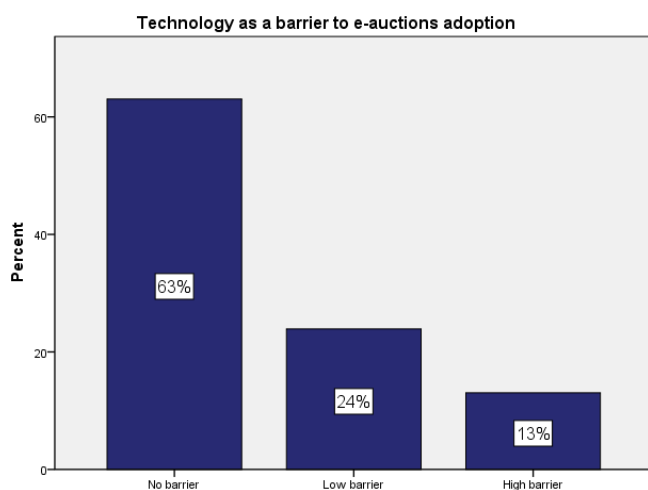


Fig. 40: Barrier - Technology | Percentages

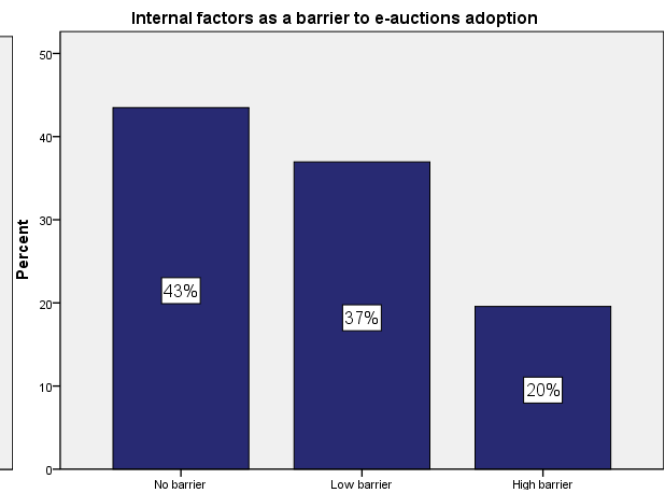


Fig. 41: Barrier – Internal factors | Percentages

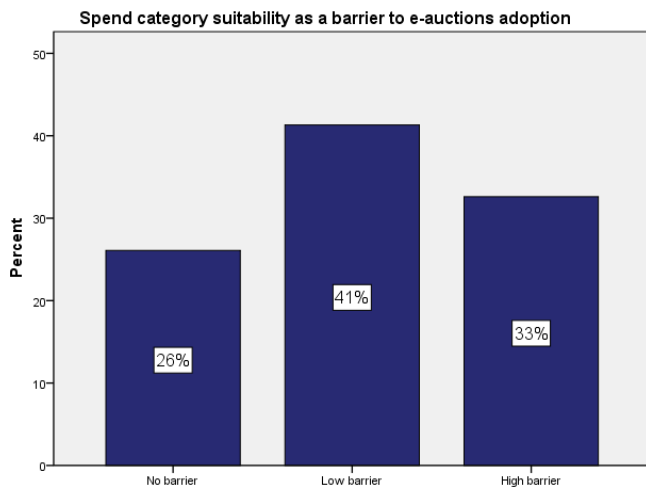


Fig. 42: Barrier – Spend category | Percentages

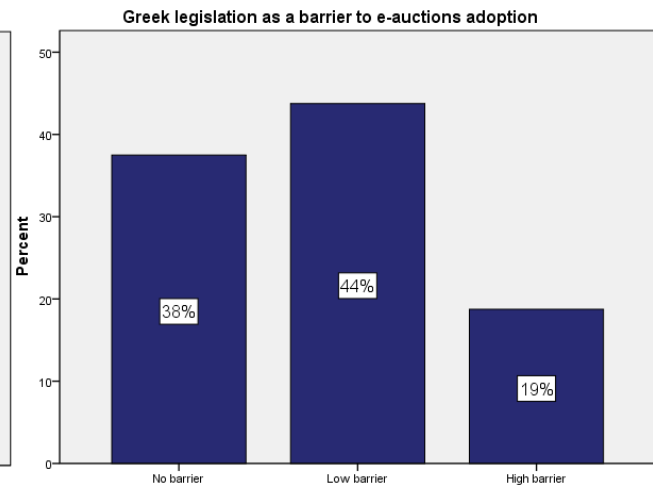


Fig. 43: Barrier – Legislation | Percentages

Assessing possible correlations between factors considered as barriers and companies' size and buyers' experience in the sample, Spearman's rho can be calculated since all variables are ordinal.

Beginning with technology considered as barrier, it seems that there is weak positive association with the number of employees ( $r_s=0,287$ ) (table 41), no correlation with turnover ( $r_s=-0,009$ ) (table 42) and negligible negative association with the number of buyers' experience years ( $r_s=-0,194$ ) (table 43). These mean the following:

- Bigger companies with more employees tend slightly to find technology a higher barrier, which is actually an unorthodox finding compared to the perception that bigger companies are more familiar with technology.
- Company's turnover is not associated to whether company considers technology as barrier or not.
- Companies with more experienced buyers tend negligibly to find technology a lower barrier.

Correlations				
			Technology as a barrier to e-auctions adoption	Comp_Number of employees
Spearman's rho	Technology as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,287
		Sig. (2-tailed)	.	,053
		N	46	46
	Comp_Number of employees	Correlation Coefficient	,287	1,000
		Sig. (2-tailed)	,053	.
		N	46	121

Table 41: Spearman's rho correlation check | Barrier Technology – Company size



Correlations			Technology as a barrier to e-auctions adoption	Comp_ Annual turnover
Spearman's rho	Technology as a barrier to e-auctions adoption	Correlation Coefficient	1,000	-,009
		Sig. (2-tailed)	.	,956
		N	46	40
	Comp_ Annual turnover	Correlation Coefficient	-,009	1,000
		Sig. (2-tailed)	,956	.
		N	40	108

Table 42: Spearman's rho correlation check | Barrier Technology – Company turnover

Correlations			Technology as a barrier to e-auctions adoption	Comp_Buyers' average number of experience years
Spearman's rho	Technology as a barrier to e-auctions adoption	Correlation Coefficient	1,000	-,194
		Sig. (2-tailed)	.	,197
		N	46	46
	Comp_Buyers' average number of experience years	Correlation Coefficient	-,194	1,000
		Sig. (2-tailed)	,197	.
		N	46	121

Table 43: Spearman's rho correlation check | Barrier Technology – Buyers' experience

Continuing with internal factors considered as barrier in the sample, it seems that there is weak to moderate positive association with the number of employees ( $r_s=0,305$ ) (table 44), almost no correlation with turnover ( $r_s=0,083$ ) (table 45) and almost no or negligible negative association with the number of buyers' experience years ( $r_s=-0,092$ ) (table 46). These mean the following:

- Bigger companies with more employees tend slightly to have internal challenges that prevent them from adopting e-auctions.
- Company's turnover is not associated to whether company considers internal factors as barrier or not.
- Companies with more experienced buyers tend negligibly to find internal factors a lower barrier to e-auction adoption.



Correlations			Internal factors as a barrier to e-auctions adoption	Comp_Number of employees
Spearman's rho	Internal factors as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,305*
		Sig. (2-tailed)	.	,039
		N	46	46
	Comp_Number of employees	Correlation Coefficient	,305*	1,000
		Sig. (2-tailed)	,039	.
		N	46	121

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 44: Spearman's rho correlation check | Barrier Internal factors – Company size

Correlations			Internal factors as a barrier to e-auctions adoption	Comp_ Annual turnover
Spearman's rho	Internal factors as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,083
		Sig. (2-tailed)	.	,612
		N	46	40
	Comp_ Annual turnover	Correlation Coefficient	,083	1,000
		Sig. (2-tailed)	,612	.
		N	40	108

Table 45: Spearman's rho correlation check | Barrier Internal factors – Company turnover

Correlations			Internal factors as a barrier to e-auctions adoption	Comp_Buyers' average number of experience years
Spearman's rho	Internal factors as a barrier to e-auctions adoption	Correlation Coefficient	1,000	-,092
		Sig. (2-tailed)	.	,545
		N	46	46
	Comp_Buyers' average number of experience years	Correlation Coefficient	-,092	1,000
		Sig. (2-tailed)	,545	.
		N	46	121

Table 46: Spearman's rho correlation check | Barrier Internal factors – Buyers' experience



Continuing with spend category suitability considered as barrier in the sample, it seems that there is weak positive association with the number of employees ( $r_s=0,282$ ) (table 47), almost moderate positive correlation with turnover ( $r_s=0,379$ ) (table 48) and almost no association with the number of buyers' experience years ( $r_s=0,023$ ) (table 49). These mean the following:

- Bigger companies with more employees tend slightly to believe more that spend categories they handle are not suitable for e-auction.
- Companies with higher turnover tend to believe more that spend categories they handle are not suitable for e-auction.
- Buyers' experience is not associated to whether companies consider their spend categories as barrier or not. This is a surprising finding, as it would be more logical that when buyers are more experienced, they are more familiar with the specificities of their spend categories, so they would have a clear understanding whether they are suitable for e-auctions or not.

Correlations				
			Spend category suitability as a barrier to e-auctions adoption	Comp_ Number of employees
Spearman's rho	Spend category suitability as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,282
		Sig. (2-tailed)	.	,058
		N	46	46
	Comp_ Number of employees	Correlation Coefficient	,282	1,000
		Sig. (2-tailed)	,058	.
		N	46	121

Table 47: Spearman's rho correlation check | Barrier Spend category – Company size

Correlations				
			Spend category suitability as a barrier to e-auctions adoption	Comp_ Annual turnover
Spearman's rho	Spend category suitability as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,379*
		Sig. (2-tailed)	.	,016
		N	46	40
	Comp_ Annual turnover	Correlation Coefficient	,379*	1,000
		Sig. (2-tailed)	,016	.
		N	40	108

\*. Correlation is significant at the 0.05 level (2-tailed).

Table 48: Spearman's rho correlation check | Barrier Spend category – Company turnover



Correlations			Spend category suitability as a barrier to e-auctions adoption	Comp_Buyers' average number of experience years
Spearman's rho	Spend category suitability as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,023
		Sig. (2-tailed)	.	,880
		N	46	46
	Comp_Buyers' average number of experience years	Correlation Coefficient	,023	1,000
		Sig. (2-tailed)	,880	.
		N	46	121

Table 49: Spearman's rho correlation check | Barrier Spend category – Buyers' experience

Concluding with legislation considered as barrier in the sample, it seems that there is no correlation with the number of employees ( $r_s=0,025$ ) (table 50), weak to moderate negative correlation with turnover ( $r_s=-0,308$ ) (table 51) and weak negative association with the number of buyers' experience years ( $r_s=-0,211$ ) (table 52). These mean the following:

- Size of company is not associated to whether company considers legislation as barrier or not.
- Companies with higher turnover tend slightly to find legislation a lower barrier.
- Companies with more experienced buyers tend slightly to find legislation a lower barrier to e-auction adoption.

Correlations			Greek legislation as a barrier to e-auctions adoption	Comp_Number of employees
Spearman's rho	Greek legislation as a barrier to e-auctions adoption	Correlation Coefficient	1,000	,025
		Sig. (2-tailed)	.	,926
		N	16	16
	Comp_Number of employees	Correlation Coefficient	,025	1,000
		Sig. (2-tailed)	,926	.
		N	16	121

Table 50: Spearman's rho correlation check | Barrier Legislation – Company size

Correlations			Greek legislation as a barrier to e-auctions adoption	Comp_ Annual turnover



Spearman's rho	Greek legislation as a barrier to e-auctions adoption	Correlation Coefficient	1,000	-,308
		Sig. (2-tailed)	.	,284
		N	16	14
	Comp_ Annual turnover	Correlation Coefficient	-,308	1,000
		Sig. (2-tailed)	,284	.
		N	14	108

Table 51: Spearman's rho correlation check | Barrier Legislation – Company turnover

Correlations				
			Greek legislation as a barrier to e-auctions adoption	Comp_Buyers' average number of experience years
Spearman's rho	Greek legislation as a barrier to e-auctions adoption	Correlation Coefficient	1,000	-,211
		Sig. (2-tailed)	.	,433
		N	16	16
	Comp_Buyers' average number of experience years	Correlation Coefficient	-,211	1,000
		Sig. (2-tailed)	,433	.
		N	16	121

Table 52: Spearman's rho correlation check | Barrier Legislation – Buyers' experience

In order to conclude the analysis of factors preventing companies from adopting e-auctions, it is worth checking which specific aspects of technology, internal challenges and category suitability are the main barriers for those companies that consider these factors as barriers. In these questions participants were allowed to select multiple options, if applicable, amongst the following:

- *Technology*

- Inadequate capabilities of e-auction platform.
- Difficulty in integrating e-auction platform with the existing system.
- Difficulty of the organization in using e-auction system – Not user-friendly system.
- Low e-auction system adoption by suppliers – Suppliers are reluctant to use e-auction platform to participate in the process.
- Too expensive to adopt e-auction system.
- Other





### - Internal challenges

- Lack of knowledge and experience of procurement professionals - buyers.
- Lack of time of procurement professionals – buyers to be trained, train participants and run e-auctions.
- Difficult to justify the Return on Investment of e-auctions
- Lack of financial resources (budget) for the relevant software.
- Difficulty for the organization to understand the benefits and accept e-auctions as a solution.
- General resistance of the organization to change and new tools adoption.
- Other

### - Spend category suitability

- Too strategic spend category
- Difficult to define clear specifications
- Need for very fast purchases in specific categories.
- Difficult supplier market in specific categories.
- Other

In order to be able to analyze the data of these 3 variables, it was mandatory firstly to define a set of multiple responses for each of them (figure 44).

Figure 44 displays two screenshots of the 'Define Multiple Response Sets' dialog box in SPSS, showing the configuration for two variables: 'Barriers\_Techn\_aspects' and 'Barriers\_Internal\_aspects'.

**Left Screenshot (Barriers\_Techn\_aspects):**

- Set Definition:** The 'Variables in Set' list contains 'N\_BarrierTechnolog...' and 'N\_BarrierTechnolog...'.
- Variables Are Coded As:** 'Dichotomies' is selected, and 'Counted value' is set to 1.
- Name:** 'Barriers\_Techn\_aspects'
- Label:** (Empty)

**Right Screenshot (Barriers\_Internal\_aspects):**

- Set Definition:** The 'Variables in Set' list contains 'N\_BarrierInternalKn...', 'N\_BarrierInternalTI...', 'N\_BarrierInternalROI...', 'N\_BarrierInternalBu...', 'N\_BarrierInternalDif...', 'N\_BarrierInternalRe...', and 'N\_BarrierInternalOt...'.
- Variables Are Coded As:** 'Dichotomies' is selected, and 'Counted value' is set to 1.
- Name:** 'Barriers\_Internal\_aspects'
- Label:** (Empty)

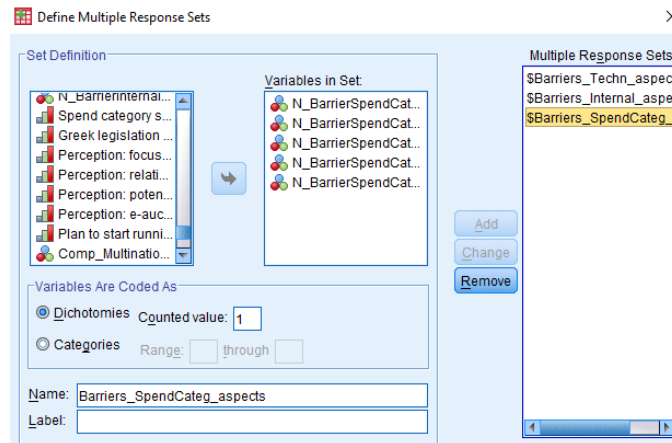


Fig. 44: Sets of multiple responses in SPSS

After that, it is possible to analyze the frequencies. Beginning with the system aspects, the options chosen the most by the 32 companies that find technology a barrier for them are “Low e-auction system adoption by suppliers – Suppliers are reluctant to use e-auction platform to participate in the process” and “Too expensive to adopt e-auction system” by 8 and 7 respondents respectively (table 53).

**\$Barriers\_Techn\_aspects Frequencies**

		Responses		Percent of Cases
		N	Percent	
\$Barriers_Techn_aspects <sup>a</sup>	N_BarrierTechnologyPlatformCapabilities	4	12,5%	23,5%
	N_BarrierTechnologyIntegration	6	18,8%	35,3%
	N_BarrierTechnologyUsabilityNotuserfriendly	5	15,6%	29,4%
	N_BarrierTechnologySuppliers	8	25,0%	47,1%
	N_BarrierTechnologyExpensivePlatform	7	21,9%	41,2%
	N_BarrierTechnologyOther	2	6,3%	11,8%
Total		32	100,0%	188,2%

a. Dichotomy group tabulated at value 1.

Table 53: Barrier Technology – Aspects | Frequencies

As for the internal challenges, the options chosen the most by the 60 companies that find internal issues a barrier for them are “Lack of time of procurement professionals - buyers to be trained, train participants and run e-auctions” and “Lack of knowledge and experience of procurement professionals - buyers” by 16 and 15 companies respectively (table 54).



**\$Barriers\_Internal\_aspects Frequencies**

	Responses		Percent of Cases
	N	Percent	
\$Barriers_Internal_aspects <sup>a</sup> N_BarrierInternalKnowledgeExp	15	25,0%	57,7%
N_BarrierInternalTime	16	26,7%	61,5%
N_BarrierInternalROI	3	5,0%	11,5%
N_BarrierInternalBudget	5	8,3%	19,2%
N_BarrierInternalDifficBenefits	9	15,0%	34,6%
N_BarrierInternalResistancetoChange	8	13,3%	30,8%
N_BarrierInternalOther	4	6,7%	15,4%
Total	60	100,0%	230,8%

a. Dichotomy group tabulated at value 1.

*Table 54: Barrier Internal factors – Aspects | Frequencies*

Last but not least, concerning spend category suitability, most of the given options were selected by the majority of respondents. Specifically, options “Difficult to define clear specifications”, “Need for very fast purchases in specific categories” and “Difficult supplier market in specific categories” are the ones ticked by 64,7%, 52,9% and 52,9% respectively (table 55).

**\$Barriers\_SpendCateg\_aspects Frequencies**

	Responses		Percent of Cases
	N	Percent	
\$Barriers_SpendCateg_aspects <sup>a</sup> N_BarrierSpendCategoryStrategic	4	6,1%	11,8%
N_BarrierSpendCategorySpecifications	22	33,3%	64,7%
N_BarrierSpendCategorySpeed	18	27,3%	52,9%
N_BarrierSpendCategorySupplierMarket	18	27,3%	52,9%
N_BarrierSpendCategoryOther	4	6,1%	11,8%
Total	66	100,0%	194,1%

a. Dichotomy group tabulated at value 1.

*Table 55: Barrier Spend category – Aspects | Frequencies*

The next 4 variables examine the level of agreement of the participants not having adopted e-auctions with some statements that based on the bibliography, are perceptions of companies related to this practice. As it seems clearly from the bar charts below, the answers about all 4 perceptions vary among all available options and in most of them there is no clear tendency on agreement or disagreement. In addition, answer “Neither agree nor disagree” is given by more than 20% of companies in each one of the questions.



Looking at the frequencies of answers in each perception, 45% of the companies not running e-auctions in spite of knowing them tend to disagree or disagree with the statement that the focus is only on price when running e-auctions, while 34% of the same subset tend to agree or agree with this (figure 45). It is important to mention that a tendency of responses on disagreement answers concerning this perception is aligned with the answers given by e-auction adopters too. Therefore, companies in Greece seem not to adopt this perception in general. As for the perception that the relationship built with suppliers would be negatively affected with the adoption of e-auctions, the most frequent answer of non-adopters is “Neither agree nor disagree” with 35% of respondents having chosen this option. Apart from this neutral answer, the tendency of rest answers is more positive than negative, as 37% of companies agree or tend to agree with the perception, compared to 29% of companies that disagree or tend to disagree (figure 46). On the contrary, as analyzed before, most e-auction adopters stated that they do not receive complaints from their suppliers, so they do not appear to be dissatisfied. This information could be taken into account by non-adopters, the majority of whom believes or tends to believe also that potential suppliers would refuse to participate in the e-auction events, as shown in the bar chart in figure 47. Concluding with the last perception, the one about e-auctions being considered suitable only for tangible goods and not for services, 33% of non-adopters clearly disagree with the statement and this is the most frequent answer given in this question (figure 48). If comparing all positive (“Agree” and “Tend to agree”) with all negative answers (“Disagree” and “Tend to disagree”), it seems that negative ones are more than the positive ones, following the same tendency with the answers of e-auctions adopters.

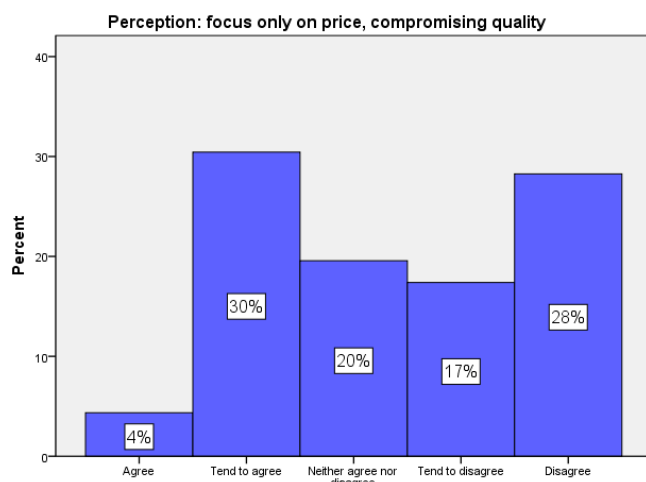


Fig. 45: Focus only on price | Percentages

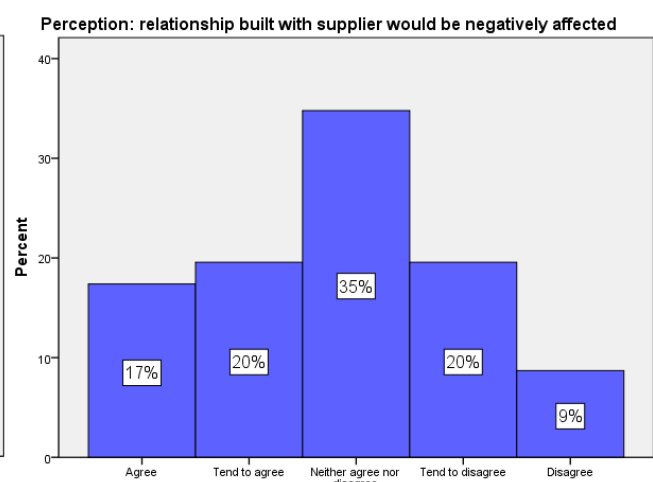
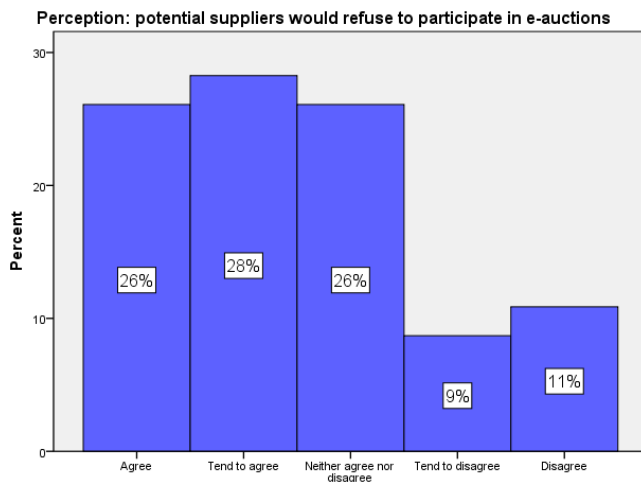
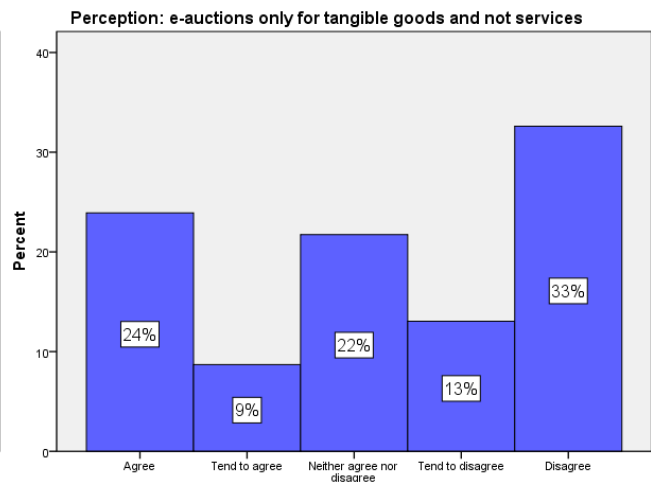
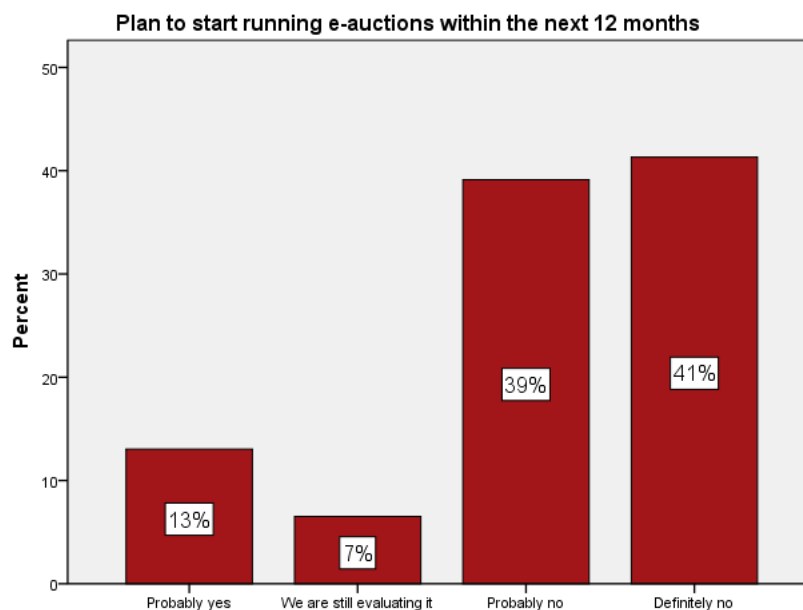


Fig. 46: Negative relationship with suppliers | Percentages

*Fig. 47: Refusal from suppliers | Percentages**Fig. 48: Only for tangible goods | Percentages*

Last but not least, what is examined in the last variable is whether non-adopters of e-auctions are planning to start using them within the next 12 months. Based on the answers of the respondents as depicted in figure 49, none of the companies chose the option “Definitely yes”, only 13% of the subset stated that they will probably start them, while 7% are still evaluating the possibility. It is interesting that the vast majority of companies are not going to start or probably will not start running e-auctions within the next 12 months. This could be considered a reasonable finding given the fact that approximately 80% of companies not having adopted e-auctions even though they are aware of them have not evaluated their benefits at all. Presumably this is the main reason why they are not willing to adopt the practice soon.

*Fig. 49: Plan to start e-auctions | Percentages*



## 4. Conclusion

By conducting an analytical review of the literature and existing studies, an in-depth understanding regarding the topic of Business-to-Business electronic auctions is gained and presented. Since it is found that there are no sufficient data in the bibliography about e-auctions use by Greek private companies, a quantitative research was carried out. Major aspects of reverse e-auctions as derived from the literature are investigated through the survey, specifically for the Greek business landscape.

The study found that between 19,4% and 35,2% of active Private Capital Companies, General Partnerships, Limited Partnerships, Société Anonyme and Limited Liability Companies in Greece have adopted reverse e-auctions for the purchase of their goods and services. It could be mentioned that there is still area for raising awareness to private companies about e-auctions in Greece and this could be utilized by e-auction platform providers. Multinational companies slightly tend more to adopt e-auctions, while bigger companies in terms of number of employees and turnover and companies with medium experience of buyers are significantly more inclined to using B2B e-auctions. Additionally, it is figured out that there is an association between company's industry and the decision to adopt e-auctions, whereas there is no relevant association with region the company is based on.

From the analysis of companies in the sample using e-auctions, it turns out that the adoption of this modern procurement practice took place the recent years after the Covid era, i.e. during the last 3 years, but companies already have high level of trust in the e-auctions process and results. The number of events running by companies per year is in the majority of cases still relatively low. Therefore, it seems that companies in Greece are increasingly experimenting with e-auctions as a procurement tool, albeit they are not considered yet as a basic practice for all their purchases and are not viewed by most of the companies as an integral part of their procurement strategy. Moreover, it is clear that procurement professionals do not want to compromise the flexibility of supplier selection criteria in their purchases, therefore English / standard reverse e-auction is the most frequently chosen type of events. The practice is used for several different spend categories, for purchasing both tangible goods and services in order to reap all the benefits as occurred from the literature:

- To bring cost savings to the company,
- To improve transparency in procurement transactions,
- To increase the efficiency of negotiations with suppliers,
- To simplify procurement process, and



- To increase the speed of the procurement process.

What has emerged from the study is that the vast majority of companies actively monitors and evaluates the effectiveness of e-auction process, so as to be able to improve it time after time and capitalize more on the benefits. As private companies take advantage of reduced costs and other benefits derived from e-auctions, they find the cost of the relevant platform reasonable. Besides, platform providers seem to offer a holistic service to their customers, including satisfactory technical support and a quite user-friendly system, having customer centricity in the core of their approach. As for the adoption phase, the most frequent answer of participants in the survey is that their companies invest enough on training to both internal stakeholders and potential suppliers participating to e-auction events. However, regardless of the adequate training, several companies face internal resistance to change when trying to implement the new technology. On the contrary, suppliers participating in the events do not usually share complaints with the buyers despite the tough real-time competition they are involved. In general, the larger part of companies that participated in the survey is just satisfied or very satisfied with the adoption of e-auctions and is going to continue using them for their future purchases.

At the other end of the spectrum, focusing on companies that have selected to remain in more conventional procurement methods, half of them have never heard of e-auctions. From the rest of companies, just a few have evaluated the possible benefits of the practice, and thus, the greatest number of non-adopters finds it difficult to start running e-auctions within the next 12 months. It is interesting that technology needed to run e-auction events is not considered as an obstacle by the majority of companies. On the contrary, internal organizational factors (mostly lack of time, knowledge and experience of procurement professionals), factors related to the spend categories that they handle (mostly the difficulty to define clear specifications, the need for very fast purchases in specific categories and the difficult supplier market in specific categories) as well as the Greek legislation seem to be higher barriers for companies. Furthermore, several companies not using B2B electronic auctions recognize that there is no need to focus only on price when selecting supplier through e-auction and that the events can be used also for services apart from tangible goods. However, the majority of them have the sense that potential suppliers would refuse to participate in the events.

Overall, it seems that there is positive momentum in e-auctions, which have started to become a significant part of private companies' purchases, but there is still much area for further adoption. This study can be extended to include the public sector too, in order to evaluate the differences with



the private companies. Future research may also explore the e-auction adoption rates in Europe, examining the various factors influencing the adoption of the practice per country.





## 5. References

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## 6. Appendix

Questionnaire of the survey in Greek & English:



Questionnaire in  
Greek & English.docx

Sampling data:



sampling.xlsx

Responses of participants in the survey:



E-auctions survey  
(Responses).xlsx

SPSS file with variables and survey data:



ThesisData.sav

Output file of SPSS with analyses:



OutputThesis.spv