IMPACT OF COUNTRY, SPEND AND BUYER ORGANISATION TYPE ON THE ADOPTION OF LONG-TERM CONTRACTS

ABSTRACT

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IMPACT OF COUNTRY, SPEND AND BUYER ORGANISATION TYPE ON THE ADOPTION OF LONG-TERM CONTRACTS

Impact of Country, spend and buyer organization type on the adoption of long-term contracts

Viewed through the context of public sector contracts

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Selecting the right type of supplier strategy is an important aspect of supplier relationship management practices. The duration of the supplier relationship can impact how certain behaviours develop within the relationship, including how concepts such as power and dependency develop throughout the engagement. Data shows that there are impacts from the estimated spend, buyer country and buyer type on the selected length of the contract, as shown through an analysis of public procurement data. This research focuses on finding out the correlations between these areas and how they interact in the public buying space, including evaluating what could be the contributing factors, such as the types of buyer organisations that are purchasing and even cultural aspects.

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Maan, sopimusarvon ja ostajaorganisaatiotyypin vaikutus pitkäaikaisten sopimusten adoptioon

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Oikean tyyppisen toimittajastrategian valinta on tärkeä osa toimittajasuhteiden hallintakäytäntöjä. Toimittajasuhteen kesto voi vaikuttaa siihen, miten tietyt käyttäytymiset kehittyvät suhteessa, mukaan lukien siihen, miten käsitteet, kuten valta ja riippuvuus, kehittyvät toimeksiannon aikana. Analyysi osoittaa, että sopimuksen arvolla, ostajan maalla ja ostajatyypillä voi olla vaikutuksia valittuun sopimuksen pituuteen, tätä on selvitetty julkisia hankintoja koskevan datan analyysin kautta. Tämä tutkimus keskittyy selvittämään näiden alueiden välisiä korrelaatioita ja niiden vuorovaikutusta julkisessa ostamisessa, myös arvioiden, mitkä voisivat olla vaikuttavia tekijöitä, kuten ostajaorganisaatioiden tyypit ja mahdolliset kulttuuriset näkökohdat.

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Mom and Dad, you're no longer here but I dedicate this achievement for you. Thank you for showing me what love, perseverance and dedication needs to look like.

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1 Introduction and Background

1.1 Objectives, research questions and limitations

The concepts of power and dependency appear in purchasing and supply chain theories as something for buyers to be aware of, when determining the right supply or purchasing strategy for their organization (Caniels & Gelderman, 2005). Supply chain professionals can find it easier to navigate complex relationships with suppliers when having a greater understanding of these two concepts. These concepts when appearing in a buyer and supplier relationships can result in the development of interdependence (Caniels & Gelderman, 2005), which can in turn weaken the negotiating position of either party, including the buyer organization, so it will be in the best interest of buying professionals to be aware of how power and dependency develop and what types of strategies can be adopted to ensure there are at least no negative consequences for the buyer, if operating in a relationship where the buyer has developed a position of power and/or dependency.

The concepts can exist in a buyer and supplier relationships either individually and/or together, ad can influence the quality, health and potential quality and commercial outcomes of the supplier relationship. Due to this, it is critical to understand the underlying conditions that potentially can create power and dependency and its impacts. This research will review the topic from three viewpoints: long-term contracts, the public sector, and the buyer perspective. Due to the unique viewpoint of studying these viewpoints, this thesis research will aim to bring valuable new insight onto the study topic.

There is a large amount of academic and theoretical literature available when studying the practice of long-standing supplier relationships. In the literary this type of relationship is commonly referred to as a long-term supplier relationship or long-term contract between the buyer and seller. For ease of review and relevance to the reviewed literary, this paper will use "long-term" instead of "long-standing" when presenting the results of the review and discussing the phenomena. Long-term supplier relationships are studied from multiple angles. In some studies, they are described as complex cost economic arrangements using relational contracts that support long-term orientation strategies through long-term agreements (Kukharskyy, 2016). Other studies look at the subject more generally, as a long-

term buyer-supplier relationship that has developed through evolution of supplier relationship management (SRM) practices, can result in various supplier integration and governance methods, is used in many industries, and can have a cultural approach. The literature selected for this review focuses on dynamics of long-term supplier relationships from both the buyer and supplier sides, reviews theories on buyer-supplier behaviors that influence the practice and its perceived value and risks. The paper will also review how long-term supplier relationships may be an impact of cultural aspects (Cannon, et al., 2010).

1.2 Research framework

The focus of the literature review will be to identify the existing research on the topic of power and dependency in long-term contracting arrangements and/or the potential research gaps. For the thesis topic, there has been a review of studies for example on the dynamic of the buyer and seller dynamic evolving over long-term contracts (Vanpoucke, et al., 2014), benefits from long-term contracting (Aoki & Wilhelm, 2017), supplier adaptation during long-term arrangements (Roethlein & Mangiameli, 1999), relational contracting (Kukharskyy, 2016), how Activity Based Costing models can be used in long-term relationships (Agndal & Nilsson, 2007) and selection of a collaborative (long-term) supplier strategy based on key desired outcomes (Kähkönen & Lintukangas, 2022) to mention some. For the topic of power and dependency, the literature selected for the thesis include research articles on how buyers can utilize power in the relationship to achieve goals such as sustainability practices (Marttinen & Kähkönen, 2022) and power and dependency perspective on the selection of a purchasing strategy in the Kraljic matrix (Caniels & Gelderman, 2005). Previous research has focused on the topic of long-term contract selection from either a value of supplier strategy point of view, supplier due diligence perspective, relational vs. competitive strategy point of view or other risk vs. benefit evaluations. Development of power and dependency from the perspective of long-term contract practices appears to have a research gap, there appears also to be a lack of research into long-term contract practices in the public sector, making this thesis an important study on the subject and can supply additional insights in the area.

The main research question presented in this thesis is the following: ***What is the relationship between the contract term and the estimated contract spend in the public tendering data***

in the European Union public sector? To support the main research questions, there are also the following sub-questions presented that this study aims to respond to:

1) *Does data show a relationship between cultural or regional differences and adopting long-term contracts?* and

2) *are long-term agreements were favored in any specific buyer types?*

The main conceptual framework that this thesis research will rely on us Supplier Relationship Management (SRM). Supplier Relationship Management (SRM) is of interest due to its focus on reviewing the way organizations manage their suppliers and resources (Vanpoucke, et al., 2014) and it provides insights into how the dynamic of a buyer and seller can evolve and change during the lifecycle of the partnership including the development of power and dependency, as demonstrated in Figure 1. When reviewing long-term buyer-supplier relationships that may be a result of an evolution of supplier relationship management (SRM) practices (Piercy, 2009) inside the organization, applying SRM can pursue various supplier integration and governance methods.

Figure 1. Potential cycle of development of power and dependency in buyer and supplier relationships (source: author's own work)
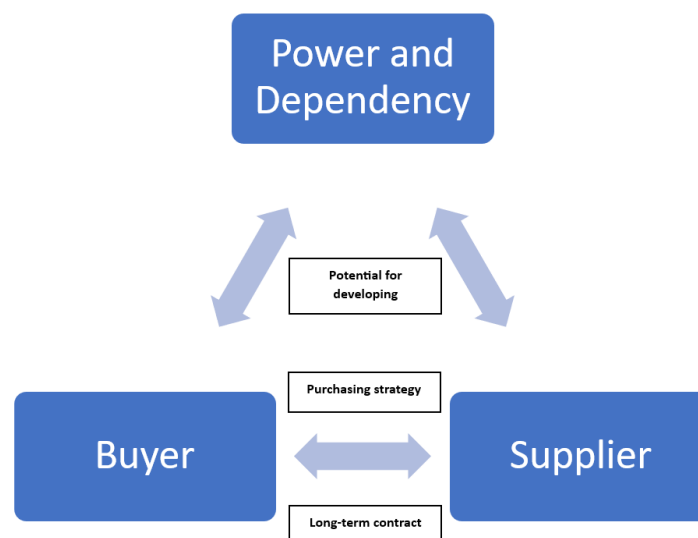
1.3 Structure of the Thesis

The research literature selected for this thesis focuses on dynamics of long-term supplier relationships from both the buyer and supplier sides, reviews theories on buyer-supplier behaviors that influence the practice and its perceived value and risks. The perspective taken in the thesis is to review the impact of long-term contracts on the development of power and dependency for buyers and suppliers contracting in the public sector through observing practices like SRM, cultural aspects (Cannon, et al., 2010) and impacts on supplier due diligence and selection practices (Prajogo & Olhager, 2014).

2 Utilization of long-term contracts in the Public Sector

Supplier Relationship Management (SRM) is accepted as one way to get value from an organisation's supplier relationships and sourcing practices (Schuh, et al., 2014). If we accept that SRM practices are more common in long-term supplier buyer relationships where there is evolution of the relationship (Vanpoucke, et al., 2014), then we need to review how the public sector is potentially approaching the topic of long-term contracting and SRM practices. One of the expectations that can be tested is that public sector organisations may have buyer behavioural differences in supplier management practices brought on either through legislation or increased scrutiny from using public moneys for purchasing activities.

2.1 Evolution of Supplier Relationship Management (SRM)

Supplier Relationship Management (SRM) is a broad concept and can be utilized by organizational buyers in many ways. As customer needs become more complex, the need for suppliers to work with their customer in a more strategic way and vice versa, becomes greater. SRM is one way to explain the coordination or management activities conducted by the parties as they engage in value-creating activities (Piercy, 2009). To further narrow down the concept, one definition in research literature has described SRM as

> *"working more effectively with suppliers to deliver benefits. -- recognizes that both parties need to achieve their goals."* (Shuh, et al., 2014, p. 5).

Supplier Relationship Management can result in various supplier integration and governance methods, is used in many industries, and can have a cultural approach. The potential for creating value within the organization trough these practices is also well understood, with the knowledge that strategic supplier management, as an expression of SRM practices, can bring cost savings and efficiencies through finding the suppliers that are seen as most appropriate and valuable to the business needs and also relates to sourcing raw materials and products in an efficient way (Kähkönen & Lintukangas, 2012). SRM is seen as a way for harness the energy of suppliers for the benefit for the buying company (Schuh, et al., 2014) and the selection of a collaboration strategy with suppliers instead of competing with them is a key decision for any organization when making strategic decisions on how they wish to work with their supply base (Ahtonen & Virolainen, 2009).

Development of SRM can be seen to have occurred from1980 onwards through the change of perspective from manufacturing industry buyers that historically were oppositional and used adversarial negotiation tactics, started to reduce their large supplier bases created by aggressive bidding for short term contracts and established longer term relationships with select suppliers. Manufacturers started to see long-term relationships to tap onto the strengths and skills of their supplier base to assist with their own process development and reducing costs. From the supplier's perspective it's noted that in addition to the multiple benefits that come from a long-term relationship such as securing investment, increasing sales and cross selling opportunities, there are also risks that come from adjusting too much and making "relationship-specific" investments (Kalwani & Narayandas, 1995). Buyers that opt to have long-term suppliers are noted to be difficult to service satisfactorily, as the sensitivity around dependence increases and so does intolerance of any underperformance (Kalwani & Narayandas, 1995). In the public sector, studies indicate that ability to use economies of scale, improved efficiency, and ability to produce public services in a cost-efficient way is a key contributor to the supplier and contracting methods selected (Máñez, et al., 2016).

2.1.1 SRM in context of public sector contracts

Public sector buyers when selecting their strategies on how to utilize suppliers as part of the value chain of producing public services, need to consider several additional aspects such as procurement legislation, bureaucratic rules, and an increased risk to the public, that buyers

in the private sector don't have to concern themselves as much with when generating their supplier strategies and contracting methods (Craven, 2023).

One of the benefits of contracting out public services is the ability to achieve greater organizational learning efficiency, however, study shows that the selected contract length can have a material impact on the materialization of cost-effectiveness and can sometimes even contribute to an increase in the cost of service production (Máñez, et al., 2016). From a power-base perspective, the public sector buyer has a lot of potential power when it comes to the supplier as the public buyer often can represent large volumes that on their own create a competitive situation in the market. The buyers also operate within public procurement legal frameworks which allow for them to control the sourcing processes to a detail level, adding to their positional power in the transaction. Applying SRM practices generally involves understanding the workings of the supplier-buyer relationship as a value-net i.e., a dynamic network that creates value for all participants (Ahtonen & Virolainen, 2009), in the public sector the presence of the procurement law as a detailed and prescriptive rules based system of regulation, can potentially be seen as reducing the ways of how collaborative mechanisms can be used in contracting for public services. In the EU for example, the procurement rules which are the product of intergovernmental compromise and negotiation, are noted to being riddled with grey areas (Craven, 2023). Suppliers that must concern themselves on being sanctioned due to compliant or non-compliant behavior, may find it more challenging to build true open and collaborative relationships with public buyer organizations for these reasons – even if the public buyer would be inclined to do so.

2.1.2 Impact of procurement legislation on supplier strategy

In the EU, the origins of public procurement regulations derive from the member states identifying some of their purchasing practices as non-tariff barriers and hindering the function of a genuinely competitive market. Some researchers have commented that the EU policy reflects contradiction in its processes, meaning that the member states who are the adopters of the processes have national priorities and tend to lean towards protectionism whilst the EU Commission is driving harmonization of processes and procurement communities to boost the internal market (Pircher, 2020). Needs for the EU member states to be able to comply with treaty principles of cross-border trade of products and services has

resulted in the ongoing introduction of new legislative actions and instruments that target the continuous development of a homogenous public procurement framework and market in the European Union (Bovis, 2020). Even with the additional regulation in place, the EU continues to give the member states the ability to apply interpretation of the EU procurement law procedures on a national level, however would seem that some member states do not take the room they have to move in the processes (Pircher, 2020), for example, in a scoreboard from 2017 it was seen that still approximately 59% of procurement contracts in the EU were solely awarded based on the lowest price (European Commission, 2017) which could indicate that many of the member states are not applying criteria that are based on a broader strategic viewpoint to supplier suitability. In the procurement frameworks of the EU and other regions, the basis for the procurement strategy and supplier management models is largely based on compliance, cost-benefit analysis and reaching the highest public good, instead of using economic models from the private sector that focus more on market based drivers such as efficiency, competition, proportionality and strategic relationships (Craven, 2023).

Procurement regulations have been noted as having eight (8) key regulatory justifications that govern how supplier selection and contracting needs to be conducted under law:

    i)   value for money

    ii)   avoiding corruption and conflict of interest (i.e., integrity)

    iii)   implementation of policy (social, economic, industrial, and environmental)

    iv)   support of international trade

    v)   equal treatment and opportunity

    vi)   fairness

    vii)   accountability; and

    viii)   an efficient process

(Craven, 2023)

However, many studies show that for buyers operating in the public procurement space, one of the key considerations they have is transfer of risk and ability to control costs (Blanc-Brude, 2013). Many contracting entities use contracts where they do full risk transfer and

move all cost liabilities to the supplier, in exchange for a fixed payment or an expectation of the supplier being able to achieve efficiency gains over the extended contract period.

In the public procurement sector, the presence of procurement law, economies of scale and high asset specificity which equals high investment required to contract out, has no doubt an impact on the selection of the supplier strategy and contract methods. Public buyers are no different to private buyers in the cases where once a decision is made to contract out, the buyer entity is at risk of incurring high transaction costs to implement administrative processes and overseeing the contract due to information asymmetry, uncertainty, lack of information and opportunistic behaviors from suppliers (Máñez, et al., 2016). Buyers in the public sector have a considerable amount of procedural requirements and law requirements that they must consider both pre- and post-award which increases the amount of administrative work required to contract out, potentially leaving the buyers less focused on long-term strategic supplier development and more focused on regulatory and rules based processes (Bovis, 2020). Buyers in the public sector also need to ensure their qualification criteria for award meets not only the value for money principle but also consider the environmental and social considerations required in the EU public procurement law (Bovis, 2020). Criticism has also been directed towards the EU Procurement Law framework on the due to its non-exhaustive harmonization which is often due to the method of application in each member state potentially varying. This variance may impact supplier contract practices for types of contracts (for example utilities, contracts based on exclusive rights, contracts in pursuit of general economic interest and in-house contracts) which would make the competitive and awarding processes for some contracts differ significantly from others, in addition to adding in the mix the complexity of how EU Procurement case-law is applied by the contracting authorities (Bovis, 2020).

Public buyers that navigate this kind of procedural and bureaucracy network, may be more inclined to adopt a cautious approach to the dynamism of strategic relationship management practices and contracting out and will choose to focus on short term cost-driven or efficiency gains alone, over adopting long-term relational viewpoints in relation to supplier management and contract practices. This kind of strategy adoption however has been shown in studies that the full beneficial effects of contracting may not even be seen in short-term contracts due to the high transaction costs in the service adoption phase. A study conducted in 2002-10 in Spain over contracting out waste collection services demonstrated that

contracting out, whilst it brought cost savings, resulted in inefficiencies due to the contract-out management in the short term (Máñez, et al., 2016). Benefits from the contracting out were only materialized in the long-term, study results showing that the municipalities needed to have the contractors in place for a period of no less than three (3) years, after which there was evidence of learning efficiency which resulted in a greater percentage of positive returns over municipalities that had utilized non-contractors (Máñez, et al., 2016).

3 Relationship Dynamics in long-term contracts

When buyers engage with suppliers for products or services where they feel it may serve their benefit to build stronger relational approaches due to the inherent risks of the product or service or are influenced by the supply and demand aspects as per the Kraljic matrix of having bottleneck or leverage products (Caniels & Gelderman, 2005), one way of achieving greater assurance and de-risking the supply is to utilize long term contracts with suppliers. This section focuses on how long-term contracts may influence the development of power and dependency behaviors in the buyer-supplier relationship, how to mitigate financial and reputational risks and potential benefits from these types of contracting strategies.

3.1 Development of Power and Dependency

When focusing on the supplier relationship aspect and how the dynamic between the buyer and seller can change and evolve during a long-term contract or relationship, literature suggests that integration initiatives are common and these have impacts on the nature and quality of the relationship and also how it is governed (Vanpoucke, et al., 2014).

Integration often will mean the buyer and seller will combine and share tangible and intangible assets in the efforts of reaching a greater synergy for both parties. Tangible assets can include logistics and production assets, human resources, and finances. Intangible assets can be sharing of knowledge between the parties to create maximum visibility in the supply chain. Knowledge sharing assists in revealing where the parties have joint practices, helps troubleshoot problems and aligns goals. The purpose of this type of integration is to find and

grow value for both (Vanpoucke, et al., 2014). Synchronization practices are part of integration thinking and in many long-term supplier arrangements the parties will enter supply chain and logistics integration by adapting things like packaging and delivery methods and frequencies to better suit the needs of the partner. When having multiple supply chain or logistics partners, this kind of integration requires a central coordinated function that is responsible for ensuring seamless integration activities (Vanpoucke, et al., 2014).

In the Vanpoucke et. al (2014) study where integration practices were outlined as a key element of long-term supplier arrangements, the development of the relationship over time has been described as a five-stage approach of awareness, exploration, expansion, commitment, and dissolution (Vanpoucke, et al., 2014). In all the stages there are distinct behaviors that both show where the parties are in their journey and impact the dynamic of the relationship so that it moves onto the next stage. The relationship journey takes the parties from initially becoming aware, i.e., positioning oneself to seem attractive to the other party, moving onto the exploration phase by making an initial transaction by trial purchases (or some other means of testing). In the expansion phase parties have entered negotiations and are now actively testing each other for compatibility, ways of working, integrity, and performance. This is where the foundation of trust is laid. Commitment happens once the parties are engaged, committed and satisfactory levels of performance and benefits are being received. Lastly in the dissolution phase one or both parties feel dissatisfaction and are considering terminating the relationship (Vanpoucke, et al., 2014).

Research into governance practices of long-term supplier relationships have various revealed various methods and theories. In the study by Vanpoucke et. al (2014), governance was separated into two mechanisms; formal (also referred to as transactional) or informal (also referred to as relational). Formal governance practices are rules-based and meant to help avoid opportunistic behavior. Informal governance practices recognize cooperation being the highest goal and focuses on having moral control. How the relationship develops is often dependent on the type of governance structure selected, as evidence seems to point that using a transactional governance structure increases unwanted behaviors (such as frequent competitive bidding by the buyer). As the long-term supplier relationship develops, a combination of formal and informal governance mechanisms should be used with the

preference of relational practices as the relationship becomes more integrated and long (Vanpoucke, et al., 2014).

Figure 2. The various stages of a supplier relationship (Vanpoucke, et al., 2014, p. 27)
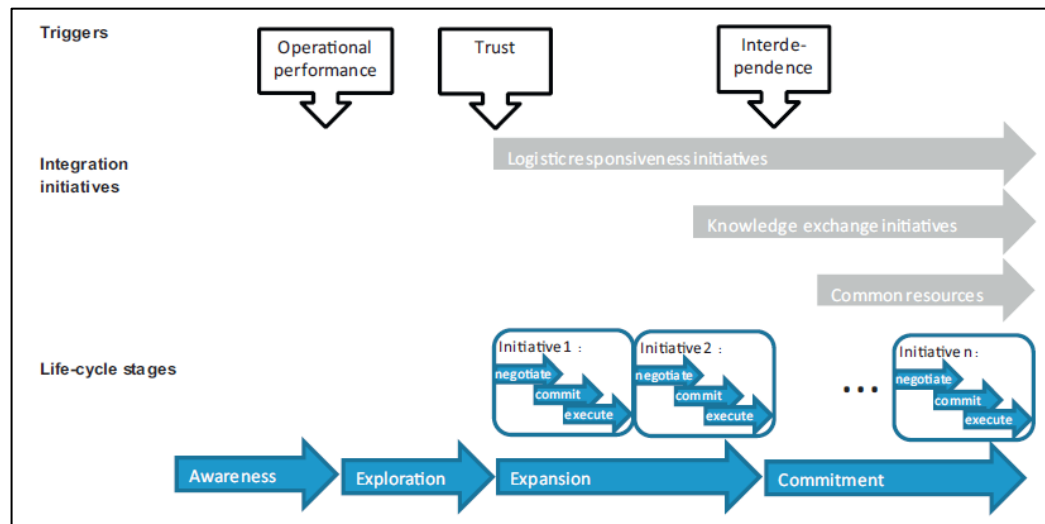
3.1.1 Behaviours that impact long-term supplier relationships

In literature a development that has been visible from 1980 onwards is the change of perspective from manufacturing industry buyers that historically were oppositional and used adversarial negotiation tactics, started to reduce their large supplier bases created by aggressive bidding for short term contracts and established longer term relationships with select suppliers. Manufacturers started to see long-term relationships to tap onto the strengths and skills of their supplier base to assist with their own process development and reducing costs. From the supplier's perspective it's noted that in addition to the multiple benefits that come from a long-term relationship such as securing investment, increasing sales and cross selling opportunities, there are also risks that come from adjusting too much and making "relationship-specific" investments (Kalwani & Narayandas, 1995). In the public sector, it is suggested for example that buyers that opt using Private-Finance-Initiative (PFI) fixed cost risk transfer contracts that extend over a period of several decades and where the contractor has to bear the full liability of construction, operation and maintenance costs under the agreement, bring greater value when compared to the initial investment (Blanc-Brude, 2013). However, this risk transfer also has been proven to result in a higher cost profile for the buyer and can work to decrease competition as only the largest or market

dominating suppliers are likely to be able to bid for these types of long-term risk transfer contracts (Blanc-Brude, 2013). Buyers that opt to have long-term suppliers are also noted to be difficult to service satisfactorily, as the sensitivity around dependence increases and so does intolerance of any underperformance (Kalwani & Narayandas, 1995).

Research indicates that long-term supplier relationships evolve through organizational and behavioral means. A Toyota study from 2017 shows how some organizations manage long-term supplier relationships by being ambidextrous in how they use exploration and exploitation (Aoki & Wilhelm, 2017). At Toyota long-term suppliers are being presented with both short-term and long-term goals during the relationship and the buyers ambidexterity is viewed through exploration-exploitation practices. Expecting the supplier to assist the buyer company to achieve high customer value is exploration but at the same time demanding high operational efficiency is exploitation. Study suggests that because Toyota has long-term, trusting relational contracts with suppliers, this kind of model can work. An example of exploitative behaviors by Toyota, is their CCC21 program that demanded a 30% cost reduction from suppliers that they had labelled to having excellent development capabilities. Toyota also uses management practices that require factory workers to conduct continuous development practices (*kaizen)* to improve processes and operational efficiencies. This demonstrates how the organization applies exploitative behaviors on an organizational level and individual level (Aoki & Wilhelm, 2017).

Explorative behaviors in long-term supplier relationships value supplier autonomy, voluntary measures and recognizes that the supplier has its own management structure so buyers should be aware of how hard suppliers are squeezed as the impacts to profit margins can damage the trust factor in the relationship (Aoki & Wilhelm, 2017). If the buyer organization wishes to use exploitation in addition to exploration, the buyer should have internal organizational support structures in place that help the supplier comply with the practices without having a negative impact on profit margins. If and when considering using exploitation of suppliers as part of the approach, buyers should keep in mind that both resource dependence theory and relational supplier management views indicate that supplier specific investments could work better in achieving better resource allocation from the supplier instead of competitive approaches (Pulles, et al., 2023).

Figure 3. Ambidexterity in buyer-supplier relationships (Aoki & Wilhelm, 2017, p. 1092)
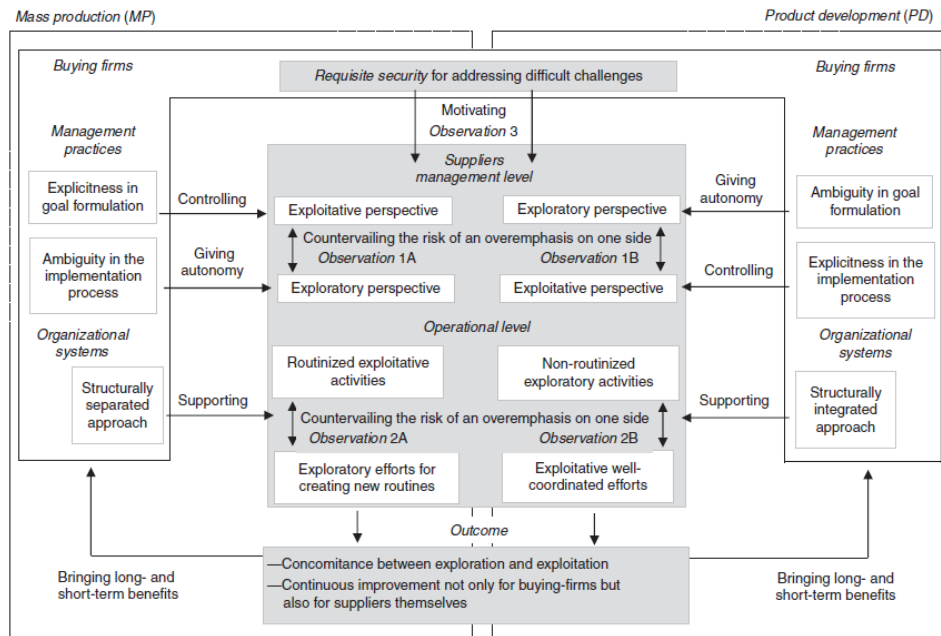
In the area of research into the relationship dynamic, an element of fairness (i.e., justice) has been presented as a key aspect of a successful business relationship (Al-Ma'aitah, 2018). Justice in a long-term relationship is said to reduce opportunistic behaviors, decrease uncertainty, and ensure efficient resource allocation. Research into justice as part of the long-term supplier relationship evolution studies the impacts of structural and social justice. Research has found that the presence of justice in the supplier-byer relationship has a positive impact. Structural justice includes distributive and procedural justice and social justice has interpersonal and informational justice. Procedural justice is followed when consistency, information accuracy, lack of bias and ethicality are present in actions. Interpersonal justice can be seen in how individuals involved in processes are treated with fairness, politeness, respect, and dignity. Informational justice is present when there is open communication and processes are explained (Al-Ma'aitah, 2018). This can be even more important in the public sector, where the buyer needs to comply with tangible aspects of bureaucracy such as procurement laws and regulations, there are also intangible demands in the principles set for how public procurement should be conducted, i.e., values of fairness, openness, and transparency.

3.1.2 Development of Dependency in Buyer-Supplier relationships

Access to supplier resources and competencies is one of the ways of how buyer companies improve their market performance. Kraljic summarised that a company's supplier strategy could depend on two factors: 1) impact of profits and 2) risk (Caniels & Gelderman, 2005). When identifying these two factors as driving the company's supply strategy, recommendations are made to form partnerships for strategic products and when bottleneck products are involved. In the automotive space for example, buyers have made decisions to either reduce their upstream or making limited supplier specific investments, resulting in them having issues with access to components in heavy demand by several industries as the bottleneck suppliers make allocation decisions that impact production capacity and buyers losing access to capacity, knowledge and engineers of the supplier (Pulles, et al., 2023). Buyers making supplier-specific investments have an interest in building longer-term relationships with unique suppliers and the drive for doing so can range from ensuring access to critical supplies or capabilities. These investments are made in the hopes of achieving reciprocal commitment from the supplier side and achieving greater benefit when compared to lower commitment supply arrangements or suppliers where the buyer has a competitive relationship (Pulles, et al., 2023).

Whilst the buyer benefits from gaining access to the supplier capacity and knowledge through supplier specific investments, the move towards a more relational management of suppliers and vertical integration practices can also be a catalyst of developing buyer-supplier dependence. The description of interfirm dependence (also referred to as buyer-supplier dependence) can be described for example in these two ways: Company B becomes dependent on Company A due to the business volumes Company B gets from Company A. Loss of these volumes could result in Company B having to for example reduce staffing or losing access to financing required to operate at the same level as before. Even though Company B could be servicing Company C and Company D, unless the volumes are considerable enough to cover the shortfall from Company A, it is likely Company B will have some significant impacts to itself through the loss of Company A business. In the previous example, Company B represents the supplier and Company A represents the Buyer (see below Figure 4).

Supplier selection and integration practices and how dependence may develop over time as a result, should be seen as universally applicable for buyers in the public and private sectors. Buyers in public sectors are generally operating under around the same industries, constraints, and suppliers as buyers in the public sectors, with the only difference coming from the influence of regulations, governance needs, and procurement laws which are likely to have some limiting influence on the buyers supplier strategy selection, however, these influences are only ever as present or limiting as the laws at the time and if the law changes and the limitations are removed, it would be likely that in the public sector would see these kinds of dependency behaviours developing in the same ways as buyers in the private sectors.

Figure 4. Development of intercompany dependence from supplier side (authors own work)
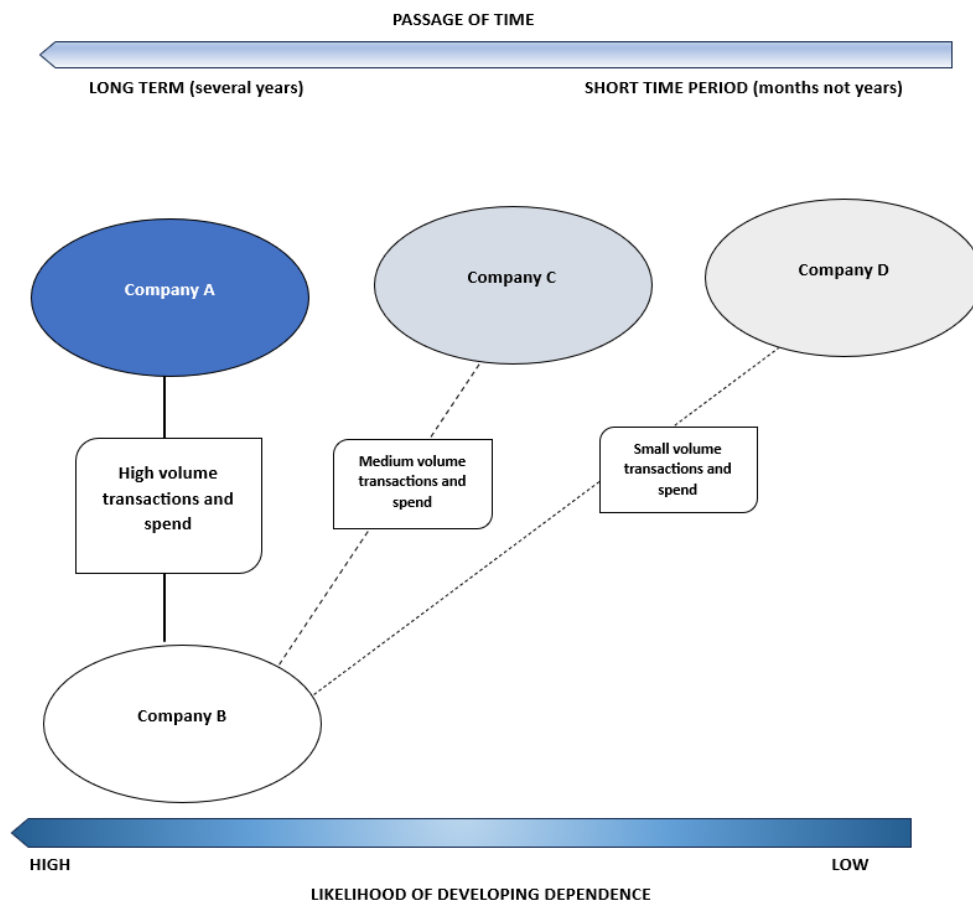
Other situations where intercompany dependency can develop is where Company A becomes dependent on the skills, capabilities, and resources of Company B, to be able to

service its own customers for example, resulting in loss of revenue or customer accounts due to reduced performance if removing Company B from the support network (see Figure 5).

Figure 5. Development of intercompany dependence from Supplier side (authors own work)
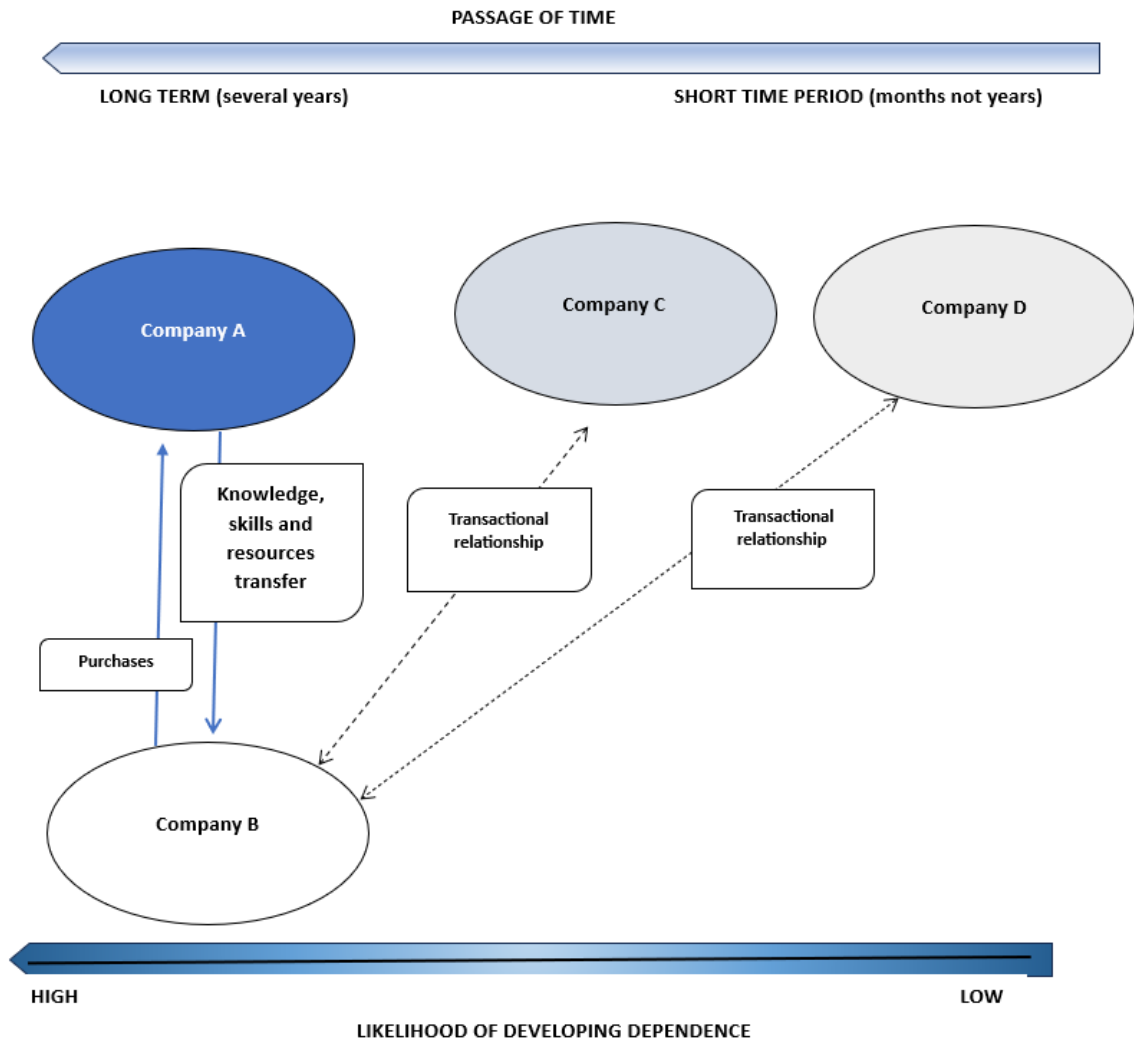
If realising that risks with single suppliers are becoming too great, or at-risk supply requires to have more than one supplier, buyers can often also build supplier networks to mitigate risks and reduce dependence from single suppliers. However, in these cases the successful management of the supplier network and its capacity for flexibility has been noted as being one of the main ways how buyers can reduce uncertainty and improve company performance for buyers in uncertain environments (Rhee & Smith, 2015). For the suppliers, one way to mitigate risks of dependence from a single buying company is to broaden the client base and cultivating relationships with several buyers. This has been noted at coming at a risk of having a negative impact on the primary company buyer, through the suppliers inability to

either focus sufficient attention to the focal company buyers or suppliers having to make allocation decisions that move required volumes or resources away from the focal company (Pulles, et al., 2023). Suppliers and buyers alike are likely to make non-committal moves in the initial exploration and expansion phase of the relationship, as this phase of relationship development is where the parties are determining if it is viable to proceed with greater integration activities and should this proceed and be successful, it lowers the bar for repeated integration activities and the tolerance for acceptance of failure in these trials increases (Vanpoucke, et al., 2014).

Buyers that seek greater integration with their suppliers are likely to do so out of self-interest and concerns of supplier opportunism or performance ambiguity. Presence of opportunistic suppliers, high switching costs and/or lack of viable replacement suppliers in the market, produce an environment optimal where intercompany dependence can develop. In the professional services area for example, literature indicates that is not uncommon for suppliers of complex technical services to adopt opportunism and to even hold up work when trying to influence the customer to accept post-contract concessions (Handley, et al., 2019). In these cases, the buyer side is likely to invest through human capital or relational contracting practices in these types of relationships to promote greater integration and prevention of unwanted supplier behaviours.

Even with some potential risks to both parties if the relationship experiences challenges, development of intercompany dependencies should not necessarily be seen as negative. Studies indicate that the development of inter-organizational relationships has some universal behaviours and elements that can work to reduce opportunistic behaviour and improve the performance and capability of the parties engaged (Handley, et al., 2019). Even though it has been observed in literature that in intercompany dependency situations the dependent party is often required to act in manner that benefits the more powerful party in the relationship (Anderson & James, 1990), long-term collaborations between the buyer and supplier have been noted to bring many benefits such as greater operational efficiency, reduction of costs, supply chain synchronization, improvement of quality and cycle time and an overall improvement in the competitive position of the parties involved (Vanpoucke, et al., 2014). If the relationship also follows the concepts of procedural justice and fairness introduced in the previous chapter, it is likely for the parties to find the cooperation more beneficial than the potential risks from becoming dependent on the other party.

3.1.3 Development of Power in Buyer-Supplier relationships

When trying to understand how intercompany dependency develops, it is important to also understand the presence of power, how it develops and how it can be used by the buyer or Supplier side. Power can manifest in several ways in relationships, one definition of power that has been presented is one person/party having the ability to do something that the other person/party would otherwise not have done (Dahl, 1961). In relation to intercompany and buyer and supplier related power situations, power is often seen used when elevated levels of dependence have been created. Power can be seen as something negative when one party in the relationship feels like theirs is limited and they do not have sufficient ways of winning in conflict situations which can result in limiting the weaker party's confidence and ability to form new relationships (Johnsen & Lacoste, 2016).

Development of power has also been noted as being critical for influencing the shared meaning-making in co-construction processes in governing, institutions, and other permanent structures (Foldy & Ospina, 2022). Situations where power relationships develop are often ones where management of resources is necessary but access to information and the resources is asymmetrical. Power asymmetries can develop when some stakeholders are granted more access to information or social power, and some are prevented from it (Berraquero-Díaz, et al., 2015).

In the buyer and supplier relationship, presence of power does not always mean either party should seek to use it. In some cases, use of power from the buyer's side can result in a retaliatory behaviour from the supplier and vice versa. Use of power by the buyer for example when the supplier is potentially feeling like a weaker party backed in to a corner, may result in the supplier becoming self-defensive and exhibiting highly opportunistic behaviours (Handley, et al., 2019) and may result in the deterioration of the entire relationship. Presence of information asymmetry and perceived asymmetry of power is a feature that may often influence the supplier as they work through strategies of imposing changes post-contract or when trying to push back proposals by the buyers where they wish to make changes to the operating environment for their own benefit and are trying to impose the supplier to absorb all of the increased costs although the change may add no other value to them outside from keeping the buyer satisfied (Blois & Lacoste, 2015). This kind of use of power can be described as 'coercive' and generally is considered as a behaviour that

brings a greater risk of retaliation through opportunistic behaviour and reduced incentives in sharing information or investing resources with the other party (Jain, et al., 2014). Use of coercive power can be said to work against the element of trust, which is important, in long-term relationships.

Coercive power is often seen in buyer supplier relationships where there is a considerable asymmetry between the parties (Johnsen & Lacoste, 2016). The duration of the relationship is an element that can either accentuate or diminish the impacts of party asymmetry. Research seems to indicate that suppliers that are involved in long-term relationships, may benefit more greatly from the positive aspects of the developed and trusting collaboration and steady income stream, which on its own reduces the possibility of exploitative behaviours and coercive power being used by the dominant side (Goffin, et al., 2006). Reasons for the reduced negative behaviours is likely due to the side with less power, in many cases the supplier and in particular suppliers with a smaller scale of operations, being able to rely on the customers focused attention on utilising the capacity of the supplier and being a recipient of the investments made by the customer that is interested in advancing its own strategic goals (although can be said this comes at the expense of the supplier).

In the software development space research has for example shown how long-term collaboration has been needed for successful management of joint projects. Implementation, management, and maintenance activities of software systems are done over a long period of time and require interorganizational participation from both the buyer and supplier side. These kinds of relationships often are formed between a single supplier and the buyer organisation, and the relationships formed in the process are commonly used as a substitute for formal hierarchy, often even foregoing formal contract documentation to govern as specific tasks are performed by the parties over time (Wang, et al., 2016).

One opposing view to the notion presented by some researchers, that power asymmetry between a dominating buyer and small supplier is more likely to result in use of coercive power (Johnsen & Lacoste, 2016), is that the presence of this asymmetry can work to improve the relationship quality by providing a stronger incentive for the parties to achieve their own interests, which can only be achieved through the other party, resulting in an increase of collaborative behaviours over the long-term relationship (Wang, et al., 2016). One additional way of reducing the risk of unwanted behaviours from the smaller or

"weaker" party is to conduct sufficient due diligence prior to the engagement, to ensure the foundation of the other party's business is at an acceptable level.

3.1.4 Supplier Due Diligence

When selecting suppliers for long-term relationships, study recommends that proper selection should be a primary goal and should be possible to find suppliers that can do highest quality, lowest price, and on-time delivery. One method is to evaluate them for accreditation. Supplier accreditation should consider evaluating things like performance, manpower, finances, available resources, and equipment. In addition to this decision criteria can include elements such as cost, quality, certifications, and past delivery performance (Jalao & Martinez, 2009). Many buyers that are concerned about critical goods as part of their supplier selection, rely on Kraljic's Matrix on identifying the types of suppliers that may fall within the high impact category, especially where supply is concerned that sits in the bottleneck and strategic box area on the Matrix (Kraljic, 1983). Once the identification has been made, the buyer has many tools available to them for evaluating the supplier prior to engaging them, as mentioned. Supplier due diligence is necessary not only to establish the risks related to the cost base of using the supplier, but also to get a holistic view of the other party prior to engaging them in a potentially long-term engagement. This view includes assessing reliability, quality, values, and ethics of the other party. Due diligence should include a risk-based view that considers the suppliers continuity plans, experience, financial records, potential violations, or disruptions caused, insurances and exposures to natural or geopolitical risks (Wildgoose, et al., 2012).

Due diligence practices themselves can have challenges for some industries such as mining and mineral extracting, as these industries have inherently a higher supplier risk environment that extends to local communities, supplier workers and the environment. Local communities that exist side by side to mines and mineral extraction have been reported to be exposed to potential conflicts and adverse impacts on the soil and water quality and quantity (Franken & Schütte, 2022). The expectations from lawmakers, shareholders, buyers, and the public have been increasing once the issues related to the supply chains in this industry were exposed to having contained for example forced labor and other unethical practices (Sellare, et al., 2022).

Buyers that are engaging with suppliers in these high-risk supply chains should focus on both the upstream (mines, smelters, and refineries) and downstream suppliers (manufacturing to end sales) as the mixture of hard and soft laws that have been drafted to address the risks in these supply chains, apply to the entire supply chain. Buyers need to be vigilant in their due diligence practices and seek information and verification of the suppliers meeting the needs of legislation and ethical guidelines through certification processes, independent audits, site visits and integration practices that aim to de-risk the engagement by reducing information imbalance (Song, et al., 2017).

Once the supplier has been selected and a contract signed, especially when the relationship is a long-term engagement, the due diligence shouldn't end there. Supplier monitoring is recommended to ensure supplier performance during long-term supplier arrangements. It's recommended to establish delivery/performance scores and make sure there is information input to track performance against the scores. Corrective actions need to be taken if the supplier falls under minimum performance scores. Supplier due diligence and tracking is recommended to be done through automation (computer-based) systems where the processes of pre-evaluation and monitoring can be performed for long-term suppliers (Jalao & Martinez, 2009). Contracted suppliers can initially work in an open and transparent way with the buyer but for example where the buyer may expect annual productivity gains and reduced costs, the suppliers may engage 'downgrade strategies' to remain competitive and keep or increase profit margins, which may involve underpaying or reducing the wages of labor and failing to observe and follow social- and environmental laws for example (Koenig-Archibugi, 2017).

3.1.5 Value and perceived risks of long-term contracts

Long-standing supplier relationships are generally being analyzed through a limited view of risks and benefits that such relationships can bring. Long-standing supplier relationships can however reveal much more interesting insights in terms of how the dynamic of a buyer and seller can evolve and change during the life cycle of the partnership (Vanpoucke, et al., 2014). There seems to be an opportunity to gain a greater understanding of how long-standing supplier relationships bring value, and if the value is greater than some of the risks

that such long relationships may create. As part of long-standing supplier relationships there are various synchronization practices between the parties that often take place, these can in many cases serve the operational efficiency and quality management aspects of the relationship (Vanpoucke, et al., 2014) however, in addition to the ability to have a streamlined buyer-seller arrangement there is also often unmeasured value that comes from building trust, having deeply rooted customer management relationships, sharing and developing practices over time and incurring knowledge from each other, that comes from investing in a supplier long term. Long-term supplier arrangements can for these reasons have tangible benefits to when compared to a short-term price-based supplier arrangement (Aoki & Wilhelm, 2017).

Supplier relationships are often critical to how a company achieves its goals on profit and productivity, which is why there is often heavy and deep analysis completed on new suppliers from 'as is' point of view before working with them (Ostring, 2004). However, there is evidence that long-term supplier relationships can sometimes be a driver for suppliers to change and evolve their organizational practices and strategies to better suit the needs of the buyer (Roethlein & Mangiameli, 1999). The limitation on the topic is that the review will not focus on any specific industry.

Long-term supplier relationships need to have commitment and continuity. Relational behaviors, decreasing conflict and nurturing the relationship increases satisfaction and performance at company and supply chain levels. When entering a supplier relationship, a way to identify if the arrangement is better served by a long-term relational or a short-term transactional relationship is to review how much risk the parties share, potential for opportunistic behaviors, uncertainty factors and the costs of termination (Al-Ma'aitah, 2018). Companies when developing their capabilities need to weigh up if they wish to develop internal resources and capability or if it's more economical and feasible to source this from an external partner such as a key supplier. This also means companies are more dependent on their key suppliers for development and performance, which can have a negative impact if the key supplier is unable to perform at the needed level (Prajogo, et al., 2020).

Research has shown that early performance of many technology-based firms have been negatively impacted by a dependence on supplier partners, in particular if a supplier captures too much of a buyers share of profits this will have a negative impact on the buyers financial performance (Prajogo & Olhager, 2014). Buyers need to be aware of dependence issues and manage their suppliers closely to reduce opportunistic behavior and capture knowledge capacity. Research indicates that engaging in inter-organizational relationships such as close interaction on boards, strategic alliances, joint ventures, and M&A's are ways to manage significant dependencies with key suppliers. Managerial ties also can assist in developing social dimensions that assist in the parties bonding and can assist in the management of transactions between the buyer and supplier (Wang, et al., 2016). Companies that can absorb external knowledge from their key suppliers, can use this knowledge for their own benefit. Being able to use knowledge transfer, including supplier critical resources and capabilities is suggested to be more effective when there is a long-term supplier relationship in place. Information asymmetry is reduced, and relationships become more stable as mutual trust develops and patterns become familiar, including patterns of behavior and product offerings. When looking inside dependent relationships, study have shown that the party that needs to sustain a long-term relationship is the party that is more dependent on the other and does not have structural power in the relationship. In these cases, the long-term relationship can have elements of governance relationship and is aiming to maintain the dependence position Not only the buyer becomes heavily invested in these kinds of relationships, but the supplier will also be locked in due to shared investments (Prajogo, et al., 2020). Research indicates when a goal is set between the parties to reduce unilateral dependencies and aim for an inter-dependent relationship, this will reduce adverse and negative behaviors from the suppliers (Prajogo, et al., 2020).

Study also shows dependencies between the supplier and the buyer can be mitigated through the effect of absorptive capacity in long-term relationships. When buyers engage with their key suppliers on a strategic level by tapping onto the hidden potential of them and engaging in knowledge sharing, this may provide valuable opportunities for the buyer. The buyer's absorptive capacity combined with a long-term relationship with key suppliers moderate the relationship and dependence on the supplier and improve business performance (Prajogo, et al., 2020).

Another area of research looks at benefits of long-term supplier relationships from a logistics integration point of view. These are found to bring potential benefits such as quality, dependability, planning, control, and cost control through vertical integration practices. Research indicates there is evidence to show that levels of integration between companies can have a direct link to organizational performance (Kulp, et al., 2004). When taking integration further in logistics between supply chain partners these can bring operational benefits, reductions in cost, lead times and improved metrics for sales, service levels and customer satisfaction. One aspect making it more important in recent years is also that more and more of products and value that companies generate, is often the product of suppliers, i.e., an external party to the organization. This means that integration activities are more important so that the buyer organization can achieve its own goals of producing products and services to the markets (Das, et al., 2006).

There are two major aspects identified in making supply chain integration successful: information technology and social connection through building information sharing and trust. Only when having integration through these aspects also can buyers see maximum benefits. Study has also found key issues that contribute to logistics integration in long-term supplier relationships, these include material flows that need information integration, ability to understand the information that has been exchanged, establishing mutual trust through understanding and aiming for mutual benefits and improving competitive performance by having joint development programs (Prajogo & Olhager, 2014).

In addition to focus in information sharing and relational governance in long-term supplier arrangements, additional study show that financial covenants are also an additional measure that is being used to strengthen the relationship or reduce financial risk and uncertainty of either party. When the long-term relationship involves high asset specificity, to avoid a hold-up threat the parties may choose to create a measure of specific capital investments to protect their own interests (Costello, 2013). These capital investments may include investing in specialized machinery, plant updates or upgrades to service the buyer organization better. This kind of investment may increase the bargaining power of the party not making the investment, as its likely that the assets have little use outside of the intended use and become sunk investments outside of the relationship. It's noted also that the coordination costs that sometimes are needed to sustain the integrated relationship, may be higher than the potential

savings and/or benefits that the buyer company was hoping to achieve from the integration (Das, et al., 2006).

In terms of risks, supplier default is one of the major threats in long-term supplier arrangements and study suggests that if there was no possibility of supplier default, the buyer would generally prefer short-term contracts to long-term contracts (Swinney & Netessine, 2009). Research has investigated the aggressive practices of Ford, who has had a habit of demanding price decreases from its supply base even when suppliers were making significant net losses and ended up in court to enforce supply agreements. Losing suppliers to default can be costly for the buyer, as there is a need to find a new supplier at potentially at a higher cost, in addition to absorbing transition costs and potentially having to cease operations (Swinney & Netessine, 2009). There are considerations to make when negotiating with suppliers that may be at risk of default, these range from deciding if it's worthwhile paying slightly more to avoid losing suppliers or to pay less because the supplier has an inherent risk to the buyer. The buyer also needs to decide if a long-term commitment is the better option for stability or short-term to limit exposure to risk (Swinney & Netessine, 2009). Study recommends committing to suppliers in areas of building new production, where tooling and capacity build lead times can be long. Commitment needs to be made at the component design phase and needs to be able to deal with uncertainty of per-unit cost and raw materials risk. These can be described as inflexibility costs, that come up in situations where the integration has reduced the available options for the buyer, effectively "locking them in" to one type of supply due to the integration (Handfield & Ragatz, 1999). In production where there is high asset-specificity, and potential costs of switching suppliers is high, research also suggests that the time horizon consideration and supplier financial health can be critical for the buyer. The buyer has incentive to protect suppliers' financial health, but only if it benefits them (Swinney & Netessine, 2009).

3.1.6 Cultural influences in selection of long-term contract as strategy

Research into how long-term supplier arrangements is being used in international business and if culture has an impact on this, shows that there are definite differences to how these arrangements are being used and seen in for example Europe, Asia, and the U.S (Cannon, et al., 2010). Buyers' long-term orientation has seen to be the difference in how cultures

approach supplier arrangements. To understand cultural differences, Hofstede's (2001) cultural dimensions have been used to identify cultural differences and how these might be expressed in values, attitudes, and behaviors (Hofstede, 2001). Development of trust differs in individualistic cultures and collectivist cultures. Individualistic cultures are seen to represent open group societies where their values promote autonomy, competition, freedom, independence, and achievement (Cannon, et al., 2010). Collectivist cultures operate more as a closed group and define themselves largely through relationships. Harmony and cooperation are valued and behaviors that enhance conformity are common (Cannon, et al., 2010). The main impact from culture into long-term supplier arrangements will be found in the areas of how the relationship is seen, governed and in the negotiation style. Study recommends that this cultural aspect should be considered in the procurement styles, for example when a buyer from a highly individualistic culture is engaging with a supplier based in a collective culture to negotiate on pricing, there is a chance of being unsuccessful because of lack of understanding of the appropriate performance/trust oriented approach that needs to be taken (Cannon, et al., 2010).

There are also interesting differences when reviewing the countries in the European zone, showing that individualism and long-term orientation can differ also within one regional area that otherwise has strong ties through trade unions, such as the European Union and EEA area (see Table 1). Even within a single economic market, there is seen variation between cultural approaches in the areas of individuality and long-term orientation if reviewed through the Hofstede culture factors (The Culture Factor, 2024). Individualism and long-term orientation are interesting Hofstede factors to review, as these can be seen to influence the outcome of buyer behaviors, as demonstrated in a 2020 study in conducted in Vietnam about Contract Length and innovation revealed that longer-term contracts were positively linked to innovation but only when the buyer was not from a foreign culture (Nguyen, et al., 2020). Vietnam scores low for individualism in the Hofstede country comparison index (Hofstede Insights, 2020), so is a collectivist society. Domestic long-term contracts were found to not have innovation or goals for newness for companies, when compared to short-term contracts. Contracts where the buyer was foreign and innovation and supplier development occurs, this is stated to occur due to a long relationship where the supplier receives constant feedback and becomes better at identifying trends that will help to improve the product or service.

Researchers link long-term contracts in Vietnam having a high level of innovation to performance-based incentives that increases the effort of the supplier to become more efficient to reach the incentive (Nguyen, et al., 2020). Long-term contracts also facilitated more frequent information sharing and efficient extracting and handling of customer-related information. Incentives to invest in human capital are seen to be more likely which increases the opportunity for innovation (Nguyen, et al., 2020). Short-term contracts have been identified as cost-inducing exercises where the buyer will need to identify new suppliers, negotiate, and contract out. In a market where there is no existing relationship with the parties or short term, the information asymmetry will cause for suppliers needing to make greater efforts to prove to be good quality (Nguyen, et al., 2020). Even though the study found long-term contracts promote innovation, when a market is competitive and transition costs are low, there are noted to being more incentives for buyers to avoid long-term contracts. Suppliers that operate in a competitive market prefer long-term contracts as it provides a steady stream of revenue (Nguyen, et al., 2020)

Table 1. Cultural differences in individualism and long-term orientation in the EU and EEA area

Count	Country Code	Country Name	Hofstede - Individualism	Hofsted - Long Term orientation
1	AT	Austria	77	47
2	BE	Belgium	81	61
3	BG	Bulgaria	50	51
4	CH	Croatia	42	40
5	CY	Cyprus	N/A	N/A
6	CZ	Czech Republic	70	51
7	DE	Germany	79	57
8	DK	Denmark	89	59
9	EE	Estonia	62	71
10	ES	Spain	67	47
11	FI	Finland	75	63
12	FR	France	74	60
13	GR	Greece	59	51
14	HU	Hungary	71	45

15	IE	Ireland	58	51
16	IS	Iceland	83	57
17	IT	Italy	53	39
18	LT	Latvia	70	69
19	LU	Lithuania	55	49
20	LV	Luxembourg	60	64
21	MT	Malta	59	47
22	NL	Netherlands	100	67
23	NO	Norway	81	55
24	PL	Poland	47	49
25	PT	Portugal	59	42
26	RO	Romania	46	32
27	SE	Sweden	87	52
28	SI	Switzerland	79	42
29	SK	Slovenia	81	50
30	UK*	United Kingdom*	76	60

Source : https://www.hofstede-insights.com/country-comparison-tool

4 Research Methods

This research uses Empirical methods to open tendering data resources and data analysis to find out a link between the length of the contract based on the buyer type, contract value and country of the buyer. The author used quantitative methods to make observations of the datasets. Use of quantitative methods allowed to see the correlations between the dependent and independent variables and to identify any patterns that were visible from the data. Statistical tests, including regression analysis and categorical data analysis methods were used as part of the empirical research.

Figure 6. Workflow of the research processes of the thesis

Research question

Design the methods of data collection

Select Data through LR and quantatitive data collection methods

Data collection		
Data research	Data cleaning	Data processing

Visualise results in text, tables and graphs

Discuss results
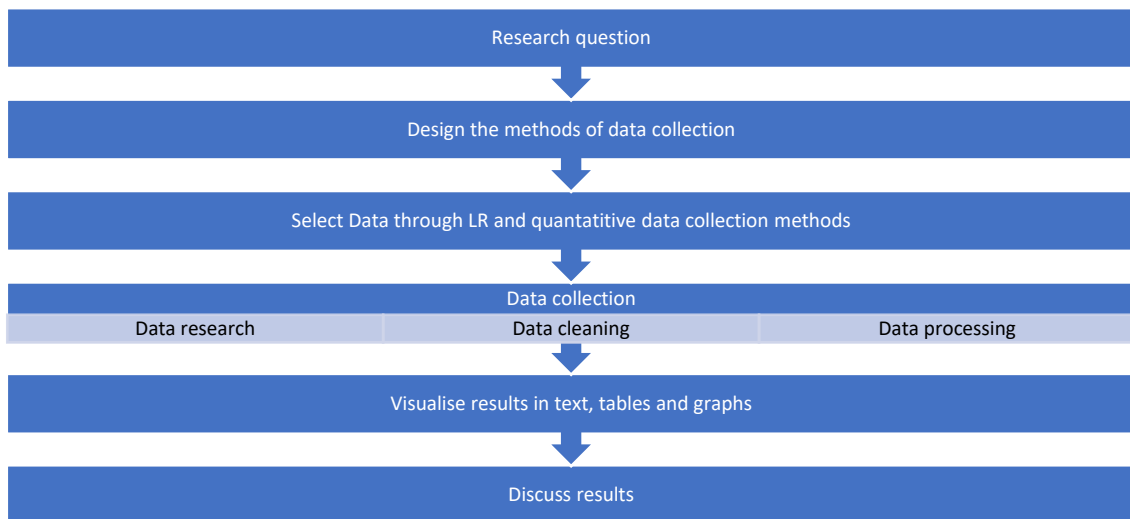
For the theoretical part of the thesis, a literature review was conducted through scientific methods and the following protocols were be applied: The thesis researcher used selected keywords and search themes (Table 2) to identify and find research and information relevant to the thesis topics as part of the literary review section. The primary source was the University's academic library and online database PRIMO which was supplemented by search engine (Google) only for supplementary data search purposes (to gain access to the Open Tenders database). When using the keyword search, the results were narrowed down by selecting only peer-reviewed scientific journals and university library book publications as part of the research. There were no timeframe restrictions set on the research and the final selection of sources was made based on relevance to the topic.

Table 2. Search words used for thesis research

Keywords and Search themes	Thesis research area
Trust and Dependency, trust, dependency, supplier and buyer trust and dependency	Trust and Dependency
Supplier relationship management, SRM, supplier management, supplier strategy, Culture theory + contracting	SRM, Culture
long-term contract, relational contracts, long-term supplier relationships, trust	Long-term contracts
Public Procurement, EU Procurement act, public sector contracts	Public sector contracting and legislation impacts

4.1 Data Collection and Data Analysis

For the empirical part, the author used quantitative data collection and analysis methods. Quantitative methods included sourcing public sector contract data from contract and tendering notices published in the European Economic Area region, collected, and compiled the Government Transparency Institute. The Government Transparency Institute ('GTI') is a non-partisan think-tank advocating good governance. GTI holds public sector administrative data that has been collected from official public procurement portals and public institutions national data repositories (Government Transparency Institute, 2023). The quantitative data analysis was focused on measuring data and making observations from the datasets available. For the data analysis section there was use of nonreactive data that was available from the Government Transparence Institutes Open Tender website (Government Transparency Institute, 2023).

Use of nonreactive data was deliberately chosen as the subjects are not aware of the data collection processes hence are less likely to be influenced by them, leaving the open-source data more likely to reflect genuine behaviors as it is not altered before being uploaded to open-source use. Nonreactive data is also easily accessible and the automated collection methods ensure a level of objectivity and provides access to a large amount of detail in the datasets.

There is of course always risk of data entry errors which may impact the results; however, this is reduced by the actions taken by the database manager which include applying data governance and quality assurance completed on the data before uploading it to the GTI website. The collection of the data on the GTI dataset goes back to 1961 for some countries, but mostly includes public procurement portal data from the year 2000. The dataset contains over 45 million contracts (including 5 million suppliers and 1 million buyers) (Government Transparency Institute, 2023). Thesis research used the Tenders Electronic Daily (TED) European dataset which comprises of the following country public procurement tendering and contract data from thirty-five (35) European countries listed in Table 3.

4.1.1 Country Source of Public Contract Data

Data is available since 2009, to narrow down the analysis and for purposes of data relevance in the empirical analysis the thesis researcher considered TED datasets from 2009 and 2010 (Government Transparency Institute, 2023) as these are the only datasets where the awarded contract term length can be seen available as a data entry point and the one data file contained tender data from multiple countries. Due to the narrowing down of the timeframe to years 2009 and 2010, some countries listed in table 3 were likely to not appear on the final analysis.

Table 3. Full list of country contract data available in Government Transparency Institute Database

Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, EU Institutions, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Sweden, Switzerland, TED*, United Kingdom.
*TED = European Union Tenders Electronic Database

The TED datasets used for empirical analysis were downloaded from the Open tender Portals website (Opentender Portals, 2023) as CSV file containing all tender and contracting data for the years 2009 and 2010. Selection of the years has been to have data during a two-year

period from well before the COVID19 pandemic, this is due to the increasing of emergency procurement during the pandemic (Smyth, 2022) to avoid having the impact of the pandemic on the data. Recency was not considered as a key requirement, as the quantitative data is being used to search for cultural and behavioral patterns which would be independent of the timeframe when the action occurred but would be rather an outcome of the business environment or a cultural aspect. The researcher favored datasets that had multiple datapoints and met the critical data quality requirement of having data entry information that allowed to view the contract duration.

In the datasets for year 2009 prior to editing there are 149 columns and 229672 rows with observations in the downloaded CSV file. For the dataset containing 2010 data there are also 149 columns and 229672 rows with observations. For thesis research, the data was pre-processed and narrowed down to include columns that can be used as independent variables. The goal was to narrow down the 149 columns (variables) down to five (5) based on relevance to the study. The key variables that were selected for analysis are outlined in Table 4.

Table 4. List of data variables selected for quantitative analysis

Variable number	Variable ID (raw data)	Variable type	Description of Variable
1	buyer_country	Categorical	Country of buying organization
2	tender_estimatedDurationInMonths	Numerical	Duration in months (of contract)
3	tender_finalPrice_EUR	Numerical	Total contract price
4	buyer_mainActivities	Categorical	Main activities of buyer entity
5	bidder_country	Categorical	Country of supplier organization

The selection of the variables has been to ensure in the analysis the thesis researcher can: 1) establish the baseline of types of public buyer organizations that conduct tendering and award contracts to suppliers 2) confirm list of countries of buyer organizations 3) confirm

contract total price ranges 4) confirm supplier country origins 5) confirm duration of contract to be awarded.

After reviewing the datasets, the researcher found that the information in the 2009 dataset had only minor variances in some categories to the 2010 dataset and that for example the combined sum results were the same when comparing for example the number of tenders conducted in the year. This was potentially due to duplication of the data as it was uploaded into the Open tender portal, due to the size of the file causing the excel to include precisely the same amount of datapoints, or that the year 2010 was in many ways identical in contracting and sourcing activities as the year 2009. Due to the similarity in the datasets, it was decided to focus on only one dataset as the item being tested and analyzed can be found in observing buyer and contracting behaviors in a full year period. The researcher decided to take the earlier dataset from 2009 for analysis.

Once the dataset to be used was decided, the data was pre-processed, and the researcher ensured that the data rows that might have had empty data fields had at least one of the following variable datapoints available: contract value or contract term. Date variables were removed as the observations were made in one year which was known, and the detailed date was not considered as significant. The N/A's were also counted, the fields with data not available for tender estimated duration was 93 933 and for tender value the N/A's were 112 004. The total percentage of data missing for contract date was 40.8% and 48.7% for contract value. However, when originally reviewing the datasets from 2009 onwards, the contract term was missing 100% in most data files from 2010 onwards, hence the thesis researcher considered the sample available sufficient for testing and analysis.

Next the researcher did further data organizing activities on the data to allow for visualization and summarize for analysis. This included creating a pivot table to structure the data so that the datapoints under reach variable could be more easily identified and analyzed (See Table 5). The data was organized around the buyer organizations type (type of main activities) when conducting the analysis from the pivot tables. Each of the Buyer Main activity descriptives had several subtypes descriptives; for example, under Airport there existed 16 subtype descriptives such as Airport, economic and financial affairs, Airport, electricity, Airport gas and heat and so on. It was determined these subtypes can be combined with the main type of Buyer and the subtype data volumes were counted in the main byer type volumes.

Table 5. List of Buyer main activity types with number of tenders and estimated duration of contracts (subtype buyer data rows are hidden to keep table shorter).

Tag	Buyer Main Activity	Määrä / tender_row_nr	Average Duration In Months
A[1]	GENERAL_PUBLIC_SERVICES	64039	35
B[1]	HEALTH	39960	27
C[1]	OTHER	33530	33
D[1]	INFO NOT AVAILABLE (BLANK)	15584	29
E[1]	EDUCATION	13701	35
F[1]	HOUSING_AND_COMMUNITY_AMENITIE	8698	34
G[1]	DEFENCE	8239	41
H[1]	ENVIRONMENT	8119	34
I[1]	ELECTRICITY	6085	28
J[1]	ECONOMIC_AND_FINANCIAL_AFFAIRS	5610	35
K[1]	RAILWAY	4120	34
L[1]	PUBLIC_ORDER_AND_SAFETY	4016	34
M[1]	URBAN_TRANSPORT	3725	34
N[1]	SOCIAL_PROTECTION	3183	29
O[1]	RECREATION_CULTURE_AND_RELIGION	2311	29
P[1]	AIRPORT	1927	40
Q[1]	WATER	1724	38
R[1]	GAS_AND_HEAT_PRODUCTION	1560	31
S[1]	COAL_AND_OTHER_EXTRACTION	1334	17
T[1]	POSTAL	1147	27
U[1]	GAS_AND_OIL_EXTRACTION	543	23
V[1]	PORT	517	26

In the dataset there was buyer country data available identifying buying activity from 30 countries in total, identified by the country code which is recorded for each tender. For the supplier (bidder) side, there were 93 countries with supplier data captured. The country data points have been listed in Annex 1 showing the bidder countries, with information added which country matches each country code.

After organizing and visualizing the data, it was also analyzed through statistical methods to identify any potential correlations between the numerical variables, to test against presented hypothesis and reliability analyses will be conducted to ensure the reliability and validity of the data. The main goal of the quantitative data collection and analysis is to establish the utilization of long-term contracts in public buying organizations, including reviewing any potential cultural differences visible through the data.

The data process used is described below in Figure 7.

Figure 7. Thesis data process workflow

Downloading TED data sets from 2009 - 2020 from Opentenders website
Evaluating all datasets between 2009 - 2020 for useability against criteria
Selecting a dataset for use (2009)
Removing columns in chosen datasets that are not chosen as variables
Data normalisation for use in analysis
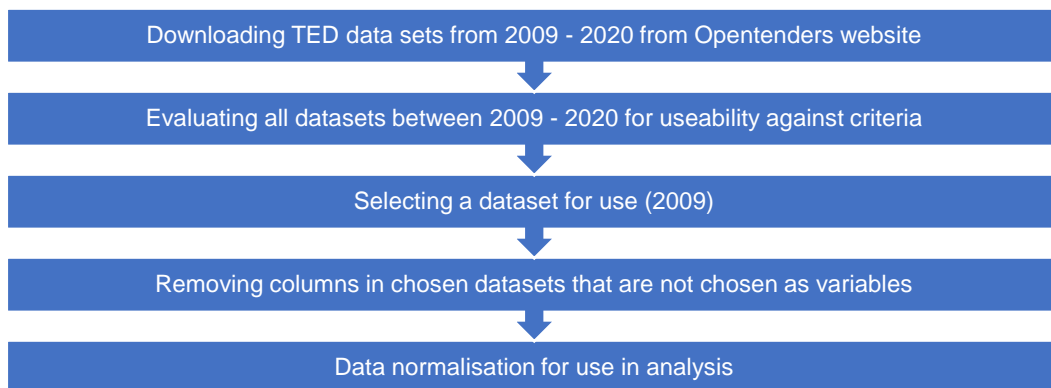
Data processing has been needed to clean the data to a state where it can be used for analysis and narrow down the relevant variables for statistical testing. There has been no other filtering, cleaning, deleting, or editing the data aside from removing duplications and columns of data where the header variable has not been deemed in scope of research and hence was not relevant to keep. Within the datasets there are some missing row values, which are due to raw data not being made available at origin at the point of collection. The data contained in the variables are either date, numerical or text based, and these have been kept as factorials in the event patterns emerge from certain countries, bidder, or tenderer fields. Data which was removed as duplicates include the value of the contract, which was available in the dataset in several columns. The rows where there is data N/A was reviewed next and the only objects where the data is missing was from the variable related to date of contract, and this was established to have occurred due to the status of the process. Rows where the date of the contract was not available included tenders that were announced, i.e., process has been opened but not completed, versus tenders that had been awarded.

The researcher selected the two numerical variables (tender duration in months and tender final price) to see if there would be correlations between the value and the length of the tender contract. Using the Stata statistical analysis software, the dataset from Open tenders was uploaded and numerical data was converted into numerical variables, after which several statistical tests were run. The file upon loading was found to have the maximum available rows which contained 229,672 observations and 7 variables (of which three were numerical). The purpose of the testing was to link the term of the contract to the value (or vice versa). When downloading the data, the researcher must at this point accept that there is a maximum row number reached and that the absence of unknown amount of data may result in the

results being conducted off an incomplete dataset. The researcher accepts this as a risk, however the presence of 229,672 observations is considered to be a sufficient representative sample for empirical testing.

To support further testing of correlations between the two numerical variables measuring tender duration and value, an initial Shapiro Wilk normality test was run to find out the if the variables were normally or not normally distributed. The hypothesis (H0) of both variables being normally distributed if $p > 0.05$ was accepted as for the variable value of tenders the results were $p = 0.96$, and $p=0.88$. Due to the variables being normally distributed, the Pearson correlation (2-tail) of variables testing was run and a hypothesis of H0 was accepted, i.e., the variables are correlated as the result was $p > 0.05$ with a correlation coefficient result of $p=0.055$. Pearson's test measures the linear correlation between two ranked variables and evaluates how these tend to change together. Correlation coefficient values that signal a strong correlation would have been in the ranges of 0,80 and 1,0. Ranges 0,40 to 0,60 are considered moderate and ranges below 0,40 indicate a low correlation, hence due to the low correlation coefficient result, the two variables were determined to being weakly positively correlated, i.e., the higher the value of the agreement, the longer the contract term.

Next the researcher analysed if the variables come from an N sample with equal or uneven variances. This was done by using a two-sample F test with $\alpha = 0.025$. The H0 hypothesis was no differences in the variances and H1 was different variances. The F critical value was calculated by using the higher variance as the numerator and lowest as the denominator, $F = 3.13$, due to the same sample size and a degree of freedom df ($df^2 = n^2-1$) = 229670, using the chi square calculation the df was calculated at 2.81 and looking up the F-distribution table (0.025) the calculated value is higher than the table value (F=3.69) so the the null hypothesis is rejected and the test shows that the data series variances are different.

To conduct further statistical analysis and regression analysis on the impact of country on the length of the contract, the researcher numerically coded the factorial data of buyer type, buyer and seller country and gave each buyer type and country a corresponding numerical ID. This categorical data conversion allowed for the data to be used as numerical data and further statistical testing was conducted between the new numerical variables (buyer type, buyer and supplier country) to make observations and see what if any potential correlations were found.

Table 6. Variables list after re-coding categorical variables

Variable number	Variable ID (raw data)	Variable type	Description of Variable
1	buyer_country	Numerical	Country of buying organization
2	tender_estimatedDurationInMonths	Numerical	Duration in months (of contract)
3	tender_finalPrice_EUR	Numerical	Total contract price
4	buyer_mainActivities	Numerical	Main activities of buyer entity
5	bidder_country	Numerical	Country of supplier organization

5 Empirical Results

This section covers the results of the quantitative data analysis in relation to the study. Some further explanations and descriptions of the data will be covered first, after which the researcher will cover what was found in the data in relation to types of buyer organisations, buyer country origins, total price ranges, supplier country origins and duration of contracts to be awarded and how these factors can be seen to provide evidence of long-term contracting practices in Europe in the public sector.

In the 2009 TED dataset, there were in total 135 739 tender entries with a contract term indicated in the tendering information. The total value of the tenders combined were 185 710 250 596 € and the median was 4 641 827€. The file contained tendering information from buyers in 30 countries and suppliers in 93 countries. The raw data had a data point confirming the tender being awarded to a supplier, this information is also available in the dataset selected for analysis, as the supplier country is only available for contracts awarded, hence any supplier country appearing in the data is showing which supplier countries were successful in winning contracts (and long-term contracts).

5.1 Establishing Baselines of tested variables

The data demonstrates that there are 22 main types of buyer organisations in the public sector in the Opentenders database, that have been tendering for goods and services in the year 2009 (Table 6). The largest buyer types responsible for the tendering activity (i.e., buyer activity seeking contracts with suppliers) were with (1) General Public Services (28%), (2) Health (17%), (3) Education (6%) (4) Housing and Community Amenities (4%) and (5) Defence (4%). Large quantities of tenders were also issued with the buyer type or marked as 'Other' (15%) or left blank (7%).

Understanding which types of buyer types were issuing tenders, it was important to understand if long-term agreements were favoured in any of the buyer types. In the data, duration of the contract (tender duration) has been inserted as months. First the contract terms were averaged to compare any emerging patterns in the averaged data. It was not unsurprising to find that where there was a term indicated in the duration, Defence (G[1]) had the longest average duration of the contract of 41 months, followed by Airport (P[1]) 40 months, Water (Q[1]) 38 months, General Public Services (A[1]) and Education (E[1]) with 35 months. All these areas can be seen as critical public infrastructure and services where the complexity of the services and assets can be high, meaning the risk of alternative suppliers not being able to meet the needs of the buyers, explaining why these buyer types would favour longer term contracts to reduce supply risks.

The shortest-term contracts were seen in Coal and other extraction (S[1]) with 17 months being the average duration, followed by Gas and Oil extraction (U[1]) 23 months, Port (V[1]) 26 months, Postal (T[1]) and Health with 27 months. The shortest offered contract terms were in the Gas, Oil and Coal extraction buyer organisations, which can be caused by these commodities in general have been imported from outside of the European Union, and the remaining activity in Poland and Germany have been consistently ramped down through the long-term vision in the European Union region to move towards climate neutrality through stricter climate and energy policies (Bijanska & Wodarski, 2024).

Port and Postal services having the other shortest contracting terms amongst the buyer organization types can potentially be explained by the fact that both organizations also had the lowest number of tenders that had been run (517 for Port and 1147 for Postal) when compared to the highest number of tenders in the General Public Services (A[1]) 64039. For

Health (B[1]) the number of tenders were high at 39960 which also may explain the shorter term contracting, as there seems to be a high number of purchasing and tendering activity – meaning the services and commodities are likely to have multiple supply chains and suppliers, hence making it more beneficial for the buyer to tender out often and have competitive pressure between the suppliers.

In addition to conducting two tail testing of the predictor variables on the response variable, multivariate regression testing was conducted for the predictor variables and the response variable in one ANOVA test (Table 7). The predictor variables tested (x) were contract value, buyer country, bidder country, final price and buyer main activities (buyer type) on the response variable (y) of contract value. The results showed a multiple R value of 1 meaning the correlation coefficient has a perfect positive relationship (100%). The adjusted R square (meaning the result is adjusted for the number of predictor variables in the model) was also 1, which indicates that within the model there is strong correlation between predictor variables and the response variable. With a F significance value of $p < 0$ the result is statistically significant.

When testing the correlation between the individual variables of buyer type and estimated duration in months, with a hypothesis of the variables being positively correlated being accepted if $p < 0.05$ being accepted with a correlation coefficient result of $p=0.002$, meaning the variables are positively correlated with a statistical significance. This indicates that the buyer types have a weak positive linear relationship with the length of the contract.

To explore the potential statistical relationship between the buyer country and type of buyer on the contract length, further linear regression testing of the data was conducted (Table 8). The results of the testing showed a multiple R value of 0.04, showing a weak multiple correlation between the response variable y (estimated duration) and the predictor variables x (type of buyer and country of buyer). This is further demonstrated by looking at the result of R square value of $0.002 = 2\%$, meaning that only 2% of the contract length can be explained by the type of buyer and country. For the variables there is seen a high variation between the sample means with F=271.44, demonstrating the observed differences are not random chance and with a F significance value of $p < 0$ the result is statistically significant.

When looking at the individual coefficients of buyer type and country ID, the coefficients reveal the expected change in the contract length if both predictor variables remain constant.

This reveals that for example the buyer type would have an 0.01 increase in the overall length of the contract and the buyer country 0.06 increase. The intercept coefficient reveals that without an impact from the buyer type or country, the expected contract length for a contract is 14.46 months. Both individual predictor variables have a p-value higher than p = 0.00, meaning that neither variable is statistically significant at $\alpha = 0.05$. This would indicate that on their own, there may be a statistically significant relationship between contract length and the buyer type, but the impact of the two variables together shows no meaningful statistical impact on the contract length.

Regression Statistics	
Multiple R	1
R Square	1
Adjusted R Square	1
Standard Error	1.61733E-08
Observations	229678

ANOVA

	df	SS	MS	F	Significance F
Regression	5	6.00167E+19	1.20033E+19	4.58885E+34	0
Residual	229672	6.00768E-11	2.61577E-16		
Total	229677	6.00167E+19			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	1.73648E-09	8.10843E-11	21.41570965	1.2E-101	1.57756E-09	1.8954E-09	1.57756E-09	1.8954E-09
tender_finalPrice	1	2.09877E-18	4.76471E+17	0	1	1	1	1
bidder_country_ID	9.69016E-12	1.47326E-12	6.577379602	4.79832E-11	6.80262E-12	1.25777E-11	6.80262E-12	1.25777E-11
buyer_country_ID	-1.22407E-12	1.79755E-12	-0.680965515	0.495893998	-4.74722E-12	2.29908E-12	-4.74722E-12	2.29908E-12
tender_estimatedDurati	5.99829E-12	1.1893E-12	5.043546981	4.57327E-07	3.66729E-12	8.32929E-12	3.66729E-12	8.32929E-12
buyer type ID	1.16472E-11	7.65925E-12	1.520674416	0.128342939	-3.36471E-12	2.66592E-11	-3.36471E-12	2.66592E-11

Table 7. Regression testing for all of the predictor variables against the contract length

Regression Statistics	
Multiple R	0.048560988
R Square	0.00235817
Adjusted R Square	0.002349482
Standard Error	28.60664738
Observations	229678

ANOVA

	df	SS	MS	F	Significance F
Regression	2	444271.0574	222135.5287	271.4464088	0
Residual	229675	187952302.5	818.3402745		
Total	229677	188396573.6			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	14.46354663	0.140202025	103.1621805	0	14.18875426	14.738339	14.1887543	14.738339
buyer type ID	0.017234928	0.013544388	1.272477404	0.203204836	-0.009311725	0.04378158	-0.00931172	0.04378158
buyer_country_ID	0.06190803	0.002660831	23.26642458	1.3356E-119	0.056692869	0.06712319	0.05669287	0.06712319

Table 8. Regression testing for two predictor variables on the contract length

5.1.1 Country of Buyer organisations

There were 30 countries of origin reported for the buyers' side, which included the biggest EU countries such as France, Germany, Italy, Poland, Spain, and the UK (pre-brexit). The list of countries with tendering data available have been listed in Annex 1. When reviewing the number of tendering activities between the different buyer countries, the largest volume of tenders had been published by the large EU countries. The top 5 buyer countries with the largest volume of tenders were France (26%) followed by Germany (14%), Poland (8%), United Kingdom (8%) and Spain (8%), as shown in Figure 8.

Figure 8. Percentage distribution of tenders per buyer country
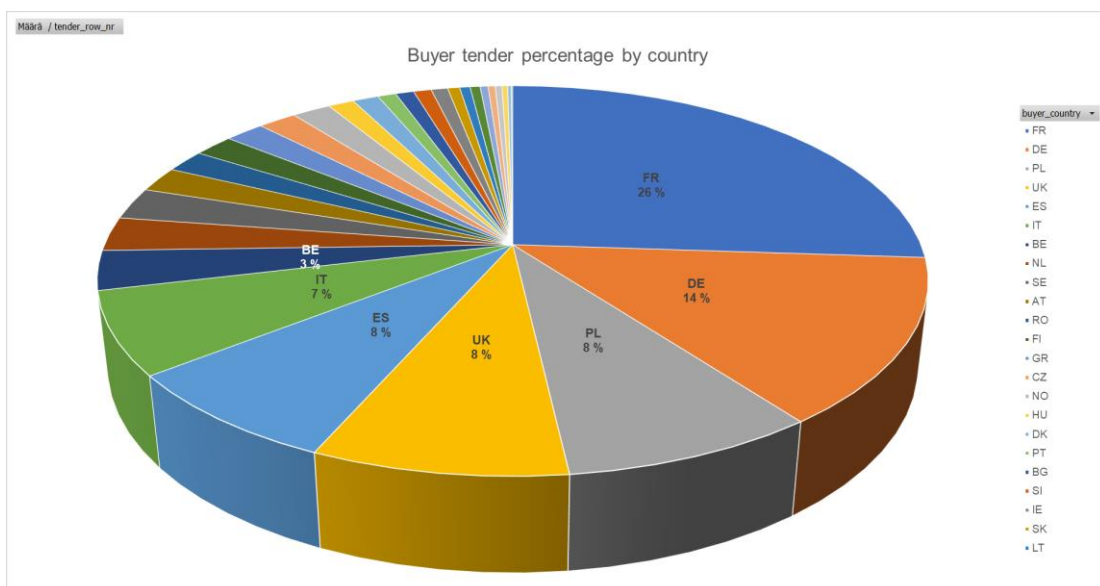
Understanding which countries tender for contracts was done to respond to the question if there are cultural or regional differences in adopting long term contracts. Once the research had established the country buying activity, a review could be made to if the country origin would have an impact on the length of contract. This impact should be seen both in the buyer side, i.e., the buyer is tendering for long-term contracts and the supplier side, i.e., the suppliers are tendering for long-term contracts.

When reviewing the data for suppliers, once the data fields where the supplier country data was not captured in the dataset due to the contract not being awarded (39%), there was a high level of correspondence noted in the country performance of suppliers to the buyer country issuing the tender for contracts (Figure 9).

Figure 9. Percentage distribution of tenders per supplier country
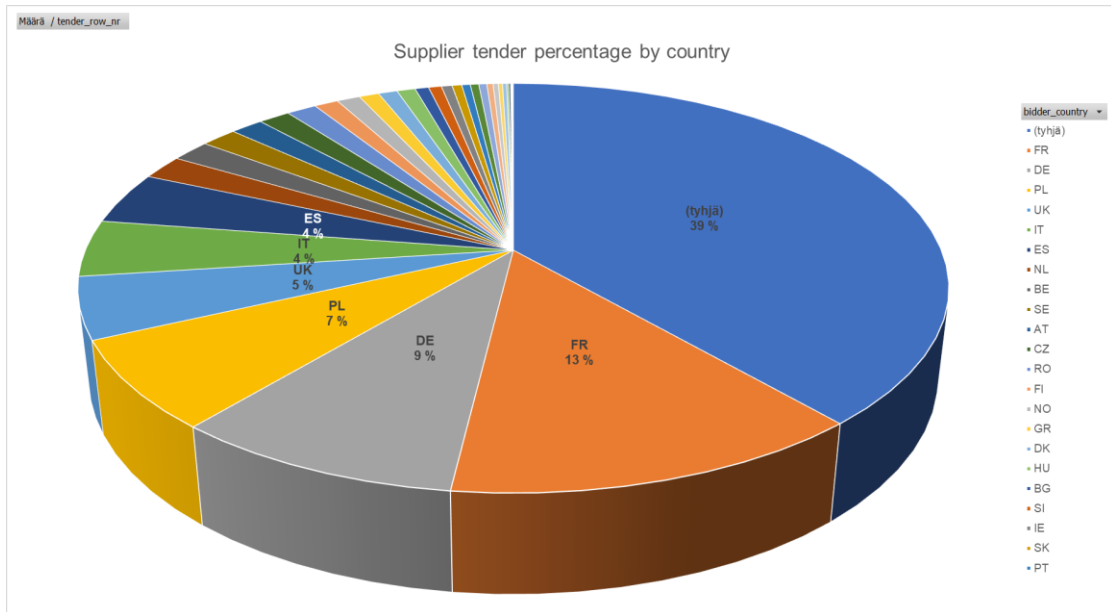
There was a significant similarity between the top 5 countries in terms of count of tenders issued (Table 9) and count of tender countries that were successful in responding to tenders. The countries where tenders were issued most were France (59870), Germany (31428), Poland (19374), United Kingdom (19325) and Spain (17939).

Table 9. Top 5 countries for buyers issuing tenders in 2009

Order	Country ID	Number of tenders (buyers)
1	FR	59870
2	DE	31428
3	PL	19374
4	UK	19325
5	ES	17939

Next the researcher wanted to test the hypothesis of the buyer country having an impact on the contract length (H0) by testing on the Pearson correlation coefficient of the predictor variable *x* buyer country on the length of contract, which resulted in a $p=0.04$ meaning the hypothesis of buyer country can have an impact on the contract length was accepted and with a $p < 0.05$ the result can be seen as statistically significant. This means that based on the buyer country, there is a weak correlation i.e., impact on the contract length.

5.1.2 Establishing Supplier country origins

Suppliers responding and winning tenders per country corresponded to the list of countries where buyers were issuing the greatest number of tenders (Table 10), with the order being the same for the top 4 positions: France (30551), Germany (31428). Poland (19374), United Kingdom (19325) with data showing variance with the (5th) largest country of winning tenders which being Italy. The correspondence could indicate that there is a preference to award contracts to suppliers that are in the same country or culturally similar (Italy and Spain being the fifth (5TH) largest buyer and supplier country in terms of tenders issued and won).

Table 10. Top 5 countries for supplier contracts awarded.

Order	Country ID	Number of tenders (suppliers)
1	FR	30551
2	DE	21052
3	PL	16070
4	UK	11133
5	IT	10295

The data also reveals the preference of the European based buyers to favour suppliers that were based in the EU or EEA areas (Table 11), even though free-trade agreements and the Public Procurement Act doesn't prevent them from engaging suppliers from countries outside of their own or the EU, EEA area (aside from where there are sanctions in place, which prevent the sanctioned country from tendering for contracts).

Table 11. Distribution of contracts awarded to suppliers within the EU and EEA areas versus outside

Suppliers based in	Count of contracts	% of total
European Union and EEA*	139431	99.69
Non-EU or EEA country	433	0.30

*EU and EEA countries at the time of the 2009 TED data were Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Great Britain, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom, Iceland, Liechtenstein, and Norway. The data also includes Switzerland as even though the country is not an EU or EEA member, they are part of the single market.

The researcher also tested the hypothesis of the bidder country having an impact on the contract length (H0) by testing on the correlation coefficient of the predictor variable x bidder country on the length of contract, which resulted in a p=-0.06 meaning there was a negative correlation between the variables and the hypothesis of bidder country having an impact on the contract length, i.e., this result can be read that the based on the bidder country there is a weak correlation impacting the contract length in a negative way (reduction or no award at all) and with a $p < 0.05$ the result can be seen as statistically significant.

5.1.3 Impact of Buyer and Seller Country on length of contract

Public tendering data was available that allowed to also review the types of buyers sending the various tenders, what the spend under the contracts were and the countries of the suppliers that were bidding for the contracts. Analysis showed that buyers from 30 had issued tenders and bidders from 93 countries had left bids to win these contracts. Table analysis of the data showed that the top five (5) countries issuing tenders for contracts, mainly France, Germany, Poland, United Kingdom, and Spain, accounted for most of the contracts issued, making up overall 64% of the tenders issued. When analysing the corresponding number of tenders won by bidder country, there was a striking similarity for the top five countries winning tenders, i.e., suppliers form France, Germany, Poland the

United Kingdom with a minor variation of Italy being the fifth (5th) highest were issuing tenders and winning contracts. Overall, in the year 147,936 tenders were issued by the top 5 buyer countries and the suppliers from the corresponding countries were successful in 89,101 of them. This table analysis was supported through Pearsons's correlation coefficient value comparing the country of buyer and country of bidder which had the highest correlation value with a moderate result of $r = 0.541$.

The data shows that even though the number of countries issuing bids was considerably higher than the number of countries successfully issuing bids, most contracts were awarded within the European Union, making up 99.69% of all the contracts issued. Empirical data also showed the bidder country had a correlation coefficient $r = -0.067$ result. A negative coefficient generally indicates that the two variables are moving in opposite directions, meaning that the impact of the bidder country was seen to have a negative impact on the contract length, this in itself can be seen as statistically significant phenomena as it indicates that bidders are awarded certain length contracts potentially based on their country of origin and the length of contract also reduces based on the length of origin. Relationship between the buyer country on the length of contract had a coefficient result of $r = 0.048$, showing a weak but positive linear correlation.

5.1.1 Total Price Ranges of contracts awarded

The price ranges of the contracts awarded were very broad, with values being recorded from 0.00 € (which indicates that the contract is either a nil spend contract or has not had a specific estimated value at point of tender) to a maximum value of 1 199 408 872 €. The lowest contract value above 0 € was found in the data at a value of 110 €. When testing the contract value and contract term variables for equality across the group, the hypothesis of H0 of $p > 0.05$ was rejected and H1 was accepted as the variables were unequal with a $p=0.0000$. When testing for equal means for these variables, the t-test result of $p > 0.05$ confirms the means are the same for both variables. One hypothesis that the researcher had wanted to test was if there was a correlation between the total tender value and the term of the contract, as one method of reducing financial risk related to a high value contract or supplier transaction is to engage the supplier for a longer period. The correlation analysis demonstrated a linear correlation between the variables of tender value and contract term, with a coefficient of

0.056. This result indicates that the tender value has a weak positive correlation coefficient on the offered contract term.

In the data the higher density of entries was in the lower value contracts, the distribution can be seen in the scatterplot graph showing that whilst there are contracts awarded with significant values, these make up the minority of the data, less than 1% overall. The highest number of tenders with contract values were in the 0 – 1M range, with approx. 93% of the issued tenders being placed in this value category (also shown in Table 13).

Figure 10. Scatterplot distribution of contract prices across the number of tenders issued
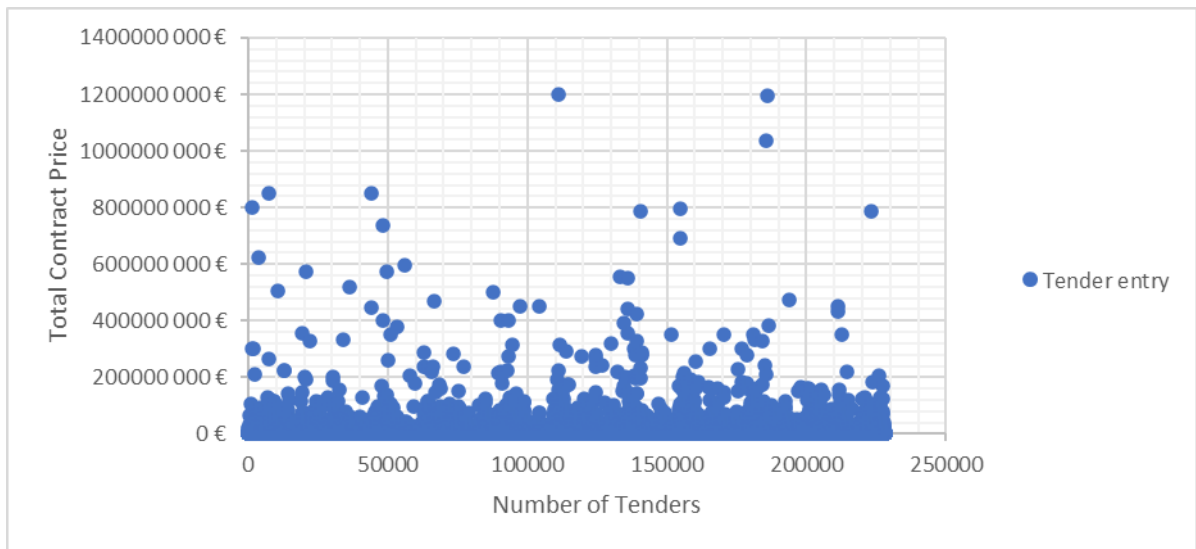
One observation that can be made from the data is the high number of low value or nil value tenders and contracts, which can signal that both the needs and the supply chains for public goods and services have a low level of complexity and potentially can be more tactical in nature when compared to the less than 1% of extremely high value and potentially high-risk tenders.

5.1.1 Impact of contract value on length of contract

When testing the predictor variable of contract value against other predictor variables, Pearsons's correlation significance showed a low positive correlation to buyer type ($r = 0.019$), buyer country ($r = 0.047$) and bidder country ($r = 0.080$). The highest correlation being with the bidder country, can indicate that the published contract value can have a small impact on the bidder country that will issue a tender for the contract. The correlation

coefficient with the response variable of contract length showed a weak positive correlation of r = 0.056, indicating that the contract length and contract value do not have a strong positive linear correlation, meaning that it is possible that there is a weak positive influence from the contract value on the length of the contract. Although it can be said statistically the researcher did not find a clear causation to the contract value from the buyer organisation, buyer country, bidder country or length of the contract, the exploratory data visualisation and use of tables and maps were used to highlight some of the key features found in the data.

This data visualisation confirmed that the highest number of contracts were in the low value areas. Comparison of the top 10 highest tender price contracts issued by type of buyer showed that the highest overall value of tenders issued were from (A[1]) General Public Services, followed by (B[1]) Health, (C[1]) Other (type of agency missing), (F[1]) Housing and Community Amenities, (K[1]) Railway, (E[1]) Education and (G[1]) Defence.

Comparison of the individual averages of the contract values for the top 10 buyer types listed above, revealed that the individual contract average values ranged from 1.1M EUR to 41M EUR. The highest average contract values were with (F[1]) Public Services and Housing, with 41.5 M EUR, which can be expected as the types of contracts tendered for this buyer are likely to be construction, infrastructure, and housing projects, which generally have a high contract value. The buyer types that had an average contract value above 1.9M EUR were involved in tendering contracts for public infrastructure such as (K[1]) Railway, and (A[1]) General Public Services (Table 12).

Table 12. Top 10 contracts by type of buyer

	Buyer Main Activities	Price
1	GENERAL_PUBLIC_SERVICES	44,881,994,724
2	HEALTH	41,591,369,254
3	OTHER	38,065,668,729
4	GENERAL_PUBLIC_SERVICES,OTHER	14,995,803,209
5	HOUSING_AND_COMMUNITY_AMENITIES	14,733,034,310
6	OTHER,GENERAL_PUBLIC_SERVICES	13,421,707,956
7	RAILWAY	11,049,637,449
8	EDUCATION	9,550,864,335
9	OTHER,GENERAL_PUBLIC_SERVICES,HOUSING_AND_COMMUNITY_AMENITIES	7,474,471,482
10	DEFENCE	6,804,951,969

The researcher also structured the data into a table format to review which types of buyers had the top 10 contract values and what was the average value of each contract making up the total value (Table 13 and Table 14).

Table 13. Contract values for top 10 buyers with highest contract spend volumes

	Buyer Main Activities	Price
1	OTHER,GENERAL_PUBLIC_SERVICES,HOUSING_AND_COMMUNITY_AMENITIES	41,524,842
2	RAILWAY	4,758,672
3	OTHER,GENERAL_PUBLIC_SERVICES	3,449,424
4	HOUSING_AND_COMMUNITY_AMENITIES	2,502,639
5	OTHER	1,951,785
6	GENERAL_PUBLIC_SERVICES,OTHER	1,938,444
7	HEALTH	1,356,579
8	GENERAL_PUBLIC_SERVICES	1,346,958
9	DEFENCE	1,220,400
10	EDUCATION	1,157,681

Table 14. Number and percentage distribution of tender contract values

Count	Range	% of total
3	1 000 000 000<	0.0013
16	500 000 000 - 999 999 999	0.0070
213	100 000 000 - 499 999 999	0.090
343	50 000 000 - 99 999 999	0.15
2886	10 000 000 - 49 999 999	1.26
2764	5 000 000 - 9 999 999	1.21
8358	1 000 000 - 4 999 999	3.66
24 460	50 000 - 99 999	10.72
189 021	0 - 49 999	82.88

5.1.1 Duration of contracts awarded

When reviewing the duration of the contracts in place, a review of the averages per buyer organization had revealed that the term durations were longest for public sector buyer organizations where there was the presence of critical infrastructure such as defence, roads, railways, and airports.

When reviewing the data points without averaging, the longest contract term that was offered was 420 months, which was in Education (E[1]). The other top 10 long term contracts with terms ranging 129 – 401 months were offered in areas of Housing and Community Amenities (F[1]), General Public Services (A[1]), Water (Q[1]), Economic and Financial Affairs (J[1]), Railways (K[1]) and Other (C[1]). Since these are public services where infrastructure projects can take sometimes decades to complete, the results are not surprising (Table 15).

Table 15. Distribution of tender contract terms (length in years)

Count	Contract term (months)	% of total
16	129-420	0.71
197	54-129	8.67
1875	1-53	80.86
218	N/A	9.74

Most of the tenders were offering contract terms of one (1) to fifty-three (53) months, with a significant percentage of 80% of all tenders with the estimated duration in this range. This would indicate that for most of the contracts and supplier relationships can be shorter term engagements and, in the data, longer term contracting arrangements were the minority (although present).

Figure 11. Scatterplot distribution of tender contract terms across the number of tenders issued
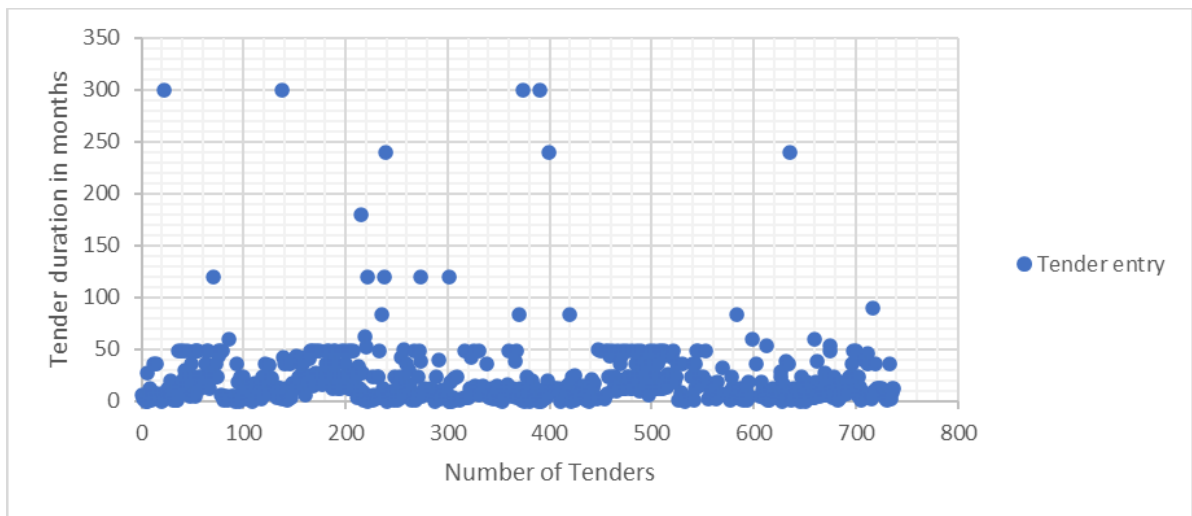
The researcher next wanted to understand what the potential statistical links were between the variables themselves, and the length of the contract so correlation tests were conducted to see what values would be seen for Pearson's correlation coefficients and what empirical analysis could be conducted from these (Table 16).

5.1.1 Influence of Buyer type on contracts

Data visualisation and averaging methods highlight some contracts from specific types of buyer types seemed to have an impact on the length of contract. There were 22 types of buyer organisations issuing tenders within the dataset, ranging from (A[1]) General Public Services to (G[1]) Defence. After the data fields where the data was missing or left blank, which accounted for 22% of the entries, the highest number of tenders issued were by (A[1]) General Public Services with 28% of the overall volumes, followed by (B[1]) Health with 17%, (E[1]) Education 6%, (F[1]) Housing and Community Amenities 4% and (G[1]) Defence 5%. When looking at maximum lengths, data analysis showed that the longest contract durations by

majority were offered by departments that were involved in complex public infrastructure or national defence. The maximum contract term offered was 420 months which was issued for a railway related tender. When reviewing the tenders' number of tenders issued, (G[1]) Defence issued 8239 tenders with an average contract term of 41 months, followed by (P[1]) Airport with 40 months then (Q[1]) Water infrastructure with 38 months and (A[1]) General public services with 35months.

When reviewing the entire dataset, statistical testing however only revealed a correlation coefficient of r = 0.002 between the buyer type and length of contract, meaning that there is a very low yet positive correlation between the variables. This result would indicate, that whilst there is empirical evidence to point that the longest contracts tend to be awarded in buyer types involved with complex physical infrastructure, this practice is not so consistent that it can be seen as firm positive correlation, i.e., length of contract does not look like causation based on the buyer type.

Variable	Pearson correlation significance	Pearson correlation significance	Pearson correlation significance	Pearson correlation significance
	Buyer Type	**Buyer country**	**Bidder country**	**Final Price**
Lenght of contract	0.002	0.048	-0.067	0.056
Bidder country	-0.006	0.541	-	0.080
Buyer country	-0.001	-	0.541	0.047
Final Price	0.019	0.047	0.080	-

Correlation is significant if $p < 0.05$, (2-tail)

Table 16. Correlation analysis between length of contract to other key variables

6 Discussion and Conclusion

The review of historical public tendering data has revealed that most contracts issued in a year through a public tendering process have a high volume of short-term contracts. Analysis of the public tendering data shows that most contracts issued in the year of observation were issued with a contract term of one to fifty-three months (i.e., a maximum contract length of four years). This number of contracts represented 80.86% of the overall contracts issued. From a legislative or procurement act perspective there are no limitations on the contract term, which would explain the preference for buyers to issue short term contracts which is seen in the data. Use of long-term contracts does not seem to be used in high numbers in public procurement according to the empirical data analysis.

Statistical testing shows that when combined and tested together, there is a positive correlation between all the predictor variables and the contract term, meaning that all the independent datapoints of contract type, buyer country, seller country and buyer type will impact the length of the agreement. Once the variables were tested individually, the variables that had the largest correlation within the groups and results that can be interpreted as significant, were the two variables of country of bidder and county of buyer. Based on this, it can be determined that the country of the buyer countries and the country of the bidder have a connection and is likely to influence the outcome of the tender process and who will be awarded the contract and the length of it. The length of the contract was not directly linked to the country of buyer or the country of the bidder as an independent variable, but when comparing the country of bidder and length of contract for example, the researcher feels the opposite direction correlation is a significant indicator.

Contracts had a large difference seen between the euro values issued in one year. Contracts ranged from very low to very high values. The data doesn't indicate why contracts were issued for low values, and the observation of the raw data for the low value contracts show no clear causation based on the buyer organisation type as contracts for low values were issued by multiple buyer types. The contract term for multiple low value contracts was noted at 0 months, meaning that the types of contracts issued may be a result of having to that they were issued under national procurement rules (European Union, 2024) which do not require the buyer to insert a contract value or term. Analysis of the contract values for all tenders

captured in the dataset, showed that the largest number of tendered contracts were in the low range contract value (0 – 49 999 EUR), making up 82.22% of all contracts issued. Midrange contract values (50 000 – 99 999 EUR) made up 10.72% and the remaining 6.37% were all above 1 million EUR and contracts up to 1B EUR.

The data shows an answer to the primary research question that even though the empirical analysis seems indicate the value of the contract does not show a strong or moderate correlation to influencing the length of the contract in a consistent pattern, there are other non-linear influences from other predictor variables, such as buyer type that are more likely to be having an impact on the contract value in individual contracts.

6.1.1 Results compared to similar research

The thesis researcher wanted to compare the results to similar research, discovering that there was not research available that had studied the use of long-term agreements and impacts from value and cultural influences from a public procurement perspective in the same study as this thesis did, but did find research where the public tendering data was used to evaluate the impacts from cross-border public procurement, covering the research focus of impact of contract value and cultural dimensions on the outcome of the tender (Kutlina-Dimitrova & Lakatos, 2016). The study by Kutlina-Dimitrova and Lakatos (2016) reviewed public tendering data over 5-year period to discover patterns for cross-border public procurement, finding that the odds of awarding a contract cross-border increases by 1.6% when the value of the contract increases with €1 million. There was also seen a decrease in awarding a contract to a foreign bidder when the amount of offers increased. Country GDP per capita and trade-to GDP ratio were also noted as positively impacting who is awarded the contract. This study correlates with the thesis researchers results showing that there was a positive linear correlation found between the value of the contract and both the buyer and bidder countries.

Other research where the topic of long-term contracting being used by public organisation buyer types analysed available case study data and discovered that in areas of health and emergency services, the buyers were more likely to have to face opportunism due to low needs for relational approaches, caused by high levels of governance needs, contract risk, uncertainty and bureaucracy (Ross & Yan, 2015). The thesis researcher saw similar

impressions of this in the data available for health tenders, that align with what was seen in the health sector tendering data having a significant number of low value contracts, meaning there was no clear evidence showing that long-term contracting was adopted in this buyer type. Another study reviewed through modelling the benefits of Public-private-partnership (PPP) long-term contracts being used by public buyer organisations such as transportation, water, healthcare, education and prisons and suggested there were could clear benefits for governments from a cost-focus, flexibility and being able to meet demand more efficiently (Zheng, et al., 2008). This study was of interest to the thesis researcher, as it focused on the same buyer organisations that were present in the open tender's database, and the research supported the observations made by the thesis researcher, that there were certain buyer types that were more likely to favour long-term contracting, and these were the in the areas of complex infrastructure. Aside from these, there were no similar studies found through a search of academic papers that would have provided an insightful comparison point.

6.1.2 Theoretical viewpoint

The researcher wanted to understand what are the types of behaviours that could influence buyers' decisions and behaviours theoretically, before studying open tenders' data to see what the empirical evidence shows and what conclusions could potentially be theoretically made based on it. Theoretically it has been demonstrated that between buyers and sellers there are certain types of dynamics that influence the behaviours and supplier strategies selected to govern the relationship. The adoption of Supplier Relationship Management (SRM) practices has brought development in the thinking how buyers can move away from transactional models and have a more relational relationship with suppliers, which often promotes long-term contracts due to the benefits that come from integration practices. As a result of integration practices there is a high possibility for the development of power and dependency between the parties, and the theoretical review revealed this to be often seen with types of arrangements where the power balance is more heavily skewed to one party due to the presence of transition risk, transfer of knowledge, competitive advantage and size of either party, which may create a potential monopoly position for one side.

Buyers in the public sector have a layer of bureaucracy influencing some of the actions and decisions that they make, which do not impact buyers operating in the private sector. In the

European Union area there is public procurement legislation that determines some of the processes and methods that can be used, depending often also on the contract value what types of controls are placed on the buyers and tender (European Union, 2024). Presence of economies of scale allows for buyers to utilise a larger number of volumes that would be available to some buyers in the private sector. When reviewing the data, it's evident the types of values of contracts available in public tendering provides the buyers significant power position when discussing matters such as volume discounts and efficient pricing. Buyers in the public space must use this economy of scale though in a way that considers the procedural restrictions and many governments general lack of willingness to tolerate contract-based risks.

Presence of governance practices in the public sector also would indicate that public buyers are more likely to be driven towards formal mechanisms that value transactional bidding practices to minimize informal dealings, hence improving transparency and fairness practices between all parties involved in the public tendering process. Opportunism, which can be one element of behaviour from party that has power in the relationship, is being avoided through governance structures and avoidance of relational practices, unless they are absolutely needed. Open tenders' data seems to support this theoretical analysis as the number of contracts issued in one year though tendering was a significant amount, for example the buyer type (A[1]) General Public Services issued 64 039 tenders in one year across 30 countries with tendering data, meaning each country issued 2135 tenders in the area for public services in one year (178 tenders a month). This would indicate aggressive bidding practices for some types of public buyers which is considered exploitative, rather than adopting a relational and cooperative SRM strategy. One year observation of contracting data demonstrated that large majority ($> 80\%$) of contracts were issued for both low values and relatively short contract periods (1-53 months). Use of long-term contracts (> 54 months) was less than 10% in total, meaning that it can be possible that one reason for this kind of buying behaviour is seen in the data, is due to buyers in the public sector tending to steer away from selecting a relational supplier management strategy that favours long term contracts, unless the type of contract has high level of risk and spend related to it.

Research appeared to indicate that development of power in a relationship, leading to unfavourable conditions, could be an outcome where the buyer has limited options for suppliers or supply. Buyers are in those cases recommended to apply strategies to broaden

the supply chain and have more than one supplier for a service or product, with the intention of improving supplier performance and reduce uncertainty. In the public sector, when reviewing the high volume of tenders and contracts issued for areas of health for example, the presence of data shows a high volume of tenders issued (33,960) in one year. This kind of data supports the theoretical viewpoints that for areas where there is presence of risk that the buyers wish to minimise and mitigate, it is proposed that reducing interdependence and having a flexible and broad supply chain with multiple suppliers is often preferred. In areas of health, the data also showed no evidence of a consistent practice for long-term contracting, with an average duration of only 27 months for contracts.

In the theoretical review, cultural influences also were seen to influence contracting practices and how buyers approach long-term contracts. Long-term orientation was seen to being different (i.e., seen less) in individualistic cultures, where the concepts of autonomy, competition, competition, and independence are valued versus collectivist cultures that operate more in a closed circle and place a stronger value on relationships. In the public sector where buyers are limited by regulation, law, and bureaucracy, it can be argued that the presence of culture and cultural influences can be reduced by the presence of regulation. The countries that were reviewed in the empirical analysis, theoretically have buyers that have both individualistic behaviours and long-term orientation preferences, and country buyers that have a low need for individualism.

An interesting aspect for the countries involved in public tendering in the European Union, is that all of them were seen to fall in the middle range (32-69) for long-term orientation, meaning they do not have a long-term orientation preference from a culture theory point of view. This is evidenced in the observation of the tendering data where most of the contracts were all short term. From a theoretical perspective it can be said that SRM is likely to have some influence on the buyer behaviours in the public sector but the result of the empirical analysis indicates there is very limited evidence in the public sector of buyers seeking to adopt long-term contracting that would lead to integration and collaboration practices that can lead to power and dependency development.

7 Limitations and suggestions for future research

The researcher and this thesis have some limitations. Firstly, the data sets being used were collected from an external data-source, where the researcher cannot verify the data collection methods were conducted efficiently, transparently and without error. The researcher however had a level of confidence in the public tendering data available in Open tenders' portal as the entity sourcing the data has described the data collection methods in a detail way and this data has been used by other Thesis researchers for similar analysis purposes. The presence of big data, however, opens the researcher to a potential error as the data is being mapped and analysed. One of the most common potential errors that could impact the thesis is the presence of a Type I error, where the null hypothesis is rejected by mistake. To prevent this type of error, the researcher ran the statistical tests multiple times, and some errors were noticed and corrected during the testing and analysis phase through this re-testing.

The thesis researcher wanted to test for the presence of long-term contracting in the public sector, and whilst the data answers some questions of what kinds of practices are found based on the evidence, due to the lack of qualitative research and interview methods, the research cannot verify exactly what kinds of external factors and behaviours and theories may be influencing the buyers. A further study could be to test the buyers' preferences and opinions through a survey methodology and cross reference the results of these with the empirical results.

This thesis also focused only on the tendering data available from the European Union and EEA area, since this is readily available. Hence, there are limitations from a geographical point of view as data related to public tendering was not reviewed from other markets outside of the EU (such as the US, Australia, China, or Africa for example). This narrows down the observations to one commercial and geographical area, so a topic for further research would be to see if public tendering data could be available from other regions and conduct empirical analysis on them. Private buyers' preferences and behaviours were also excluded from this research and thesis, due to the lack of open data related to private contracts. For further study, it would also be recommended to use qualitative methods to collect survey and interview data from private buyers. This type of data could be reviewed on its own, to see what type

of SRM practices are evident in the private sector and if long-term contracting has significant differences between the private and public buyers (does one sector favour long-term or short-term contracts and if yes, why?).

Appendix 1. Buyer country data points available in the datafile

Count	Country Code	Country Name
1	AT	Austria
2	BE	Belgium
3	BG	Bulgaria
4	CH	Croatia
5	CY	Cyprus
6	CZ	Czech Republic
7	DE	Germany
8	DK	Denmark
9	EE	Estonia
10	ES	Spain
11	FI	Finland
12	FR	France
13	GR	Greece
14	HU	Hungary
15	IE	Ireland
16	IS	Iceland
17	IT	Italy
18	LT	Latvia
19	LU	Lithuania
20	LV	Luxembourg
21	MT	Malta
22	NL	Netherlands
23	NO	Norway
24	PL	Poland
25	PT	Portugal
26	RO	Romania
27	SE	Sweden
28	SI	Switzerland
29	SK	Slovenia
30	UK*	United Kingdom*

*Pre-brexit datasource, UK tenders still accounted towards EU tenders

Appendix 2. Supplier country data points available in the datafile

Count	Country Code	Country Name
1	MA	Morocco
2	KE	Kenya
3	AD	Andorra
4	AE	United Arab Emirates
5	AF	Afganistan
6	AN	Netherlands Antilles
7	AR	Argentina
8	AT	Austria
9	AU	Australia
10	BD	Bangladesh
11	BE	Belgium
12	BG	Bulgaria
13	BH	Bahrain
14	BJ	Benin
15	BR	Brazil
16	BY	Belarus
17	BZ	Belize
18	CA	Canada
19	CD	Democratic Republic of Congo
20	CG	Republic of the Congo
21	CH	Switzerland
22	CN	China
23	CR	Costa Rica
24	CY	Cyprus
25	CZ	Czech Republic
26	DE	Germany
27	DK	Denmark
28	DZ	Algeria
29	EE	Estonia
30	EG	Egypt
31	ES	Spain
32	FI	Finland
33	FR	France
34	GB	Great Britain
35	GI	Gibraltar
36	GR	Greece
37	HK	Hong Kong
38	HR	Croatia
39	HU	Hungary
40	IE	Ireland
41	IL	Israel
42	IN	India
43	IS	Iceland
44	IT	Italy
45	JP	Japan
46	KG	Kyrgyzstan
47	KP	North Korea
48	KR	South Korea
49	LI	Liechtenstein
50	LK	Sri Lanka
51	LT	Latvia
52	LU	Lithuania
53	LV	Luxembourg
54	MC	Monaco
55	MD	Moldova
56	ME	Montenegro
57	MK	North Macedonia
58	MQ	Martinique
59	MT	Malta
60	MY	Malaysia
61	NE	Niger
62	NG	Nigeria
63	NL	Netherlands
64	NO	Norway
65	NZ	New Zealand
66	PA	Panama
67	PG	Papua New Guinea
68	PK	Pakistan
69	PL	Poland
70	PR	Puerto Rico
71	PT	Portugal
72	RE	Réunion
73	RO	Romania
74	RS	Serbia
75	RU	Russia
76	SA	Saudi Arabia
77	SE	Sweden
78	SG	Singapore
79	SI	Slovenia
80	SK	Slovakia
81	SM	San Marino
82	SZ	Eswatini
83	TH	Thailand
84	TR	Turkey
85	UA	Ukraine
86	UK	United Kingdom
87	UM	United States Minor Outlying Islands
88	US	United States
89	UY	Uruguay
90	VC	Saint Vincent and the Grenadines
91	VG	Virgin Islands
92	ZA	South Africa
93	ZM	Zambia

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