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A case study research of asymmetrical relationships between service providers and emerging companies within the healthcare industry

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Abstract

A case study research of asymmetrical relationships between service providers and emerging companies within the healthcare industry

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This master thesis report aims to highlight the importance of interorganizational relationships between experienced service providers and emerging biopharmaceutical (EBP) companies within the Swedish healthcare industry. A shift in innovation strategies regarding new pharmaceutical- and medical device products has prompted a paradigm shift within a complex industry where collaborations between organisations has become increasingly crucial. With a better understanding of how these companies operates, increased collaboration efforts could result in a faster and more precise product development with new products reaching the market improving the health for people around the world. In order to allow experienced service providers to enhance services towards EBP companies, a fundamental understanding of how decision makers within these EBP companies prefer to conduct relationships is needed. We have examined relationship preferences of EBP companies by conducting a qualitative case study through 14 interviews with decision makers combined with a quantitative conjoint analysis. Eight factors was identified as important for when EBP companies decide to engage with a service provider: cost behavior, professional competence, adaptability, communication, personal relationship, stability, EBP insight and size. The factors adaptability, personal relationship, cost and size were used in the conjoint analysis to determine their relative importance which show that adaptability and cost behavior was of the largest importance. With descriptions of each factor, we have provided a meaningful guide to action of how to address these factors as a service provider. The relationships is largely investigated as relationships between contract research organizations (as service providers) and EBP companies, but we have created a framework applicable for service providers within the healthcare industry in general.

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Populärvetenskaplig sammanfattning

Det här examensarbetet har utförts med målet att belysa vikten av utökade relationer mellan organisationer inom den svenska hälsoindustrin, mer specifikt mellan dedikerade tjänstebolag och växande läkemedels-/medicintekniska företag. Nya innovationsstrategier för utveckling av läkemedelsprodukter och medicintekniska apparater har resulterat i ett paradigmskifte inom en högteknologisk industri där kollaborativ produktutveckling har visat sig vara en viktig nödvändighet. Den totala utvecklingen av antalet nya produkter inom industrin ökar där en allt större andel av alla projekt idag drivs via mindre utvecklingsbolag. Ett tjänstebolag kan i det här sammanhanget vara ett företag som utför prekliniska och kliniska studier för läkemedel, tillverkar läkemedelssubstanser, utför produktvalidering, levererar marknadsinformation, bedriver kontakt med myndigheter och mycket mer. Majoriteten av alla företag som utvecklar läkemedel och medicintekniska apparater är idag så kallade mikroföretag som opererar i en "virtuell" miljö med max tio anställda vilket är en historisk förändring där industrin tidigare har bestått utav ett mindre antal giganter.

För att kunna driva denna typ av verksamhet har behovet av tjänstebolag växt där allt mer ansvar gällande produktutveckling har lagts över på externa aktörer. Om denna innovationsstrategi ska fungera och vidare främjas förutsätter det att relationen mellan utvecklingsbolag och tjänstebolag fungerar så bra som möjligt. Vi har utifrån denna situation undersökt vilka preferenser beslutsfattande individer i utvecklingsbolag har när det kommer till relationer med tjänstebolag. Vi har dessutom undersökt hur tjänstebolag kan anpassa sin verksamhet utifrån dessa preferenser för att möjliggöra effektivare samarbeten som vidare kan bidra till att produkter med ökad kvalitet snabbare når marknaden och förbättrar hälsan för människor runt om i världen. Vi har undersökt dessa preferenser genom att utföra en kvalitativ fallstudie med 14 intervjuer tillsammans med beslutsfattare i utvecklingsbolag samt en uppföljning via en kvantitativ conjointanalys. En analys av intervjustudien visade att åtta konceptuella omständigheter var extra viktiga när dessa individer bedömde kvalitén av samarbeten med tjänstebolag: kostnader, professionell kompetens, anpassningsbarhet, kommunikation, personlig relation, stabilitet, förståelse för utvecklingsbolaget (hos tjänstebolaget) och storlek på

tjänstebolaget. Vi valde sedan att ställa fyra av de faktorer som uppmärksammades mest mot varandra i conjointanalysen (kostnader, personlig kontakt, anpassningsbarhet och storlek på tjänstebolaget) för att slutligen avgöra vad som anses vara viktigast där anpassningsbarhet hos tjänstebolaget följt av kostnader för tjänster vägde mest.

Utifrån datan från intervjuerna har vi tagit fram ett innehåll som konkret beskriver hur respondenterna reflekterade över de åtta omständigheterna. Vi har då utifrån deras reflektioner producerat rekommendationer för hur tjänstebolag kan anpassa sin verksamhet för att kunna bemöta det som efterfrågas av beslutsfattande individer i tjänstebolag. När vi undersökte relations-preferenser tittade vi främst på relationer med kontraktsforskningsbolag (Contract research organizations - CRO) som tjänstebolag men konstaterar vidare att våra rekommendationer kan appliceras i andra typer av tjänstebolag inom hälsoindustrin. Den huvudsakliga verksamheten bland CRO-bolag involverar tjänster som berör kliniska studier av läkemedel och medicintekniska apparater. Kliniska studier är extremt dyrt och tar flera år att genomföra. Detta medför att om ett utvecklingsbolag väljer att arbeta med ett CRO för att utföra sina kliniska prövningar så ligger extra mycket vikt på att relationen mellan alla involverade parter fungerar väl. När det gäller företag som utvecklar läkemedel eller medicintekniska produkter är det dock inte bara kliniska studier som är krävande. Hela industrin präglas av långvariga processer som kräver mycket resurser och därför existerar dessa interaktioner med tjänstebolag i många olika former och kvalitén på relationerna är i överlag avgörande för en framgångsrik verksamhet.

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Distribution of work

This project was carried out as a joint effort between Adam Schön and Oliver Possnert. All content has been mutually processed and revised by both parties even though certain responsibilities have been assigned between them. Adam had the main responsibility for the conjoint analysis with its technical specifications while Oliver contributed with material related to the biotech- and pharmaceutical industry.

Abbreviations

CRO = Contract Research Organization

EBP = Emerging Biopharmaceutical

IOR = Interorganizational Relationship

CEO = Chief Executive Officer

USD = United States Dollars

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1 Introduction to the subject

Within any industry the interaction between organizations is central. Every company needs to work in the context of another organization, either as a customer, supplier, competitor, etc. The study of interactions between organizations within all sorts of industries is constantly evolving and one of the most popular buzzwords within the business world in the 21st century is “collaboration”. In a survey conducted by C&E (2010) questioning CEOs from 766 companies 96% of the CEOs considered collaborations as ‘important’. Another interesting opinion was forwarded by Unilever’s CEO who called for a shift from traditional capitalism to “collaborative capitalism” (2010, cited by Austin and Seitanidi, 2012). Within these interactions and collaborations there is a relationship between two organizations. Researching the relationship between organizations is a complex and difficult line of study as it is difficult to get a full insight into a relationship without being a part of it. This work presents a case study where we aim to investigate the nature of relationships between emerging companies within the health-care industry, and more closely, the pharmaceutical industry and dedicated service providers. We will also provide recommendations derived from our research on how these relationships can be enhanced based on preferences of decision makers who are involved in the formation of such relationships. While conducting the case study, the progression is supervised by an experienced service provider while we uncover the perspectives of emerging companies, resulting in a nuanced view on the subject from both sides of the table. This case highlights an example of asymmetrical relationships between very small actors and very large actors within an advanced and complex industry with many external stakeholders. Further, the small actors operates in an uncertain environment while the large actors are considered to have a stable position in the industry.

1.1 Purpose of the study

As the biopharmaceutical industry evolves, the service provider industry has to adapt. We intend with this study to contribute to the formation of strategic outsourcing partnerships between larger global service providers and emerging biopharmaceutical (EBP) companies in Sweden. The partnerships would be mutually

beneficial as the knowledge and experience of the global service providers would be valuable for an EBP company and the global service providers would access a new target segment within the pharmaceutical industry. We will try to uncover how the global service providers has to adapt their relationship strategy to create the most beneficial partnerships with future customers.

1.1.1 Purpose formulation

The purpose of this study is to investigate the nature of asymmetrical relationships within the pharmaceutical industry between large, global service providers and small, emerging pharmaceutical companies.

We do this by researching and evaluating the priorities and expectations of the pharmaceutical companies in Sweden when they engage in a long-term strategic partnership with a service provider. We intend, with our findings, to give recommendations to global service providers on how they could adapt their business in order to satisfy the needs of these companies. The partnerships would be mutually beneficial and could increase the speed and quality of drug development in Sweden.

1.1.2 Research questions

To answer the research question above we formulated two research questions to be answered. The first question aims to determine what motivates the EBP company to buy these services and which factors they value the highest. The second questions aims to determine who these EBP companies are (Who works there? What are their capabilities? etc.). This information will help us understand who these service providers are doing business with and what they value.

- Which key factors are the most important for an emerging pharmaceutical or medtech company when they choose which service provider to engage with?
- What are the common characteristics (size, financial situation, maturity etc.) of the emerging pharmaceutical and medtech companies in Sweden? And

how do these characteristics influence the nature of the relationship between the service provider and the emerging companies?

1.1.3 Limitations

The companies under investigation will be conducting preclinical and/or clinical studies up to phase III. We will not investigate any companies that already buys services from our supervising company, IQVIA. During the study the general service provider takes the form of a CRO, however we intend to create a framework applicable to different types of service providers within the pharmaceutical industry.

2 Background - The Swedish pharmaceutical industry

A big change within the Swedish pharmaceutical industry has been observed from the early 2010's. An increasing number of small research based companies have emerged. In a report published by SwedenBIO in 2016 there were at the time 64 different companies within the Swedish pharmaceutical industry conducting clinical trials for 144 different projects developing novel drugs (SwedenBIO, 2016. See Figure 1).

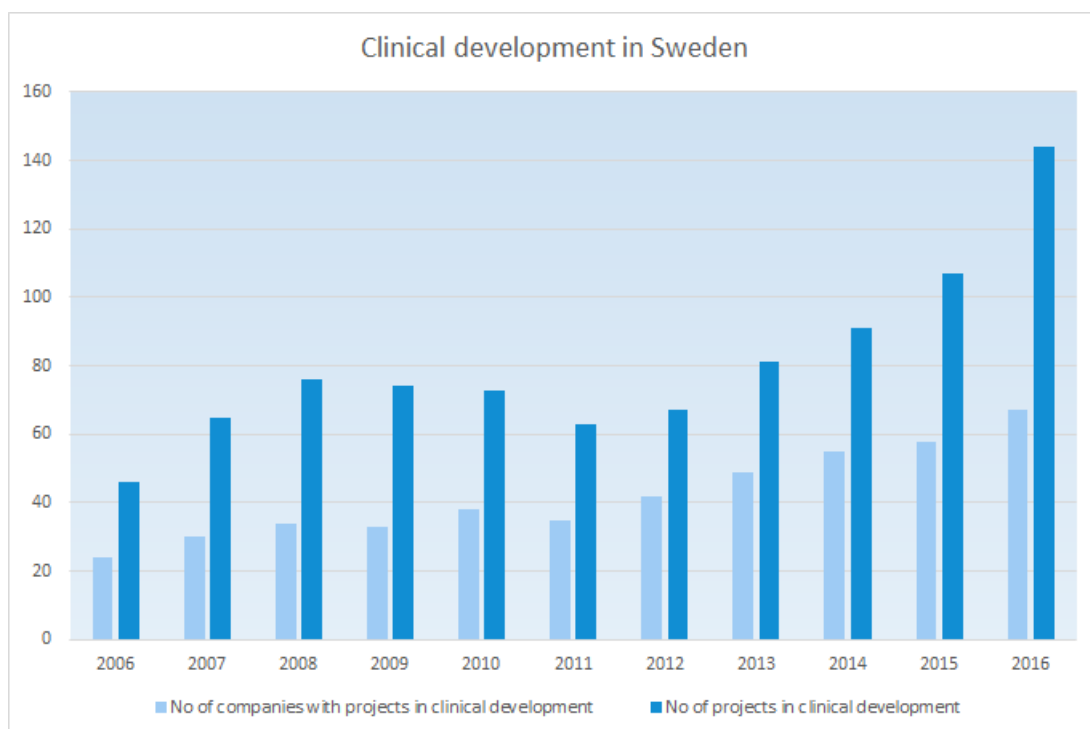


Figure 1: The number of pharmaceutical companies conducting clinical trials has increased over the last decade (64 in 2016). An even larger increase of the total number of projects in clinical trial has been observed during the same period (144 in 2016). Source: SwedenBIO pipeline report, 2016.

This is an increase of 228% in the number of projects and a 191% increase in the number of companies involved in clinical trials compared to 2011. The report stated that a total 144 companies in Sweden are engaged in research and development for new drugs, and the number is steadily growing. 77 of the Swedish

pharmaceutical companies currently focus on research in an earlier stage than clinical development such as discovery or preclinical research and therefore are not presented in the statistics regarding clinical development. Out of these 144 companies 125 are classified as small or micro companies with 10 or less employees (See Figure 2).

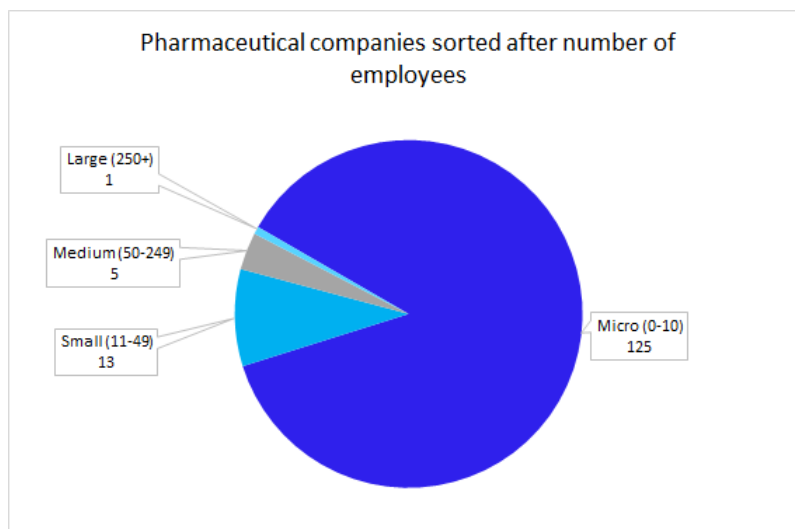


Figure 2: Showing the distribution of company size according to number of employees for 144 pharmaceutical companies in Sweden 2016. Source: SwdenBio pipeline report 2016.

When comparing two pipeline reports from SwedenBIO from 2013 and 2016 the amount and size of the companies has changed. Even though it's only a difference of 3 years between the reports, there were more companies who generally had less employees in 2016 compared to 2013 (SwedenBIO, 2013, 2016). Most of these companies are located in four different clustered areas. The biggest area is Stockholm-Uppsala with 51% of the companies, followed by Malmö-Lund (27%), Gothenburg (13%) and Umeå (6%). A similar report from SwedenBIO released in 2012 reports that 21% of the companies conducting R&D in the pharmaceutical industry originated from academia, 24% originated from a combination of academic and internal research (SwedenBIO, 2012). This is a possible explanation to why the companies are clustered in areas around large academic cities in Sweden.

Although the estimated combined market potential for all early stage companies in Sweden are difficult to measure due to a large variety in target indication areas (addressed diseases), it is seemingly safe to say that the trend in increasing numbers of emerging companies indicates a large demand for new drugs. Pharmaceuticals make up 6% of the total export in Sweden corresponding to 74 billion SEK in 2017 according to Statistics Sweden (SCB, 2018). Sweden's global trading in pharmaceuticals can thus explain the incentives for further development of new drugs. In their latest report from 2018a, SwedenBIO reports the 76 companies are currently involved in drug development regarding precision medicine which exclusively involves substances tailored for specific target indications for certain patient groups (SwedenBIO, 2018a). Biologically active target drugs based on larger biomolecules can in many cases render a more focused and effective treatment for specific indications which differs from conventional pharmaceuticals where drugs are mainly based on smaller, chemically synthesized molecules. These type of drugs lay the foundation of the paradigm shift within the pharmaceutical industry.

2.1 The paradigm shift - The emergence of biopharmaceutical companies and service providers

Throughout the first half of the 20th century, the advancements in organic chemistry was considered the main driver of innovation regarding drug development where practically every new drug constituted active substances based on small, chemically synthesized molecules. Already at the time of the 70's, R&D expenditures was astronomically high and the total cost for pre-human and clinical trials was estimated to 179 million USD (adjusted to USD in 2013) on average per approved drug (DiMassi, 2016. See Figure 3).

The pharmaceutical industry was at that time composed of a handful of large companies which were able to handle the enormous costs and resources required for development of novel drugs and the general idea was that no new company would ever be able to enter the ingrained industry (Gassmann, Reepmeyer and Von Zedtwitz, 2008). In parallel, progression in biotechnology with new scientific discoveries gave rise to a completely new innovative playing field. Genetic engineering and protein chemistry derived new pharmaceutical applications and

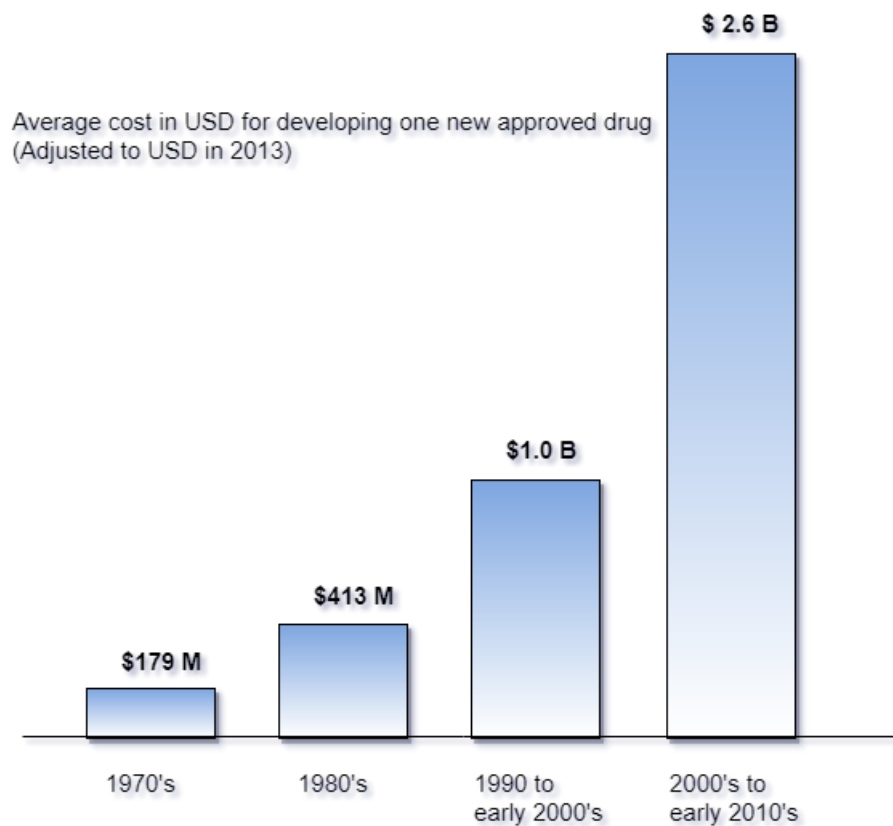


Figure 3: The development cost on average per approved drug has increased with almost 1400% over four decades reaching past 2.5 billion USD in the early 21st century (DiMassi, 2016).

the first biopharmaceutical product soon revealed itself. Via a joint effort, Genentech and Eli Lilly launched Humulin® in 1983, a recombinant insulin engineered in *Echerichia Coli* (Quianzon and Cheikh, 2012). This was the first biopharmaceutical drug which started a new wave of drug development within the industry. In 2014, a total of 212 biopharmaceutical drugs had been approved in USA and/or the EU increasing every year where 108 was approved within the period of January 2013 to July 2014 (Walsh, 2014). The rising success of biotechnology prompted new enterprises based on novel technology platforms. Micro to small companies utilizing these technologies as diagnostic tools, medtech or drugs (bio and non-bio) we will refer to as EBP companies. The pharmaceutical industry was already strained by high R&D costs and even more complex sciences only made it harder to overcome the struggles to reach success within the industry where the estimated

development cost per drug reached past 2,5 billion USD in the 2000's (DiMassi, 2016).

In a recent analysis report, researchers have examined over 22,000 drug development projects over the last 20 years (Shih. H.P, Zhang. X and Aronov, A.M, 2018). They found that over 2,400 therapeutic mechanisms were targeted for more than 1,400 indications which in combination results in a total of 15,100 mechanism-indication pairs for putative drugs. The high rate proliferation of new technologies and discoveries of new drug targets made it difficult to confine every new application within a limited number of companies and their R&D operations (Gassmann, Reepmeyer and Von Zedtwitz, 2008). In order to exploit the new found opportunities to the fullest, bold entrepreneurs used innovative management- and financing strategies in order to create and sustain new emerging companies with unique expertise within narrow emerging fields in biotechnology and healthcare. Many of these companies, unlike their predecessors, found that a slim and specialized business model fitted well together with highly specialized areas. The resulting consequence and validation of success for this model can be observed in the corporate environment within the pharmaceutical industry in Sweden where a large number of small companies has emerged and operates in a virtual setting. By "virtual", we are in this case referring to micro-sized companies without an actual operation beyond business development and management. Further, the main asset in these companies is considered to be the intellectual property, and the core concept of managing a virtual company is to develop a product by outsourcing all the necessary 'practical' work. With unique intellectual properties, a compact management strategy and capital funding, EBP companies realized that resources had to be managed more efficiently in order to sustain development (B.S. Piachaud, 2002). To obtain the competence required for these activities, resources had to be managed by specialized service providers, and quickly enough, a new type of industry took form. Never before have such a large dependency on external service providers taken place within the pharmaceutical industry due to the shift in R&D logistics and the increasing number of new drug targets and indication areas.

2.2 Service providers within the pharmaceutical industry

The overwhelming task of navigating a pharmaceutical company in the right direction requires diverse competence and lots of resources. It is nearly impossible for a pharmaceutical company to manage all of its operation by themselves, even more so for an EBP company in an early stage. service providers delivers competence and solutions in almost every area regarding research, development and commercialization of pharmaceuticals. Products of delivery may include tools/methods for research, regulatory and medical advisory, formulations, market access solutions, administration of clinical trials, manufacturing and much more.

2.2.1 Contract Research Organizations

A Contract Research Organization (CRO) is a service provider that supports the pharmaceutical and biotechnology industry by providing research services for drugs and medical devices. CROs provide very precise R&D related services that can be used from the preclinical phase to the commercialization of the product. CROs exists in all sizes, ranging from small local companies to large multinational enterprises. One of their more prominent services is regarding clinical trials where they may administer certain aspects of a trial or providing a ‘full-service’, managing trials with little involvement of the client. Their expertise helps to minimize the time-to-market for the product by offering access to a large network of clinics and optimization of procedures. Conducting clinical trials is pivotal in drug development and is mandatory for all pharmaceutical companies in order to receive market approval for their products. The trials are seldom done by the pharmaceutical companies themselves and most often carried out by a CRO instead. SwedenBIO reported in 2007 that at least 46% of all clinical trial projects conducted by swedish companies was performed using external CRO’s (The use of CRO’s was not disclosed for 36% of the projects leading to the assumption of a higher percentage). The evolving trend regarding the use of CRO’s can be observed globally where the estimated market value for CRO operations was 8.8 billion USD in 1999 (Naude, 1999, see Piachaud, 2002) and is expected to grow and reach 51.3 billion USD in 2024 (Grand View Research, 2018).

2.3 Bringing drugs and medical technology to the market through clinical research

The development of medical devices and pharmaceuticals are different in many ways. For a medical device, clinical trials may be conducted depending on if the use of a device is intended for treatment or not. If not (diagnostic tools for instance), it is usually sufficient to provide documentation which proves that the device delivers the intended function, that it is safe to use and manufactured with material and methods according to certain conventions (See Läkemedelsverket, LVFS 2003:11 for current legislations in Sweden and EU regarding medical devices). If the device is intended for treatment purposes, an initial pilot study is launched where the device is tested on 10-30 patients with the disease in order to determine preliminary safety and performance information (Chittester, 2014). Thereafter, a pivotal trial is conducted in order to determine effectiveness and adverse effects in a larger population, followed by a post-approval study where long-term data regarding overall performance and additional effects is collected. Drug development on the other hand requires further extensive testing with additional requirements. Before a drug can be introduced on the market it has to go through several trials to make sure that the drug will not be harmful to the patients (FASS, 2017). These trials are heavily regulated and require a lot of testing and documentation. All of the trials takes 12 years to complete on average before the drug can be introduced on the market. The trials focuses on testing a lot of different aspects of the drug, out of which safety is the most important.

2.3.1 Preclinical trials

After a candidate drug has been identified, it has to be further investigated and confirmed to be safe and stable enough before it can be tested in humans. This is done through extensive research investigations in animal models to see how the drug affects a living organism, if it has the wanted medicinal effects, if it has any unforeseen side effects and how it leaves the body of the animal. Researchers also decides how the drug should be administered to a patient (pill, injection etc.). If the researchers, doctors and the Swedish Medical Products Agency (Läkemedelsverket) agree that sufficient evidence and documentations has been produced, the candidate drug can be tested in humans in clinical trials. There are

thousands of candidate substances that don't make it past this phase, so a large number of different substances must be tested before at least one is found that qualifies for clinical trials. Usually, the preclinical phase takes around 4-5 years to complete.

2.3.2 Clinical trials

During a clinical investigation drugs are tested in humans. It is divided into multiple phases where the amount of trial patients and dosage is slowly increasing. Clinical trials are usually performed over 7 years before the drug can be approved and introduced on the market.

Phase I

The first phase of the clinical trials is the first time the drug is tested on a human. The patients are usually healthy, volunteering males who are under constant medical observation. The purpose of the first phase is to investigate if the candidate drug behaves in the same way in a human body as it did in an animal's. The first doses are made as small as possible while still being large enough to possibly have an observable effect. The dosage is slowly increased until desired medicinal effects has been tested.

Phase II

In the second phase of the clinical trials the drug is tested on a limited number of patients with the symptoms which the drug should address. During this phase different dosages of the drug is tested to find out which quantity is the most effective against the targeted disease. When a dose has been decided, the candidate drug enters the third phase of the clinical trials.

Phase III

In the third phase the candidate drug is tested against an ineffective placebo drug or an already approved drug on a large scale. This is to get an objective view of how the drug affects a larger group of patients. The large-scale testing makes statistical analysis of the drug possible. If the tests are successful, the drug can be approved and enter the market.

Phase IV

Most approved drugs enter a fourth phase of clinical studies. This phase is not mandatory as the other phases but is conducted by almost every company that brings a drug to the market. This study is investigating long-term risks and benefits of the drug as well as identifying potential additional side effects. It also monitors how well the drug works when it is used by a wider population.

3 Theory on formation of relationships and the importance of trust

In this theoretical framework we present previous research on two major subjects: *Interorganizational theory*, providing general contingencies which relationships may be formed upon, and *Trust as a factor in relationships* which highlights the importance of trust when engaging with another party. In combination, we incorporate views on how these subjects relates to a relationship between an EBP and a CRO (as well as with service providers in general).

3.1 Interorganizational theory - why are relationships formed?

A definition of the concept of 'Interorganizational theory' was given by Roland L. Warren: "The concept of interorganizational field is based on the observation that the interaction between two organizations is affected, in part at least, by the nature of the organizational pattern or network within which they find themselves" (R.L. Warren, 1967). The interaction between two organizations is further presumed to be a product of a motivated engagement in a relationship of arbitrary nature. Put in context of this work, the conditions of which a potential relationship is realized is directly related to the contingencies affecting companies in the pharmaceutical industry explicitly, whether it is a global service provider or an EBP company. Researchers stress that one of the main reasons for interorganizational collaborations has to do with its potential for organizations to combine resources, skills and knowledge from a wide range of stakeholders in order to address various challenges; all of which help create value (Gray and Stites 2013). This win-win value has been labeled in different ways by scholars: "shared value" (Porter and Kramer 2011), "blended value" (Emerson 2003), "mutual benefit" (London and Hart 2010), and "bottom of the pyramid" (Hart and Prahalad 2002). Regardless of what this value is called many consider this value creation to be the central motivation behind interorganizational relations. In the context of this research the value of the EBP companies when engaging in these relationships is the access to resources and knowledge that the service providers can offer. The service providers value from these relationships can either be looked at directly, through financial income, or through the knowledge and experience these customers will

bring to their company, further developing their own competence.

Regardless of the type of industry, Christine Oliver (1990) further propose six contingencies as determinants for engaging in an interorganizational relationship (IOR): Necessity, asymmetry, reciprocity, efficiency, stability, and legitimacy. We will take a look at these contingencies within the pharmaceutical industry, specifically at the relationship between a CRO and an EBP company but similarities can be found between other service providers and EBP companies.

Necessity

An organization will most likely find themselves in a situation where they need to meet regulatory and legal requirements leveraged by either the industry, legal- or governmental agencies. Regarding development of pharmaceutical or medical agents, the requirements are heavily regulated and therefore the *necessity* of an IOR with a CRO should be fulfilled to some extent, although a pharmaceutical company is able to conduct their own clinical trials in theory.

Asymmetry

The probability of an EBP company being able to overcome the challenges of conducting their own clinical trials in order to meet the requirements is extremely low due to the enormous amount of resources required for such activities and therefore the *asymmetry* of an IOR with a CRO could be fulfilled solely by the resource dependency where these organizations internally are not self-sufficient (Oliver, 1990; Pfeffer, 1982).

Reciprocity

The contingency of *reciprocity* partly lays the foundation of this project where an IOR could be motivated by a mutually beneficial exchange of cooperation, coordination and collaboration rather than power and control among the organizations (Oliver, 1990), although this contingency can be overridden by the asymmetry contingency between CRO's and pharmaceutical companies.

Efficiency

The contingency of *efficiency* for relationship formation is based on the anticipa-

tion of being able to increase return on assets, reduction of unit costs, downtime and cost per client. Efficiency may be found as a central aspect for the EBP regarding resource dependency where they optimally should be inclined to direct their outsourced needs with as few service providers as possible in order to decrease transaction costs and time spent on managing a high number of partners. An EBP company could also be able to increase the efficiency by reduction in employees and accelerate the time to market via an engagement with a CRO (B.S. Piachaud, 2002).

Stability

The willingness to engage in an IOR has also been described to be due to environmental uncertainty where an organization may seek to strategically retain stability through dependence on externally fixed institutions. Smaller organizations may seek to engage with larger organizations who are able to exert influence and leverage control over the external environment (Oliver, 1990; Pfeffer, 1982). The contingency of *stability* is crucial when it comes to delivering services involving clinical trials which is a process that requires many years of work in combination with careful planning and execution over time.

Legitimacy

As all of the contingencies already mentioned are able to be seen as independent and singular determinants as incentives to engage in an IOR, they are more or less overlapping most of the time whereas *legitimacy* may occur as the least independent determinant. The contingency of legitimacy as a motive to engage in IOR's is affected by the pursuit of retaining or improving reputation, image and prestige for an organization according to the norms of the environment (Oliver, 1990). Legitimacy are thus to be considered in combination with other contingencies when selecting the right organization to engage with after the realization that the need for a certain type of relationship exists in order to possibly gain more prestige and enhancing their credibility within the industry.

We will see to the possibility to enhance the reciprocity contingency to some extent where we intend to investigate how large service providers can adopt their business towards EBP companies and engage in a learning process in order to

develop their own knowledge about small innovative companies while improving their services and gaining more clients based on a genuine will to fuel the drug development pipeline. Since the phenomenon we are studying concerns the *formation* of IOR's, we need to look at the fundamental aspects of how perceived value is reflected upon between different parties when they decide whether to engage in specific relationship with a service provider or not. In other words, after one or several of the previous contingencies has been identified, the EBP should also be able to expect the desired outcome.

3.2 Trust as a factor in relationships

A relationship between a service provider and a pharmaceutical company can take many forms when we think of partnering solutions and degree of commitment amongst the parties, ranging from brief transactional relationships involving lesser services, to fully partnered relationships with joint ventures and cooperative development. Regardless of the nature of the relationship, we define the relationship between a service provider and an EBP company as a strategic alliance where both parties aim to achieve the same strategic objectives (Das & Teng, 1998) in terms of delivering new drugs to the market. Formation of new relationships is highly built on trust where each party has to be convinced that the opposite organization does not assume an opportunistic behavior. Khodyakov (2007) derived a processual definition of trust adequate for this work:

“Trust is a process of constant imaginative anticipation of the reliability of the other party’s actions based on (1) the reputation of the partner and the actor, (2) the evaluation of current circumstances of action, (3) assumptions about the partner’s actions, and (4) the belief in the honesty and morality of the other”.

We therefore seek to understand the underlying contingencies which creates expectations in the minds of decision makers involved in the identification of a suitable service provider for an EBP company. Note that trust is not necessarily entitled the truth regarding certain attributes of the other party, but perhaps constructed views based on the appearance of the other party and the current setting in combination with previous experience of similar situations. In summary: The contingencies that decision makers assess in terms of trustworthiness for a service

provider. The level of trust and related contingencies between two organizations can be analyzed in different levels: Interpersonal trust, interorganizational trust or institutional trust (trust between an individual and an organization) (Schilke and Cook, 2013). In this work, the aspect of trust will be investigated in a specific direction where the trustees is considered to be the decision makers for EBP companies who holds certain expectations. The trustors is considered to be service providers which are assessed by the trustees.

The term 'Service provider' implies a contractor conducting services for other businesses in exchange for money. By definition, this is true, although the relationship between a service provider and a pharmaceutical company can be considered to be deeper and more complex. Due to a large input of time and capital in drug development projects and where a pharmaceutical company often out-source large portions of the total development, both of the parties often seek to a long term relationship according to a preferred partnering model (B.S. Piachaud, 2002). Even though the relationship itself may not be continuous, recurring business interactions takes place throughout the relationship life cycle. The preferred service provider can of course be different from time to time according to specific project needs where certain service providers might offer specialized services in very specific areas. In perspective, we could imagine a small EBP company with one early-stage preclinical project in its portfolio, assuming that the company plan to finish phase II and then license the product: A CRO could then conduct quality controls, preclinical pharmacokinetics, pharmacology and toxicity studies, phase I and phase II trials; pharmacokinetic/pharmacodynamic decision making studies or managed multicenter studies, statistical analysis, reporting of the project and interceding with regulatory agencies (B.S. Piachaud, 2002). The process going from early preclinical phase to clinical phase II can take 6-9 years (more or less depending on the project). If one single CRO would commit to all these activities, we assume that the relationship must be deeply rooted in mutual understanding and trust. The issues of mutual understand and trust is something we will investigate further throughout this work.

4 Methodology: The use of quantitative and qualitative research in our work

Even though we intend to uncover how companies within the healthcare industry behave when engaging in relationships, the circumstances of which these relationships are formed is in the end a product of social interactions between individuals. Words, concepts and epistemological interpretations is emphasized as important indicators rather than statistical data when investigating people and social phenomena (Bryman & Bell, 2011). This onset is the foundation of qualitative research which is fundamentally different compared to quantitative research. There are claims that clearly suggests an inductive qualitative approach for our investigation (See 4.2). Out of curiosity, we decided to conduct our research divided into two parts where we first conducted a qualitative case study followed by a quantitative conjoint analysis.

4.1 Quantitative research - Based on numerical data

Quantitative research entails the collection of numerical data prompting a deductive relationship between theory and research. The sole foundation for this approach is to let quantifiable data support or reject a hypothesis (often derived from a predetermined theoretical framework) (Bryman & Bell, 2011). Provided with a solid execution, quantified measurements is to be considered a powerful research method where the reliability of the data can be fairly high, assuming few unknown variables which may alter the results. Reliability refers to the consistency of measurements, an indicator telling us to what degree the data can be trusted contingent to the methods and instruments used in an experiment (Bryman & Bell, 2011). Quantitative research is the basis of advanced natural sciences in, for instance, physics, chemistry and molecular biology. Research questions within these areas can be fairly simple with low ambiguity, although the research design and execution in itself can be very complex. As an example, we can imagine asking the question “How many individuals in the study population prefer Swedish service providers over foreign?”. To answer that question, we would simply measure the number by asking them to choose. The data would be unambiguous to the extent that we can answer the question of ‘how many’. The data would on

the other hand be insufficient for further interpretation. We cannot answer any other question, for instance “*Why* they prefer Swedish service providers over foreign?”, which is perhaps more interesting to find out. Quantitative measurements renders data with little room for interpretation (compared to qualitative data) and is easily tangible to the research questions which derives the experiment. The convenient relationship between the research question and the results, in the form of numerical/quantifiable data, enables measurements of validation for the experiment where unambiguous data helps answering your questions. The incentives for conducting quantitative research is thus, for us, motivated by the advantages of being able to measure reliability and validity. We chose to not reject a quantitative approach due to these advantages by conducting a conjoint survey analysis to see whether it can provide additional support for our findings from our qualitative research. With this in mind, we will continue by highlighting the advantages and pitfalls of embracing a qualitative approach which in the end provides us with the actual results sufficient for answering our research questions.

4.2 Qualitative research - Creating a deeper understanding

Bryman and Bell (2011) uncovers the leading ideas of qualitative research in their book *Business Research Methods* which we have deployed throughout this project in a case study. We didn’t list the disadvantages of quantitative research on the basis that the methodology distinguishes itself from qualitative research in a way which can be viewed as opposites. With this in mind, we can consider every advantage of qualitative research as opposing disadvantages for quantitative research and the other way around. Further, contrary to quantitative research, qualitative research assumes an inductive approach leading to a theory being generated out of the research. A common way to accomplish this is the use of grounded theory (see 4.3.1). In qualitative research, there is little consideration regarding measurements of stringent data. Instead, the purpose of creating a deeper understanding of ‘sensitizing concepts’ is emphasized. This is further conformable with data derived from human minds where much effort is put in to interpreting for instance, social behavior, opinions and feelings. Blumer (1954, see Bryman & Bell, 2011) described the idea of employing sensitizing concepts as a mean to uncover the variety of forms which the investigated phenomena can assume. Rich data with

high resolution (free text, video footage i.e.) is directly collected from the objects under investigation, commonly people. By comparing similarities and differences within a study population, the derived data can be conceptualized and narrowed down into generalizations which with close representation of the raw data describes a setting in the real world. Bryman and Bell (2011) explains the potential deficiencies with this course of action where the derived concepts can be of little use as a guide for empirical enquiries if the generalizations is taken to far. On the other hand, if the data isn't narrowed down sufficiently, but instead independently interpreted without a sufficient generalization, there is a risk of producing “quantifiable” data without statistical representation. Reliability and validity comes with a different meaning when evaluating the quality of qualitative research compared to quantitative research.

Due to the nature of processing non-quantifiable data, definite measures of these indicators make little sense. Instead, Mason (1966, see Bryman & Bell, 2011) refers to validity as an indicator which can be judged based on an evaluation of whether ‘you are observing, identifying, or “measuring” what you say you are’. Reliability is to evaluated as both external reliability and internal reliability (LeCompte and Goetz, 1982, see Bryman & Bell, 2011). External reliability refers to the degree to which a study can be replicated. External reliability is inherently difficult to achieve since it is impossible to ‘freeze’ a real world setting (where circumstances constantly change) in which the initial study takes place. The internal reliability refers to the consistency amongst the researchers (if the study is a joint effort), the agreement about whether they makes similar interpretations of the observations or not. The strategy to achieve reliability and validity in qualitative research is thus dependent on the use of methodological conventions and principles which enables comparisons with previous findings. Regardless of the issues involving quality ‘measurements’, inductive qualitative research is still regarded as one of the most powerful research methods for investigating the arbitrary nature of a human population. In our quest to uncover the reasoning amongst decision makers within the healthcare industry, the choice of conducting a qualitative case study is thus a rational product based on the advantages mentioned in this Section.

4.3 Case study

The nature of the case we are investigating entails a relationship between a small entity in an uncertain environment and a very large entity with a stable and fairly certain position within a complex industry. The small entity is to be considered as the party with incentives for engaging in the relationship. The relationship is considered to be asymmetrical where the large entity holds all the resources and the small entity takes a greater risk. With our case, we want to investigate how EBP companies want their relationship with a service provider to be constructed and why they choose one service provider over another. As stated by Robert Yin in his book *Case Study Research* (1994): “In contrast, ‘how’ and ‘why’ questions are more explanatory and likely to lead to the use of case studies, histories, and experiments as the preferred research strategies. This is because such questions deal with operational links needing to be traced over time, rather than mere frequencies or incidence.” Based on this insight we will conduct an empirical case study in our research. Another decision that was made was whether the case study should be single or multiple case. In *Case Study Research* Yin presents four criteria that should be covered if you want to make a single case study, in case these four criteria are not fulfilled he recommends doing a multiple case study:

1. It is a critical case
2. It represents an extreme or unique case
3. It is a revelatory case
4. It should be a case used only to motivate further studies

When conducting a critical case study you usually want to test out a very well-formulated theory. As we are doing an exploratory case study it can not be classified as a critical case study. Our case(s) are neither extreme nor unique since you can find a lot of similarities between the circumstances under which these companies make their decisions. The case is not revelatory either since it has earlier been accessed for observation and analysis. As the goal of our study is not only to motivate further research this point is not fulfilled. As none of the four criteria is fulfilled, we will be conducting a multiple case study.

4.3.1 Grounded theory

Due to the explorational fashion of our research where we aimed to gain new insights, we used a methodological framework derived from grounded theory. Grounded theory was initially given attention by Glaser and Strauss in their renowned book published in 1967, *Discovery of Grounded theory: Strategies for Qualitative Research*, but has been developed over time and several versions now exists (Bryman & Bell, 2011). Strauss and Corbin (1998) evolved a prominent methodology where a theory can be derived from systematically gathered data in a research process. Instead of working on the basis of an existing theory and preconceived concepts, the theory emerges throughout the research by collecting and analyzing data in parallel iteratively. Strauss and Corbin claims that this approach renders a theory more aligned with the reality compared to a conceptually composed theory, offering insight and enhanced understanding which can provide a meaningful guide to action. We note that this claim is specified for inductive qualitative research and not true when conducting research in other forms.

4.3.2 Case study design: Semi-grounded theory

Since we do have an existing theoretical framework to attach our findings to, we have not used grounded theory to the full extent in terms of deriving a completely new framework. Instead, we have the grounded approach in the data collection and emergence of concepts without taking the theoretical framework into account. After that, we use the theory to find similarities and differences with the intent to further contribute to the field with further elaborated concepts and ideas derived from our case. With this, we assumed a semi-grounded theory where we do not have to reject any findings which may conflict with the existing theory. When we conducted our case study, we used the following ‘tools’ which Bryman and Bell (2011) outlined in their review on grounded theory based on the work of Glaser and Strauss (1967), Strauss and Corbin (1998) and Charmaz (2000):

Theoretical sampling

Collection, coding and analysis are conducted in parallel in order to decide which data should be collected next and where to collect it. This is a fundamental aspect of grounded theory which allows the development of a theory throughout the

experiments by making continuous adjustments. The current state of the emerging theory controls the process, altering the approach by inferring suggestions on what to do next in order to develop the theory further. The concept of theoretical sampling is by these means a recursive method where the data and data sources creates the emerging theory which is constantly affects the way new data is collected and analyzed.

Coding

Coding is the process where data is processed and broken into fragments which can be categorized and further analyzed. The coding process starts as soon as the initial data has been collected and continues throughout the entire data collection. Contrary to quantitative studies, the data are not fitted into preconceived standardized codes. The codes emerges from the data and constantly updated by the researcher making interpretations of how the content can be categorized. In this process, the data is disconnected and transformed into conceptualizations.

Theoretical saturation

The coding process is conducted iteratively until a point where the data no longer can create new meaningful categories. At this point, the data fragments can be observed as shorter sentences or even single words with little or no ambiguity. Theoretical saturation also applies to gathering of data where the collection process is conducted until we reach a point where further collection no longer contributes to new insights on the subjects under investigation. Although, the number of interviews might vary among studies in order to reach theoretical saturation, Guest, Bunce & Johnson (2006) suggests that a minimum of 12 interviews is sufficient for saturation while Hagaman and Wutch (2017) added that 16 interviews or less should be enough. Of this, we aimed to achieve at least 12 interviews but not more than 16 in order for us to be able to get as much insight as possible without spending more time than necessary.

Constant comparison

A constant comparison between emerging codes and raw data is continuously done in order to preserve a close connection between conceptualization and data. Since the fragmented data is being altered and lose lots of information in the cod-

ing process, we need to make sure that the emerging categories are still meaningful and represents the raw data as much as possible.

4.3.3 Finding key informants: Sampling and obtaining interviewees

Firstly, we had to define the attributes suitable for the key informants necessary for data collection. Since we wanted the participants to represent smaller EBP companies we started with the identification of companies and added them to a list of prospects. Data giving us the criteria items was retrieved from the companies own websites where the following criterias was used:

- The company should have at least one project in preclinical or clinical development
- The company should not have a commercialized product
- The product(s) in development should be either pharmaceuticals or medical devices/diagnostic tools
- The company should be small/micro sized according to the definition in our background Section (See 1.1)

In order to find these companies, we used SwedenBIO's online business directory (SwedenBIO, 2018b) which at the time contained 237 member companies. We screened each company in the directory and added relevant companies to our list. A second sampling for companies was carried out in the same way using a pipeline report from SwedenBIO which included additional non-member companies (SwedenBIO, 2016). The key informants at each company was selected on the criteria that they should have insight and understanding of the company's main operation and business development strategy as well as being involved in the decision making process of purchasing services. An interview request was sent via email to all companies on our prospect list. The request was in most cases sent directly to the Chief Executive Officer (CEO), otherwise, the company's info-address. We announced in the email the criterias for a key informant as well as the purpose of the interview. A reminder was also sent to all prospects who did not respond to the initial request.

Other Key Informants We also reached out to organizations outside our target population such as network- and support organizations within the pharmaceutical industry. We sent interview requests to these organizations looking for individuals who may have insights on the subject of relationships between pharmaceutical companies and service providers. These organizations are continuously reviewing the life science and pharmaceutical industry in Sweden and can deliver broader understandings of the corporate environment which our study population find themselves in.

4.3.4 Conducting interviews: Data collection

The interviews was conducted either by phone, through web meeting tools or in a physical setting depending on the geographical availability and preference of the interviewee. Each interview was recorded with a disclosed approval (except for one interviewee who didn't approve recording of the session. Here we took notes instead). The interviews was in-depth and semi-structured, based on three main topics where we allowed the interviewees to reflect upon each topic either related to their company or based on previous experiences within the industry. Example questions was sent out to each respondent a few days prior the interview session. We adjusted the questions during the interviews according to their answers in order to limit the content and maintain focus on topic. The following topics were covered in the interviews:

1. About the company: The interviewees answers questions about their company, where they are today in their development and reflects upon challenges and circumstances they consider is of importance regarding an EBP. Based on this information we classified each company and compared attributes between them in order to develop typical cases of EBP companies.
2. Molecule to market: The interviewees answered questions regarding market intelligence and reflects upon their position and future prospects of the company. We also tried to investigate how their strategic view is developing throughout the life cycle of the company, starting from the early research phase, throughout clinical trials and further into the commercialization in the future. This information was used to approximate their understanding

regarding the surrounding environment and what they believe is important in a macro perspective for an EBP company.

3. Relationships: The interviewees answered questions about previous, current and future/desired relationships and collaborations with external parties such as CRO's and other service providers. In this topic, we tried to force deeper reflections regarding the nature of preferable relationships. This information is directly related to our research questions.

The recorded interviews was summarized in written transcripts. The topic 'about the company' was not fully transcribed in a literal sense because we felt like there was little to interpret in terms of choice of words of the respondents, although content wise, we made sure to cover everything that was said. When summarizing the topics of 'From molecule to market' and 'Relationships', which required reflections based on feelings, certain parts of the interviews was transcribed word for word in order to capture the choice of words and formulations.

4.3.5 Analysis: Coding interviews

The coding process was carried out using a combination of *selective coding*, *open coding* and *axial coding* in an iterative process according to the following steps (see Figure 4):

1. Selective coding

We first identified sections of interest in the interview transcripts and inserted them in a spreadsheet without altering the text. The sections of interest contained information and statements that we interpreted as preferences for when the respondents would choose a service provider as well as suggestions on how a service provider could improve their initial approach when engaging in a relationship. This is what we outlined as our core category in the selective coding.

2. Data fragmentation

The sections was summarized in shorter paragraphs and sentences with the same conceptual representation. The summarized data sections was compared between each other where we identified commonalities and differences.

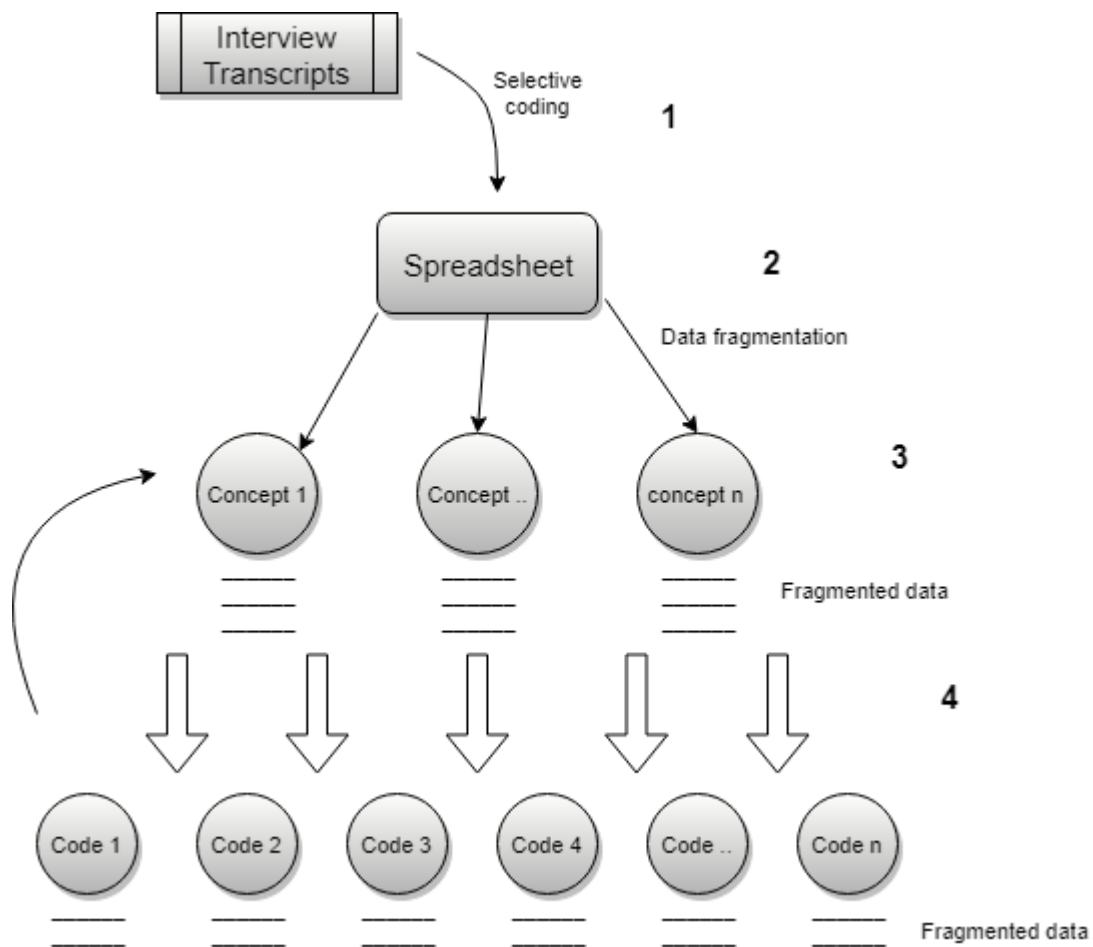


Figure 4: The coding process used: 1) Selective coding retrieves relevant data from transcripts. 2) The retrieved data is fragmented (and sorted) into smaller pieces of text. 3) Concepts is created with data fragments with open coding. 4) The concepts is further divided into specific codes using axial coding.

3. Open coding

Initial concepts could be derived by mapping similar statements amongst the sections. The emerging concepts was created and labeled as specific topics which the data could relate to. We transferred all summarized data and listed them under each concept by translating paragraphs and sentences. The translation of the summarized sections was made with epistemological interpretations into words and shorter sentences as underlying variables in columns under each concept in a spreadsheet.

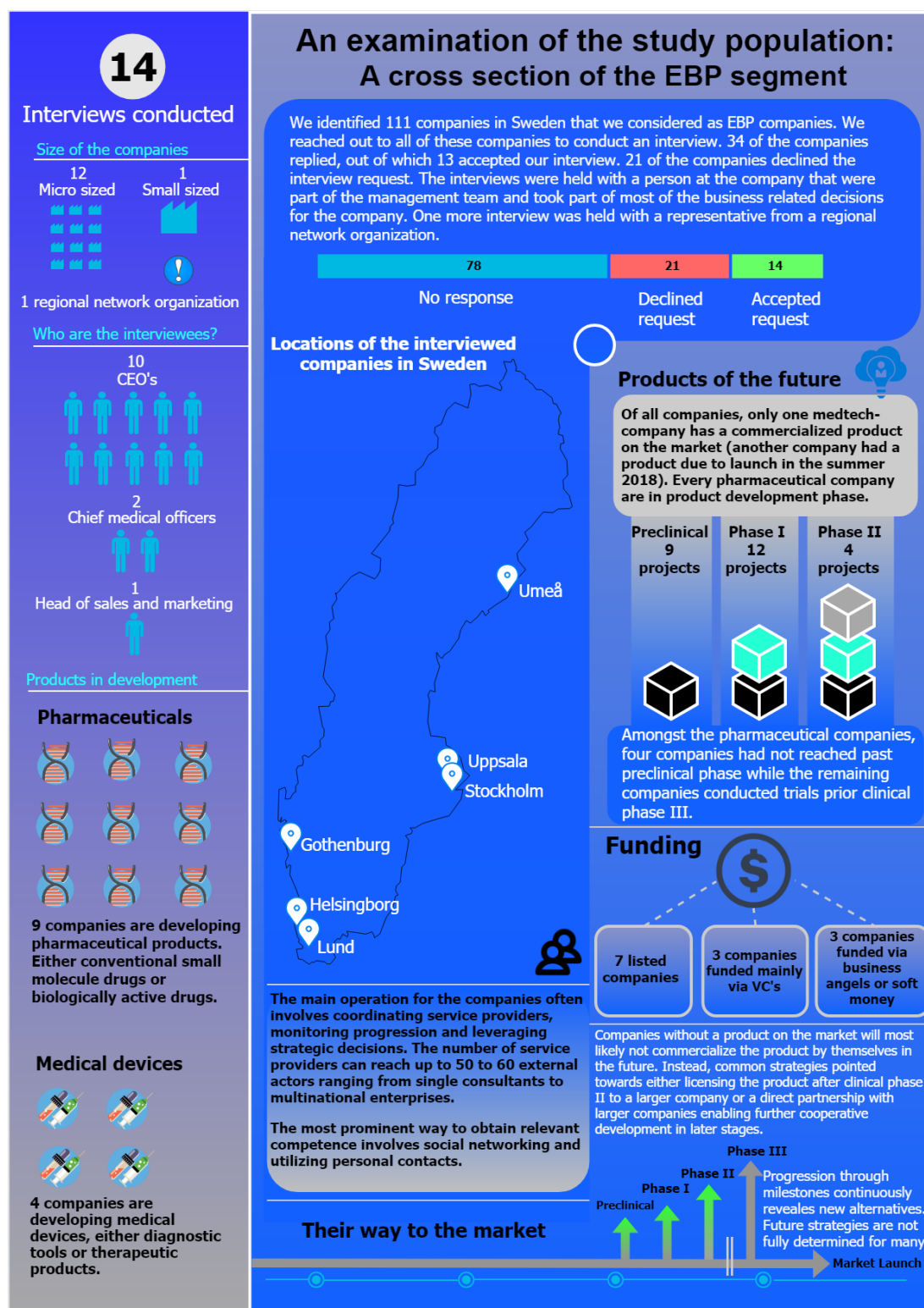
4. Axial coding

Step by step, the concepts was broken down into codes which could explain the data more specifically and the fragmented data was transferred between codes as they emerged. Each code with associated content was revised and further broken down into new codes iteratively. The coding process is illustrated in Figure 4. The final codes are presented in Section 5.1 *Results* labeled as factors with the processed data describing them. The factors are categories which we believe an EBP company considers when evaluating a service provider.

The coding process was carried out until we reached theoretical saturation. To make sure that each concept with associated codes represented the original data, constant comparisons was made against the corresponding section in the transcripts. The translated words and sentences which represented the original data could be adjusted in order to maintain a close connection with the original meanings from the respondents. Data without the need for interpretation such as, for example, information about the company, financial circumstances, current collaborations did not undergo the coding process, but was instead just collected from the transcripts and sorted. The analyzed data was thereafter used to create a survey which we used to further validate key findings from the case study.

4.3.6 Study population: Info graphic

In Figure 5 on page 31 we present a full page info graph which outlines the details regarding our study population. It contains information regarding the size of the companies, the position of the person we talked to, the type of product under development, the responses of our interview requests, the geographical location of the companies, a short description of the companies's main operation, the phase of you companies's products, how the companies are funded and a short summary of their future plans. All of this information is provided to give an overview of how the companies operate and gives insight about the data used in this research and where it comes from.



4.4 Survey

During our case study we found four factors to be very important when an EBP company chose which service provider to buy services from. The factors were *the size of the service provider, price, adaptability* and *personal contact*. As it is important for a service provider to know how these factors are weighed against each other we decided to construct a survey designed to gather data from which we could perform a conjoint analysis. Especially interesting is the relationship between the price and the other factors as this dictates the amount of resources that can be reorganized by the service provider to adapt their business to this customer segment. Conjoint analysis is a set of techniques ideally suited to study customers' choice processes and determining trade offs (Vithala R. Rao, 2014).

A conjoint analysis is a technique that uses factorial design to evaluate the importance of different attributes in a product or service. When conducting a traditional conjoint analysis the respondent is asked to rank different products or services from the most desirable to the least desirable. These products differentiate in the level of the attributes being measured. The results from the ranking is then put through a mathematical analysis to determine the relative importance of the attributes. More technical information about our conjoint analysis can be found in appendix A. As one of the main services being provided by our supervisor is CRO services we decided to use a case where the respondents had to rank different CRO services.

4.4.1 Design of survey

We wanted people in management positions at EBP companies to answer the survey. The first questions in our survey were constructed to confirm that the respondents were part of our target population. These filter questions asked about the position the respondent had at the company and if they were involved in deciding which CRO their company was working with. In the survey the respondent was put in a fictional case where they assumed the role of the chief executive officer (CEO) for an EBP company that were choosing a CRO that would perform their phase I clinical trial. Using examples gathered during our case study we used the following text to put the respondent in the case:

“You are the CEO of company that was recently founded based on academic research involving inhibition of cancer cell-signaling. You have now developed an antibody as a candidate drug against a certain type of cancer. The goal is to finalize clinical trials in phase II and then license the product to a large pharmaceutical company who are interested in your product. You operate as a virtual company with 2 employees. Your company is listed and has been financed by issuing new shares. You now want to conduct a clinical phase I trial. Since you are a virtual company you will have to collaborate with a CRO who will be able to conduct the trial for you. You have identified eight different CROs that are willing and able to conduct your trial. The estimated price for the trial is around 30 MSEK, but you think that it would be possible to pay more.”

To conduct the conjoint analysis the levels for each attribute had to be decided. In the article *Effect of Differences in the Number of Attribute Levels on Conjoint Results* by Wittink et al. (1990) it is shown that an increased number of levels can be connected to a increased part-worth value in conjoint analysis. To avoid this effect all attributes in the analysis had two levels. We used the examples gathered from our interview study where respondents described better or worse experiences with service providers that were related to our factors. The factors decided upon can be found in Figure 6.

Factor ID			
Personal Contact	Adaptability	Size	Price
+ You've had direct contact with the person who would be in charge of the project.	+ You have developed the project plan together with the CRO.	+ 2000 employees	+ 40 MSEK
- Your contact at the CRO is a sales representative and you've not met the person who would be responsible for the project.	- The CRO offered you a project plan that has worked for companies in a similar situation as yours.	- 150 employees	- 20 MSEK

Figure 6: Showing the four factors with corresponding levels used in the conjoint survey: Personal contact, adaptability, size and Cost.

After the levels of the attributes had been decided we used the statistical analytics tools IBM SPSS to generate the cards, or fictional service providers, that

the respondents would have to rank in our survey (Figure 7).

<i>Card 1</i>	Price of clinical study: 20 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	You have developed the project plan together with the CRO.	2000 employees
<i>Card 2</i>	Price of clinical study: 40 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	150 employees
<i>Card 3</i>	Price of clinical study: 20 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	You have developed the project plan together with the CRO.	150 employees
<i>Card 4</i>	Price of clinical study: 20 MSEK	You've had direct contact with the person who would be in charge of the project.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	150 employees
<i>Card 5</i>	Price of clinical study: 40 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	2000 employees
<i>Card 6</i>	Price of clinical study: 40 MSEK	You've had direct contact with the person who would be in charge of the project.	You have developed the project plan together with the CRO.	150 employees
<i>Card 7</i>	Price of clinical study: 20 MSEK	You've had direct contact with the person who would be in charge of the project.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	2000 employees
<i>Card 8</i>	Price of clinical study: 40 MSEK	You've had direct contact with the person who would be in charge of the project.	You have developed the project plan together with the CRO.	2000 employees

Figure 7: Showing eight 'cards' with combinations of the factor levels (One row corresponding to one card) which was generated with IBM SPSS. These cards was used in the conjoint survey.

4.4.2 Finding respondents

In our case study we also noticed that the way medtech and biopharmaceutical companies utilized service providers were different (See results). Therefore we decided to only include pharmaceutical companies in our target group in contrary

to our case study. We used the same list of companies we used for our case study and excluded any companies we felt weren't part of our target group and ended up with a target group of 97 companies. The companies were once again contacted through email where we quickly explained the reason for our survey. To make it more attractive for the respondents to answer our survey we also promised to share the results of our study with the respondents. To collect the results we used the online survey tool SurveyMonkey. Two rounds of reminder emails were sent out to the respondents one and two weeks after the initial request was sent out. The survey got 23 responses which responds to a response rate of 24% (see Figure 7).

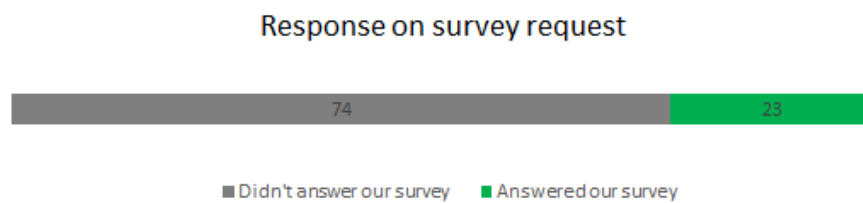


Figure 8: Response rate for the Conjoint survey: 97 companies were contacted. 23 companies answered the survey while 74 companies did not answer.

5 Results

In our case study we interviewed both pharmaceutical companies and medtech companies. A difference in the way they use service providers (especially CROs), was noticed between the groups. As the regulations are different regarding development of medical devices compared to pharmaceuticals, medtech companies are in general not as dependent on the long-term relationships with service providers as pharmaceutical companies. The road to market is also considerably shorter when developing a medtech device, meaning a lot of companies can take their product all the way to market without licensing their product to a larger company. This alters the strategy for the company considerably, affecting the relationships they have with service providers. The results presented in this segment doesn't include the very specific opinions which only related to medtech companies as they did not fit into the conceptualizations.

5.1 Case study: Empirical evidence on preferences

Eight conceptual factors emerged throughout the coding process. Each factor did not receive full representation from every respondent but got covered by the majority of them. A full separation of the data fragments over single factors was not possible because some fragments was directly linked to a combination of several. The fragmented data was sorted under the following labels (factors of which a decision can be made upon regarding engaging in a relationship): *Cost behavior*, *Professional competence*, *adaptability*, *Communication*, *Personal relationship*, *Stability*, *EBP insight* and *Size*. Interpretation of the fragmented data and comparisons with the transcripts rendered the explanations for each label below:

Cost behavior

Cost was discussed as a factor when choosing service provider. They did not formulate the aspect of cost stating that they would seek to the cheapest alternative possible. Instead, the term 'cost sensitive' was often used, implying that if possible, actions towards greater cost efficiency was preferable. Most interesting was the fact that high costs was related to size of a CRO, where the price for conducting a trial increases with the size of the CRO. The aspect of cost sensitivity

was regarded as an inherent attribute for an EBP company since they are usually micro sized in combination with the absence of a revenue stream (no commercial operation). Although we haven't investigated existing pricing models or how transactions normally are carried out, so called 'minute charging' was mentioned as a nuisance. What was meant by 'minute charging' was the concept of a service provider charging a sum for every single action, no matter how trivial that single action would be. Examples was given such as: The individual at the contractor made a phone call in line of your project and charged the client for the time used making that call. The contractor may have revised some documents for the client and charged them for a couple of hours of work etc. This aspect was not reflected upon directly related to CRO's, but in a more general sense in terms service providers. As an example, It was mentioned that 'minute charging' was a common phenomenon among law firms.

Professional competence

Professional competence could mean different things and is thus a vague preference aspect in itself if not elaborated. When we analyzed the coded interview material, aspects implying that the CRO should possess a certain degree of competence based on experience was identified when choosing the "right" CRO. Experience was further reflected upon as being related to larger, well-established CRO's. The CRO should have relevant knowledge and previous experience regarding the target treatment area for the client. Preferably, the CRO should have conducted similar projects in the past (with similar indications) and be able to display reference projects and their results. We also listed mentions about the 'ability to meet deadlines' and 'quality of results' as professional competence since we encountered assumptions that those aspects is a result of long-term experience as a CRO company.

It is important that the CRO are able to develop and manage an effective time plan and at the same time be able to generate high quality results. Also, the CRO's level of experience seemed to be linked to perceived judgment ability, i.e. the buyers interpretation of the ability to make the right choices. In order to render high quality results and effective time management, doing the right thing at the right time is important. In other words, the CRO should be able to make qualified judgment

calls based on knowledge and experience in order to enhance the project outcome.

Beyond experience, professional competence was also listed in a more general context as the ability to convince the client that their expertise should be accounted for. As an example from one case, the respondent emphasized that in order to deliver a time efficient project of high quality, the CRO should in advance prepare and somehow exert commitment to the project. Increasing level of commitment to the project enhances the customer's confidence that the CRO is will take responsibility and utilize their expertise to a larger degree. The same respondent continued by stating that the CRO, if necessary, should use its expertise to challenge the strategy proposed by the small company and bring new insights and ideas to the project.

Adaptability

The preference for adaptability was frequently mentioned as important in the relationship with a service provider. The most highlighted aspect of adaptability involves the notion of being offered a 'standard plan' for a service or trial. The idea of being offered a standard plan for a trial before discussing the project in detail or allowing tailored solutions to be derived was highly resented. The takeaway from many of the interviews was that the CRO should be responsive for the client's project and not assume any specific needs until certain details has been discussed, and from that point come up with a mutual project plan. From that, the 'ability to compromise' was mentioned as desirable where smaller companies might not possess the capability of conducting trials in the same way as larger pharmaceutical companies do. In terms of flexibility (which we consider a subcategory of adaptability), extensive bureaucracy was mentioned as a source of irritation and further linked to larger organizations.

"Many people who starts a new company wants to change the world. You don't change the world through bureaucracy. Bureaucracy is used to support processes and make them scalable. You need to have the flexible approach." - CEO of an EBP company

In general, regardless of size, the respondents enjoys relationships with minimized bureaucracy with effective decision making and swift turns of action. It was ex-

plained that extensive bureaucracy can be very difficult for a small company to handle where fast progression and effective results is important in early the development, meaning that they don't have time nor capability to exercise unnecessary formalities. Similar examples for the preference for flexibility was given involving the in-house line of communication of the CRO; They mentioned that it would be advantageous to work with a CRO that has a variety of services to offer, but not in exchange of being pushed around within the organization amongst several individuals and having to explain the situation from the beginning every time. Instead, one contact person at the CRO could be responsible of handling the line of communication in-house and coordinating the relationship between the organizations. This creates an interpersonal relationship instead of an institutional- or interorganizational relationship.

Communication

The idea of one contact person at the CRO seemed highly important. Already from the start of the relationship, there should be one dedicated person who is in charge of the project which prevents misunderstandings and promotes easier communication. This person should be readily available as well as responsive to the client's concerns. The contact person should mediate between the organizations and deliver understanding in both directions where information can be filtered and adapted to the level of knowledge of the small client. We would also like to include mentions that it sometimes can be difficult to understand the 'language' of larger organizations. They mentioned that it's perhaps derived from incompatible bureaucracy in larger organizations opposing smaller companies. The CRO should be supportive and acknowledge the fact that the smaller company doesn't always know what needs to be done. Even though all of the respondents did have long-term experience within the industry, most of them have a background from larger companies which differs in many ways compared to EBP companies. This might result in a lack of understanding of how a small company should be navigated in the best way. The experienced CRO need to take responsibility to make sure that the playing field is leveled by communicating progression and upcoming activities. Advantages of being able to conveniently monitor progression and details for projects online without having to make regular calls or sending emails was also discussed. Lastly, it was highlighted that geographical availability as well as

cultural compatibility was important for good communication. Respondents with the experience of working with international CRO's said that communication can in some cases be impaired by the difference in time-zones and language barriers. Cultural differences could also lead to misunderstandings of 'how things are done'.

Personal relationship

The importance of a personal relationship between the individuals representing the organizations in an arrangement was heavily considered. The respondents were fairly unified in a sense that they prefer to conduct business with people where they feel a presence of 'personal chemistry'. In the end, the quality of the IOR seemed not to exceed the quality of the individual relationship amongst representatives from each organization. The term intimacy was recurring between interviews where they said that it was important to feel comfortable with the business partner since the usual projects regarding contract research are conducted over a long period of time and exchange of sensitive information is a fact. Before engaging in a relationship, it was preferable that the buyers could meet the actual people responsible for the project so that they can get to know them properly. It was described as not being a business transaction where a service is provided, but instead, the parties build a collaborative team which has to function well in terms of dynamic interactions amongst individuals. The concept was followed up by the idea that initial interactions with sales representatives who are not directly linked to the specific project may very well compromise the trust when engaging in a relationship. Examples were given where respondents had experienced formal initiations when engaging in relationships where they get delegated and pushed around amongst different individuals whose only purpose is to convince the client about the service and sell it to them. These circumstances seemed to be highly resented. The necessity of sales representatives was still highlighted. During initial briefings, the CRO's representative evaluates the needs and seek to make sure that they understand the client's request and further develops a suitable offer and thereafter connects them with the right people in the organization. With this additional function, sales representatives are commonly referred to as business developers since they perform deeper analyses of the client's situation together with setting up a realistic course of action. Even so, it was mentioned that 'opportunistic sell-

ing' of arbitrary services can be observed in the industry amongst CRO's from certain countries. Respondents who acknowledged the use of business developers emphasized that they should be responsive and involve the project staff early on. The idea of after going through an extensive negotiation process and signing contracts suddenly being pushed over to an "anonymous" group of consultants who will carry out the project is not something they want.

Stability

The theoretical framework for this study outlines a factor for engaging in a relationship referred to stability where it is specified that smaller organizations may seek to minimize exposure of inherent vulnerabilities and thus decrease the number of uncertain variables in the surrounding environment. We listed stability as a factor since we noticed mentions with interpreted underlying meanings suggesting that this is a viable preference. As an example, one respondent said that it would be an advantage of working with legitimate and well-known actors for future references. The respondent continued by stating that previous or existing relationships with well-known and respected organizations may increase the chances to establish new relationships with desirable actors as well as improving the organization's image and credibility. Further on, working with larger organizations may increase stability in the operational work. Organizations with large amount of resources are able, if necessary, to divert unforeseen events and delays utilizing additional resources. The term reliability was used occasionally when discussing these scenarios. The respondents also covered the ability to maintain human resources, mentioning that working with smaller organizations could be a problem during a long term relationship. They said that turnover of personnel could compromise a relationship if the organization wasn't able to replace or hire new staff members if someone would quit their job.

EBP insight

As the EBP market segment is composed largely of smaller and more novel companies in comparison to conventional pharmaceutical and medtech companies, it was emphasized that it is important that a large CRO understand their needs and how they operate. The CRO should not assume that the small company has everything in order and know exactly what to do. This notion varied amongst the

respondents, but an idea we want to highlight is that an experienced CRO should use their experience and offer guidance and support beyond the main service. In order to offer guidance, it is important that the CRO understand the goals for the small company which might differ compared to larger pharmaceutical companies. The goals varies of course, but as an example, since many of the EBP companies plan to license projects after a certain phase in the development pipeline, the trials could perhaps be adjusted in order to have a smooth transition into future projects with new sponsors. The CRO should also understand how small business operates in more general. They should be responsive and understand that certain actions might render consequences which the small company might not be able to handle. Every respondent agreed upon that a general understanding is important, but also that understanding for their specific situation is important. The respondents represents small organizations, usually with one main project in the pipeline which could be seen as the company's baby. Every decision involving the product in development is carefully leveraged, and the CRO should, according to the respondents, preferably consider the same approach regarding EBP projects.

“Our baby should be their baby as well. You want to feel that you can hand over the project safely, so that is it well taken care of. We will always have the main responsibility but you want to be able to hand over some responsibility to a service provider if needed.” - CEO of an EBP company

Size

When we specifically asked about preferences regarding the size of the CRO, the respondents was able to list both advantages and disadvantages based on if the CRO was large, medium or small. Even so, most comments on “size-related” factors seemed to be assumptions based on general experience on how larger organizations works and not contingent to mere size independently. We have covered a few of size-related aspects in previous Sections, for example when working with a larger organization, laborious bureaucracy was listed as a negative consequence while resource availability was considered an advantage. It was agreed upon that larger CRO's are more expensive and therefore, to some extent, decreased in attractiveness. Another frequent belief was that working with larger CRO's came with the risk of not being prioritized as a small client. The idea is that larger organizations focuses their business on large clients who are willing (and able) to

pay more and utilize more services. The respondents acknowledged this as being reasonable since these clients most certainly generates more revenue for the CRO. The size preference varied amongst the respondents, but the overall statement was that small or mid-sized CRO's was preferable.

Some respondents did not imagine any problems working with larger organizations, while others wanted a match in size where the capabilities of the CRO should match the scope of the project (assuming that the capability increases with size). Other thoughts was that size doesn't matter while still addressing certain attributes to large and small CRO's. Interestingly, the preference of working with small CRO's seemed to be due to the flexibility of those organizations. The respondents who preferred working with small CRO's stated that small organizations more likely will prioritize their projects and adapt accordingly. The flexibility of small CRO's was highlighted with the notion that they understand the 'ad-hoc' approach, meaning that they are more inclined to compromise with less hassle. The listed perceived disadvantages working with smaller CRO's follows: Turnover of personnel can make it difficult to manage projects properly (It was mentioned that smaller companies usually have a higher turnover ratio), less resources available can result in difficulties to overcome unforeseen events, and lastly, a small CRO may not possess the experience or knowledge required to offer everything the client needs.

5.2 Takeaways from the expert interview

We conducted one interview with an experienced member of a regional network organization for life science companies in Sweden. The intention of this interview was to map out the relationships between EBP companies and their service providers. During the interview the role of the service provider was brought up in an interesting way: What the service providers delivers is not only an analysis or a product, they provide information about which result to expect, what information should be sent to the government, which indication to target etc. They provide a strategy for the EBP company. Continued discussions led to the insight that the service providers within the life science industry are responsible for most of the innovation happening within the industry. The virtual EBP companies hold

a patent for a drug and buys most of the development and marketing process in the form of services. This moves the innovation of the drugs from the small pharmaceutical company to the service providers. Our expert even said many of the service providers within the industry should be looked at as innovation companies.

The expert continued to explain how, since the fall of AstraZeneca in Sweden, pharmaceutical companies has not in general continued to hire staff. Instead the service providers are hiring, making profit and paying taxes. There was no direct proof of this expect for the observation made by our expert. In our interview study we also met with a lot of former employees of AstraZeneca who now were managing the EBP companies. The expert continued by explaining that the old way larger pharmaceutical companies are buying services can be explained through “It’s simply a clinical trial”. Today, when the companies buying the services are much smaller, the service provider can not only provide a clinical trial. The customers of the service providers are shifting from companies with over 10’000 employees that has prepared strategies for their drug in every way to virtual companies that can exist without any employees. Because of this, they additionally have to deliver the strategy, information and knowledge that they posses through their services to make the development process of drugs as efficient as possible. To finish, our expert described that, as many of the employees as the EBP companies come from AstraZeneca, they were used with looking at the service providers within the industry as “only service providers” and he highlighted that a change has to occur where the view of service providers has to become what they are, innovation companies.

5.3 Results from conjoint analysis

The resulting rankings of the cards in our conjoint analysis can be found in Figure 9. As can be seen, card 3 and 6 were the most popular. Card 5 and 2 were the least popular choices in the survey. In Figure 10 you can find the part-worth utilities of the conjoint analysis. The utility estimate shows the preference of a certain factor level where a large positive value responds to a high priority when choosing which CRO to work with. A large negative value represents a very low priority. As can be seen in the results for the utilities, high adaptability and a lower cost of the

project is prioritized highest out of the different factor levels.

		CARD:							
		1	2	3	4	5	6	7	8
RANK:	1	3	0	7	4	0	7	0	2
	2	3	0	4	4	0	5	2	5
	3	5	0	6	6	0	1	4	1
	4	6	0	4	3	0	2	6	2
	5	4	3	0	3	0	5	4	4
	6	2	1	2	3	1	2	6	6
	7	0	12	0	0	6	1	1	3
	8	0	7	0	0	16	0	0	0

Figure 9: Showing the total ranking of the cards (1 being the highest) and the number of respondents which ranked each card accordingly.

		Utilities	
		Utility Estimate	Std. Error
Cost	20 MSEK	1,033	,071
	40 MSEK	-1,033	,071
PersonalContact	You don't know project manager	-,696	,071
	You know project manager	,696	,071
Size	150	,489	,071
	2000	-,489	,071
Adaptability	The CRO offered you a standard plan	-1,098	,071
	You have developed a project plan with the CRO	1,098	,071
(Constant)		4,500	,071

Figure 10: Showing the part-worth utilities for the conjoint analysis. A high positive utility responds to a high priority while a large negative value responds to a high opposition. Lower numbers responds to a lesser consideration for a certain level.

Below (Figure 11b) is the importance values gathered from the analysis. The importance values is a percentage representation of the importance of the different factors in our analysis. As can be seen these results, adaptability has the highest importance with 32%, followed by cost (30%), personal contact (21%) and size (17%). The correlation coefficients from the analysis can be found in Figure 11a. The coefficients measure the quality of reproduction of the empirical data based

on the results from the analysis. As the values are very high (0.997 and 1) they indicate a high quality of reproduction.

Correlations ^a		
	Value	Sig.
Pearson's R	,997	,000
Kendall's tau	1,000	,000

a. Correlations between observed and estimated preferences

(a) The utility values from SPSS

Importance Values	
Cost	29,867
PersonalContact	20,863
Size	17,209
Adaptability	32,062

Averaged Importance Score

(b) The Importance values from SPSS

Figure 11: Results generated by SPSS

5.4 Grouping of results

Based on the factors found in our interview study, a grouping of the factors was made. This grouping separates the factors based on the service provider's ability to change or improve the factor. Three categories was created: 'Static factors' which are the factors that are nested within the company of the service provider, 'Soft factors' which are related to the softer knowledge and structure of the relationship (see Figure 11). Finally cost was created as a factor outside of the groupings mentioned above as we found that it is the most common factor which is both related to- and leveraged against both of the other two factor groups.

Static factors

The factors placed in the static group are professional competence, size and stability. All of these factors relates to the inherent attributes of the service provider. The professional competence is based on the company's past experiences within the industry. The size of a company is naturally very difficult to change for a company. The stability of a company is largely dependent on a mix between the two previous factors as it is largely affected by the extra resources a service provider can provide when unpredicted complications arise, which further relates to the size of the service provider. Previous experiences (professional competence) within the industry also correlates with the stability of a service provider as

it can act as a credible future reference for the EBP company. This ensures that a future license taker (larger pharmaceutical company) can trust the quality of the work.

Soft factors

Adaptability, communication, personal contact and EBP insight were placed in the group of soft factors. These factors directly relate to the people and the procedures at the service provider. This means that the factors could be altered to fit the EBP customer segment either through education or a change of culture within the company.

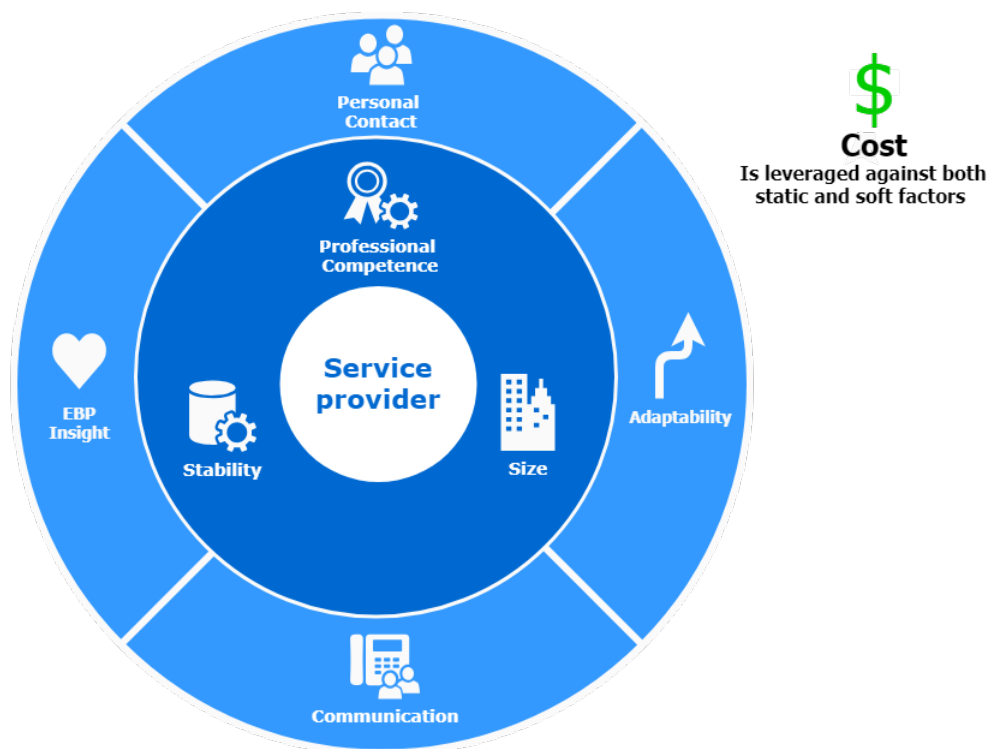


Figure 12: Grouping of factors that EBP companies assess in a relationship with a service provider: Professional competence, stability and size is to be considered as *static* factors inherent to the organization. Personal contact, adaptability communication and EBP insight is to be considered as *soft* factors which is more dependent on individual employees at the service provider.

6 Discussion and conclusions

Even though the relationship between an EBP company and a service provider should be considered as an IOR, the thoughts and ideas have been analyzed on an institutional level and to some extent an interpersonal level (see 3.2). We have investigated personal preferences and expectations amongst individuals who are representing EBP organizations. In this regard, we cannot account for how EBP companies as unified organizations reflect upon relationships since there are most likely a group of people involved in the final decision making, for instance, management staff, investors, a board with shareholders and advisors. However, we still believe that our study population, constituting CEO's and Chief medical officers, make up the key opinion leaders with direct insights in the daily operation which relates to the contingencies we investigated as well as mandates for final decision making. So, in order to validate the relationship between our findings and the research questions (see 4.2, we must consider this difference between an organization and the individual who represents it.

The size of the study population (13 decision makers and 1 additional 'expert' on the subject) can be regarded as sufficient for data saturation in a case study with in-depth interviews according to our literature investigation which suggests 12 to 16 interviews. This is of course not a definite number to rely on, instead, we should consider our own view of whether we encountered a complete variation of the emerged concepts sufficient for saturation. During our interview study, the collected data emerged as fairly consistent after nearly half of the interviews with few additional mentions of new illuminating concepts. Every interview did of course, to some extent, contribute with unique ideas and different opinions adding to a more detailed variation, but nothing that would alter the definition of any concept. Still, we did only cover a minority (12%) of the total target population of 111 EBP companies. If a researcher would conduct the same experiment within the whole population we can thus imagine a larger variety of mentions in light of the investigated concepts. Further, we speculate that an emergence of completely new concepts would probably not happen to a larger degree since they seemed to be deeply connected to the inherent attributes used for identifying the the target population.

When looking at the method used in our quantitative study (the conjoint analysis) there are many factors in play that could have altered the results. The choice to only have two factors for each level made the survey very 'black or white', meaning each attribute was either good or bad. This might have influenced the respondents to focus on the very essential attributes, which could be either good or bad. The quality of the levels for each attribute is also very hard to determine, defining descriptive factor levels for a service as complex as a CRO is very hard to do. Especially when you only use four different factors. As our choice of factor levels came directly from examples provided by our study population we believe they are relatable for most of the respondents. As the correlation coefficients of the result is very high this reflects that the respondents were very consistent in their answers, showing a somewhat unified opinion. As the construction of the analysis is very abstract the results should not be taken as a complete truth, but instead be seen as a good indication of how EBP companies prioritize within the industry by a general sense.

6.1 Contingencies which motivates engagement in a relationship

The contingencies of necessity and efficiency (see 3.1) are inherently existing as a motivation for engaging in a relationship with a service provider as an EBP company. The EBP companies are required by authorities to uphold a regulatory and legal code of conduct when developing pharmaceuticals and medical technology which they seldom are able to do alone. As for efficiency, an EBP company are inclined to work with as few employees as possible where outsourcing is an efficient way to maintain an operation. It was also made clear that the contingencies of asymmetry and reciprocity played an essential role when identifying the circumstances which a relationship between an EBP company and a service provider was formed. Due to the virtual setting of these companies, the asymmetry contingency exists as foundation which the relationship is formed upon where the EBP companies are not able to conduct any operational work themselves. They are solely dependent on their service providers in order to progress which motivates a need for reciprocity. The idea of a service provider just selling services for fi-

nancial gain is considered to be an opportunistic approach and is seldom desired by EBP companies. Instead a mutual understanding and a willingness for the service provider to offer support and guidance is encouraged during a long-term relationship where the responsibility is handed over to an external actor. Finally, we believe that large global service providers with extensive resources and well developed standard operating procedures are able to further contribute with the contingencies of stability and legitimacy. Experienced service providers can offer stability and legitimacy by delivering reliable high standard services while leveraging future stakeholders who are familiar with their work. For instance, if an EBP choose to license a pharmaceutical product under development to a large pharmaceutical company, both parties would benefit if prior development activities has been conducted by a well known CRO which has produced a solid foundation that can support further development. All of these contingencies, derived by Christine Oliver, are intended to be used as motivational factors for engaging in a relationship. As these motivational factors build expectations upon the service provider we can, through the definition of trust by Khodyakov, say that these contingencies builds trust in the relationship. As the factors generated in our interview study also builds expectations upon the service provider we argue that our factors also build trust in the relationship. Even though Oliver's contingencies motivate a relationship and our factors are used to compare different service providers relations can be found between them:

Professional competence

We consider professional competence to make up a part in asymmetry where 'competence' and 'know how' exists in a asymmetrical fashion between EBP companies and service providers. Service providers are able to provide knowledge and solutions which an EBP company are unable to produce. Further, professional competence lay the foundation of legitimacy where an EBP company would be considered to have a credible project if the work has been carried out by service providers with relevant competence. Lastly, the professional competence of the service provider can contribute to stability in a micro perspective where the knowledge is used to produce a service with minimized uncertain variables which might affect the outcome.

Adaptability

A service providers ability to see to the adaptability factor involves their capability to identify mutual goals and the underlying purpose for a certain project. We also emphasize that the service provider should do it in a way that benefits the specific EBP company and their strategic goals. By that, we argue that adaptability relates to reciprocity to some extent.

Communication

With good communication, a relationship can potentially increase the efficiency of certain activities. We listed cultural compatibility, communication content and how the parties should communicate which are aspects that is crucial for efficiency. Even more so if a EBP decision maker is able to achieve the best results and at the same time do so by having lines of communication with as few parties as possible.

Personal relationship

Personal relationship involves personal chemistry which we believe comes from mutual understanding and shared values. We argue that these values to a large extend builds trust through reciprocity.

Stability

Even though we tried to not bring any prior theory into our interview study we still ended up with a factor that was very similar to the Oliver's contingency of stability. Therefore we argue that the contingency can be directly connected over the two definitions.

EBP insight

EBP insight also has a foundation in the service provider's understanding of the EBP company's position. This understanding involves the understanding of the EBP company's goal, current resources, competence and positioning. Therefore we also argue that this factor is very closely connected to the contingency of reciprocity.

Cost

Cost in itself is hard to see as a motivation for a relationship. However, by calling it cost-efficiency we can find a motivation behind a relationship through the contingency of efficiency. In the relationship we've investigated in this report we see cost as one of the most important aspects since the small EBP company is very restricted in their funding and therefore has to get the most value possible out of their relationship.

Size

Size is a factor that we don't see directly connected to one of Oliver's contingencies. As the factor of size is mainly built up of preconceived ideas about a service provider it makes assumptions based upon the other factors presented. We still list this factor as it was something brought up by many of our interview respondents and therefore has an effect when they pick which service provider to work with.

6.2 Creating trust in an interorganizational relationship

The final grouping of the derived factors (see Section 5.4) made sense in the way we analyzed the creation of trust in relationships between EBP companies and service providers. We consider the static factors of professional competence, stability and size as inherent to the organization of a service provider rather than related to single individuals. If trust would be created upon these factors, it should be regarded as institutional trust (see 3.1) where for example, the CEO of an EBP company assesses the attributes of a service provider as an organization in whole. Instead, if trust would be created upon the soft factors of adaptability, communication, personal contact and EBP insight, we can consider it to be interpersonal trust. The CEO of an EBP company would be able to assess the attributes of people within the organization of a service provider, either individuals or smaller groups of people. Even though a large global service provider should be inclined to adapt to all of the factors in order to optimize the generation of trust, it is perhaps not the easiest thing to do. Rather than restructuring a whole organization from top to bottom, we believe that it is more practical to initiate a change within, starting with the personnel who directly conducts business with EBP companies. In the end, it is the total set of employees who makes up an organization, therefore, education

and a shift of mindset amongst the employees can hopefully lead to adaptation initiatives of larger magnitude in the future. The case study indicated that the soft factors seemed to be of greater importance when EBP companies chooses service providers. This was further confirmed by the conjoint analysis where the factors of adaptability and personal contact was rated as more important than size. In the previous section we also related our factors to Oliver's contingencies. When looking at the analysis all of the soft contingencies except communication were mainly connected to reciprocity. This also emphasizes our claim that the soft contingencies revolve around persons understanding each other and not organizations. We will make an effort to present how the conceptualizations regarding these factors can be implemented in the real world.

6.3 Recommendations to global service providers

In our study the main findings are pointing towards an increased need of adaptability at the service provider. Many different solutions were discussed, both among ourselves and during our interview study. One of the most important aspect is to gain knowledge and understanding of the EBP companies. Not only on an organizational level but also on a personal level. As the EBP companies usually have very few employees, gaining the trust of these individuals is key when approaching an EBP company. Also understanding the different capabilities and needs of the EBP companies is very important when engaging with these customers. This could be achieved through hiring new and/or educating employees. A possible change for many service providers to increase adaptability would be by decentralizing the organization. The service provider can create independent departments which more or less independently only focuses on smaller clients such as EBP companies. This would give the employees at the service provider working with the EBP companies a larger playing field where they could adapt to the specific customer.

Further, we want to emphasize the importance of interpersonal relationships between a service provider and EBP companies which was one of the most highlighted concept in our case study. The employees at the service provider who directly works with EBP companies should consider them as people and get to

know them. This goes on a professional level, but not only in a existing relationship. More time should be spent on getting to know them (even if they aren't clients) through networking events and other formal occasions. We believe that EBP companies are much more inclined to conduct business with people they are able to assess based on previous encounters. The most prominent way for EBP companies to obtain external competence and initiations with service providers involves networking with personal contacts.

Many discussions were about the way that global service providers usually engaged with customers. It was through salespersons and a common opinion was that creating a contact with a salesperson to then, once the contract has been signed, be handed over to a project leader who has not been part of the planning of the project was not well looked upon. To avoid this occurrence the project leader has to be involved earlier in the process, where they can be part of the design of the project plan. Connected with the earlier point, is the way global service providers are used to work with larger customers who have a better knowledge about regulations and a better idea of what has to be done in a project. These smaller EBP companies often don't know for certain how to design a project in the most efficient way. To challenge this, a more instructive sales process has to be adopted where the service provider, who are the specialists of the specific procedure, instructs how the service could be performed in the best way. When doing this, it's important not to run over the customer, but instead inform them of why the suggested alternative is better. As the adaptability of the service provider was highlighted this also shows that a service provider has to listen to what the EBP company wants during discussions, and not assume they know everything. A solution on how to bridge the competence gap between the companies was brought up during an interview: As the EBP companies doesn't always know what the correct pricing for a service might be when engaging with service providers some companies has created contacts who will 'sit on the other side of the table' and be part of making sure that the EBP company is treated fairly. Our final recommendation is highlighting the need of real-life engagement. A salesperson has to travel and meet with customer in real-life. This means that local offices should be set up by the international service providers who are looking to increase their business in Sweden related to these EBP companies.

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Appendix A - Technical specification of conjoint analysis

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1 Introduction

In our interview study we found four different factors that were very important when an *emerging biopharmaceutical* (EBP) company decide which service provider to buy services from. The factors were *the size of the service provider, price, adaptability* and *personal contact*. For the service providers to adapt in the most beneficial way to these EBP companies it is also important to know the relative importance of these four variables as it is hard to improve all of them at once. To evaluate the relative importance of these variables we chose to perform a conjoint analysis. A conjoint analysis is a survey based statistical technique to determine how the respondents of the survey values different values/properties of a product or service. We decided to use this technique since we wanted to research which factor were the most important and conjoint is a very popular technique when ranking different factors.

1.1 Purpose

This report will analyze the different factors through a conjoint analysis. The conjoint analysis will both be done manually through a factorial design experiment and by using the program IBM SPSS. The report will compare the results and draw conclusions from them regarding the logic used in SPSS. The analysis will be done through a survey that will be answered by people in leading positions at the emerging companies that buy services within the pharmaceutical industry to ensure the quality of the responses.

1.2 Conjoint analysis

Conjoint analysis is an technique based on factorial design. This technique determines which factors a customer prefers over others when selecting which product or service to buy. There are four different types of conjoint analysis [1]: The traditional conjoint analysis that uses stated preference ratings, choice-based conjoint analysis that uses stated choices, adaptive conjoint analysis that is well-suited to handle a large number of factors and self-explicated conjoint analysis that is a bottom-up method. The method is used in a large number of fields to determine how a product or service should be designed or improved to maximize the aspect

the customer has the biggest preference for. As the time limit of this research was short we decided to run a traditional conjoint analysis. Making a choice-based, adaptive or self-explicated conjoint analysis would not fit in our time frame.

1.3 IBM SPSS

IBM SPSS is a platform that offers advanced statistical analysis, a vast library of machine learning algorithms, text analysis, open source extensibility, integration with big data and seamless deployment into applications [2]. It is a common and easy-to-use tool when conducting a conjoint analysis.

2 Theory

2.1 Factorial design

When evaluating a system where more than one factor is affecting the result of the system a common method is called factorial design [3]. Factorial design is based around changing the levels (different values) of the factors and comparing the results of the different experiments (single trial run of the system). The effect and relative importance of the factors can then be calculated.

One such analysis is a 2^k factorial design. A 2^k factorial design is often used in the early stages of research when multiple factors will be investigated [3]. The number 2 in the name comes from the amount of levels for each factor and the k represents the amount of factors in the system. In a 2^k factorial analysis where each factor has two levels these are usually coded as plus or minus to signal if the factor is high or low in the specific experiment.

As an example, if we have two factors (a and b) with two levels (+1 and -1) that we want to test we would need to complete $2^2 = 4$ experiments before analyzing the results. One with no factor active, two where only one of the factors are active and one where both factors are active. We code these as (I) , a , b and ab respectively. To calculate the **main effect** of the a -factor (A) we take the difference of the average response of the high value of a and the average response of the low value of a . Numerically we can write this as:

$$A = \frac{a+ab}{2} - \frac{((I)+b)}{2} \text{ and respectively the main effect of } B \text{ as: } B = \frac{b+ab}{2} - \frac{((I)+a)}{2}$$

To calculate the interaction between the factors, ab , we calculate how the value of A correlates when the value of B changes $A_{B_{high}} = \frac{ab-b}{2}$ and $A_{B_{low}} = \frac{a-(I)}{2}$. The effect of ab can then be calculated through $AB = \frac{A_{B_{high}} - A_{B_{low}}}{2} = \frac{ab+(I)-a-b}{2}$.

Once the main effects and interaction of the factors in the system has been calculated we can make a **regression model representation**:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_{12} x_1 x_2 + \varepsilon$$

Where y is the response, β_0 represents the average of all responses, x_1 and x_2 are defined on a coded scale from -1 to +1 to represent the high and low level of A

and B . x_1x_2 represents the interaction between x_1 and x_2 . β_1 is half of the estimate main effect of A : $\beta_1 = \frac{A}{2}$. Likewise $\beta_2 = \frac{B}{2}$ and $\beta_{12} = \frac{AB}{2}$. β_0 is the average of all the results from the experiments. ε is a random error term. The model can also be represented as $y = X\beta + \varepsilon$ in matrix form where:

$$y = \begin{bmatrix} (1) \\ a \\ b \\ ab \end{bmatrix}, X = \begin{bmatrix} 1 & -1 & -1 & 1 \\ 1 & 1 & -1 & -1 \\ 1 & -1 & 1 & -1 \\ 1 & 1 & 1 & 1 \end{bmatrix}, \beta = \begin{bmatrix} \beta_0 \\ \beta_1 \\ \beta_2 \\ \beta_{12} \end{bmatrix}, \varepsilon = \begin{bmatrix} \varepsilon_0 \\ \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix}$$

β_1 and β_2 represents the part-worth utilities of A and B . The relative weight, or importance values, of the factors can be calculated by looking at the total variation of the part-worth utilities. The total variation of the part-worth utilities can be found through:

$$\beta_{tot} = \sum_{i=0}^n |2\beta_i| \quad (1)$$

To get the importance value of one factor we can simply divide the part-worth utility of that factor with the total variation and get a percentage value for its relative value. For example:

$$A_{RW} = \frac{\beta_1}{\beta_{tot}} \quad (2)$$

2.2 Traditional conjoint analysis

In traditional conjoint analysis the respondent (usually a customer) is given a number of fictional products or services to choose between. These products or services are then ranked from the most desirable to least desirable. This technique is especially useful in a competitive market [4]. These ranking are used as the response in a factorial design (called preference rating in conjoint analysis). Using the method in factorial design the relative importance of the factors, or importance values, can be calculated.

2.3 Fractional factorial design

As the number of factors in a factorial design increases, so does the number of experiments; or in the case of a conjoint analysis, the number of products or ser-

vices to be rated. As it might be difficult for a respondent to rank a large amount of fictional products or services it is common to use a method called fractional factorial design to reduce the number of choices. A common use of fractional factorial designs are in screening experiments where many factors are considered and the objective is to identify those factors (if any) that have a large effect on the result [5].

A fractional factorial design is done by picking a **generator** that will be used to decide which experiments to try out to still get a result that matches the full factorial design. As an example we take a 2^3 factorial design that would take 8 experiments (or treatment combinations) to make a full factorial design (See Figure 1).

		Factorial effect							
Treatment combination		<i>I</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>AB</i>	<i>AC</i>	<i>BC</i>	<i>ABC</i>
	(1)	1	-1	-1	-1	1	1	1	-1
	<i>a</i>	1	1	-1	-1	-1	-1	1	1
	<i>b</i>	1	-1	1	-1	-1	1	-1	1
	<i>c</i>	1	-1	-1	1	1	-1	-1	1
	<i>ab</i>	1	1	1	-1	1	-1	-1	-1
	<i>ac</i>	1	1	-1	1	-1	1	-1	-1
	<i>bc</i>	1	-1	1	1	-1	-1	1	-1
	<i>abc</i>	1	1	1	1	1	1	1	1

Figure 1: Level coding of a 2^3 factorial design

If we decide to use the generator $I = ABC$ we would not have to make all 8 experiments but only the ones where the factorial effect $ABC = I = 1$. This would mean we only have to complete 4 experiments, *a*, *b*, *c* and *abc*. In Figure 2 you can see the experiments that would have to be performed in a $I = ABC$ fractional factor design. The factors chosen are chosen to keep all of the dimensions in the experiments.

If you look at the factorial effects in Figure 3 you can see that *A* and *BC* have the same level coding for all treatment combinations. This means that when looking at the effect of *A* you are really looking at the effects of $A + BC$. The same can be said for $B + AC$ and $C + AB$. These experiments can be useful when you believe the combined effects of factors will not have a big impact on the result compared to single factor's main effects.

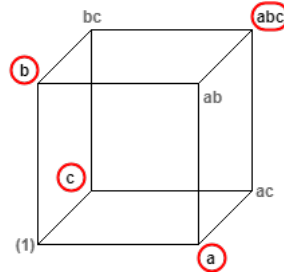


Figure 2: Dimension representation of a $I = ABC$ fractional factorial design

		Factorial effect							
Treatment combination		I	A	B	C	AB	AC	BC	ABC
	a	1	1	-1	-1	-1	-1	1	1
	b	1	-1	1	-1	-1	1	-1	1
	c	1	-1	-1	1	1	-1	-1	1
	abc	1	1	1	1	1	1	1	1

Figure 3: Level coding of a 2^3 fractional factorial design with generator $I = ABC$

3 Methodology

The methodology of this paper is divided into three parts. The design of the conjoint analysis which discusses how the survey and data collection was done. The targeting of respondents which described who answered the survey and how we reached out to them. And finally how the data collected in the survey was analyzed. To make sure that the results from the SPSS and the manual analysis would be worth comparing, the data collection method and data used were the same in both analyses.

3.1 Design of conjoint analysis

As the factors that were going to be researched were known when the study began the first step to create the survey was to decide the number and structure of the levels. In the article *The Effect of Differences in the Number of Attribute Levels on Conjoint Results* by Wittink et al. it is shown that an increased number of levels can be connected to a increased part-worth value in conjoint analysis [6]. To avoid this effect in the study all the factors in our analysis all had the same amount of levels. When constructing the values of the levels we assumed there to be a linear factor effect. Because of this we made sure to have a large difference between the

factor levels to avoid the random variability of the responses to create inaccurate part-worth values for the factors [7]. The exact wording used in the conjoint analysis were examples provided by our interviewees when they presented better or worse examples of service experiences in this industry. The four factors and their corresponding factor levels can be found in Figure 4. The second row (+) were coded as +1 in the analysis and the lower row (-) was coded as -1.

Factor ID			
Personal Contact	Adaptability	Size	Price
+ You've had direct contact with the person who would be in charge of the project.	+ You have developed the project plan together with the CRO.	+ 2000 employees	+ 40 MSEK
- Your contact at the CRO is a sales representative and you've not met the person who would be responsible for the project.	- The CRO offered you a project plan that has worked for companies in a similar situation as yours.	- 150 employees	- 20 MSEK

Figure 4: Different factor levels used in the conjoint analysis

The eight different cards (the CROs that were ranked) were generated by using through the use of SPSS, the resulting cards can be found in Figure 5.

The scenario in which the respondents had to rank CROs was created with inspiration from circumstances described during our interview study. In the scenario we wanted to place the respondent in a situation that they could relate to. The scenario is described quickly without any exact details to make the rankings of the respondents only focused on the four factors being measured. As the respondents is experienced within the pharmaceutical industry they were allowed to draw their own conclusions about any missing information. The scenario was stated as follows:

"You are the CEO of company that was recently founded based on academic research involving inhibition of cancer cell-signaling. You have now developed an antibody as a candidate drug against a certain type of cancer. The goal is to finalize clinical trials in phase II and then license the product to a large pharmaceutical company who are interested in your product. You operate as a virtual company with 2 employees. Your company is listed and has been financed by is-

	Cost (a)	Personal Contact (b)	Adaptability (c)	Size (d)	Factor coding
Card 1	Price of clinical study: 20 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	You have developed the project plan together with the CRO.	2000 employees	cd
Card 2	Price of clinical study: 40 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	150 employees	a
Card 3	Price of clinical study: 20 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	You have developed the project plan together with the CRO.	150 employees	c
Card 4	Price of clinical study: 20 MSEK	You've had direct contact with the person who would be in charge of the project.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	150 employees	b
Card 5	Price of clinical study: 40 MSEK	You've not met the person from the CRO who would be responsible for the project, only a salesperson.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	2000 employees	ad
Card 6	Price of clinical study: 40 MSEK	You've had direct contact with the person who would be in charge of the project.	You have developed the project plan together with the CRO.	150 employees	abc
Card 7	Price of clinical study: 20 MSEK	You've had direct contact with the person who would be in charge of the project.	The CRO offered you a project plan that has worked for companies in a similar situation as yours.	2000 employees	bd
Card 8	Price of clinical study: 40 MSEK	You've had direct contact with the person who would be in charge of the project.	You have developed the project plan together with the CRO.	2000 employees	abcd

Figure 5: The cards used in the conjoint analysis

suing new shares. You now want to conduct a clinical phase I trial. Since you are a virtual company you will have to collaborate with a CRO who will be able to conduct the trial for you. You have identified eight different CROs that are willing and able to conduct your trial. The estimated price for the trial is around 30 MSEK, but you think that it would be possible to pay more.”

As the cost of clinical studies varies depending on scale and indication we gave

some additional information regarding this. This ensures that the respondent understands the possibilities with the fictional company's budget and doesn't make the other variables insignificant as they would if the company operated under a strict budget [8].

3.2 Targeting of respondents

Before the survey was sent out to the respondents we contacted some people that we interviewed earlier to get feedback on our design. It was very helpful and led to some minor changes to make the survey more understandable.

The target group was already identified through our interview study where we tried to identify all the EBP companies active in Sweden. To collect the responses the online survey tool SurveyMonkey was used [9]. Respondents were contacted through email. Two reminder emails were sent out to the companies in our target group. The first was sent out one week after the initial request and the second two weeks after the initial request. The first questions of the survey were constructed to filter the respondents to make sure that the people who answered the survey was part of our target population. These questions included question about the respondent's position at the company and if they were involved in deciding which CRO their company was/would be working with.

3.3 Analysis of data

The instructions on how the analysis of the data through SPSS will not be described in this report but can be found online [10] [11]. Through the analysis the part-worth utilities and importance values of the factors were calculated.

The analysis of the data was also done through a manual calculations. The rankings of the cards were then averaged over all responses. The part-worth of the different factors were calculated using the following formulas:

$$Cost = \frac{\frac{C_2+C_5+C_6+C_8}{4} - \frac{C_1+C_3+C_4+C_7}{4}}{2}$$

$$PerCon = \frac{\frac{C_4+C_6+C_7+C_8}{4} - \frac{C_1+C_2+C_3+C_5}{4}}{2}$$

$$Adapt = \frac{\frac{C_1+C_3+C_6+C_8}{4} - \frac{C_2+C_4+C_5+C_7}{4}}{2}$$

$$Size = \frac{\frac{C_1+C_5+C_7+C_8}{4} - \frac{C_2+C_3+C_4+C_6}{4}}{2}$$

where C_n represents the average rating for card n . The combined effects of the factors were not calculated as they were considered too small.

The combined factor effects were calculated based on Figure 6. To calculate the combined factor effect of one contrast level the cards coded as -1 were subtracted from the cards coded as 1 for the specific factor combination. The resulting value was then divided by 8.

		Contrast level										
		AB	ABC	ABD	AC	ACD	AD	ABCD	BC	BCD	BD	CD
Factor coding (Card)	cd (1)	1	1	1	-1	-1	-1	1	-1	-1	-1	1
	a (2)	-1	1	1	-1	1	-1	-1	1	-1	1	1
	c (3)	1	1	-1	-1	1	1	-1	-1	1	1	-1
	b (4)	-1	1	1	1	-1	1	-1	-1	1	-1	1
	ad (5)	-1	1	-1	-1	-1	1	1	1	1	-1	-1
	abc (6)	1	1	-1	1	-1	-1	-1	1	-1	-1	-1
	bd (7)	-1	1	-1	1	1	-1	1	-1	-1	1	-1
	abcd (8)	1	1	1	1	1	1	1	1	1	1	1

Figure 6: Combined factor

Then the total variation and importance values were calculated according to equations 1 and 2 in the Theory Section.

4 Results

A total of 97 companies were contacted through email. Two rounds of reminder email were sent out one and two weeks after the first email was sent out to the companies. 23 of the companies contacted answered our survey which is to a response rate of 24%.

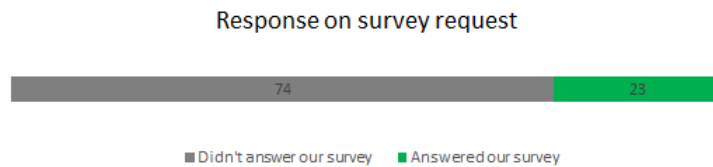


Figure 7: Response on the survey request

The ratings and the average rating of each card can be found in Figure 8.

		CARD:							
RANK:		1	2	3	4	5	6	7	8
	1	3	0	7	4	0	7	0	2
	2	3	0	4	4	0	5	2	5
	3	5	0	6	6	0	1	4	1
	4	6	0	4	3	0	2	6	2
	5	4	3	0	3	0	5	4	4
	6	2	1	2	3	1	2	6	6
	7	0	12	0	0	6	1	1	3
	8	0	7	0	0	16	0	0	0
Average:		3,478	7	2,652	3,261	7,652	3,13	4,478	4,348

Figure 8: The amount of rankings for each card in the survey

4.1 Results from SPSS

In Figure 9a and 9b you can find the utility values and the importance values gathered from SPSS respectively. The importance values show that the respondents prioritized adaptability (32%) and cost (29.9%) over the other factors. Size was the least prioritized factor but it still had an impact on the result with an importance value of 17.2%.

Utilities		Utility Estimate	Std. Error
Cost	20 MSEK	1,033	,071
	40 MSEK	-1,033	,071
PersonalContact	You don't know project manager	-,696	,071
	You know project manager	,696	,071
Size	150	,489	,071
	2000	-,489	,071
Adaptability	The CRO offered you a standard plan	-1,098	,071
	You have developed a project plan with the CRO	1,098	,071
(Constant)		4,500	,071

(a) The utility values from SPSS

Importance Values	
Cost	29,867
PersonalContact	20,863
Size	17,209
Adaptability	32,062

Averaged Importance Score

(b) The Importance values from SPSS

Figure 9: The results generated by SPSS

4.2 Results from regression model representation

The factor results from the regression model representation can be found in Figure 10. The part-worth utility of the factors calculated were the same as the results from the SPSS analysis. The importance values differ slightly from the SPSS analysis.

In Figure 11 the resulting combined factor results can be found. Worth noting is that the part-worth utility of $A = BC$, $B = AC$, $C = AB$, $D = ABCD$ and $I = ABC$.

	Part-worth:	Importance Value:
Cost	1,033	31,148
Personal Contact	-0,696	20,984
Size	0,489	14,754
Adaptability	-1,098	33,115

Figure 10: The resulting factor values of the manual calculations

		Individual factor level				Contrast level											
		<i>I</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>AB</i>	<i>ABC</i>	<i>ABD</i>	<i>AC</i>	<i>ACD</i>	<i>AD</i>	<i>ABCD</i>	<i>BC</i>	<i>BCD</i>	<i>BD</i>	<i>CD</i>
Factor coding (Cards)	<i>a</i>	1	1	-1	-1	-1	-1	1	1	-1	1	-1	-1	1	-1	1	1
	<i>b</i>	1	-1	1	-1	-1	-1	1	1	1	-1	1	-1	-1	1	-1	1
	<i>c</i>	1	-1	-1	1	-1	1	1	-1	-1	1	1	-1	-1	1	1	-1
	<i>abc</i>	1	1	1	1	-1	1	1	-1	1	-1	-1	-1	1	-1	-1	-1
	<i>ad</i>	1	1	-1	-1	1	-1	1	-1	-1	-1	1	1	1	1	-1	-1
	<i>abcd</i>	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	<i>bd</i>	1	-1	1	-1	1	-1	1	-1	1	1	-1	1	-1	-1	1	-1
	<i>cd</i>	1	-1	-1	1	1	1	1	-1	-1	-1	-1	1	-1	-1	-1	1
Part-worth:		4,5	1,033	-0,7	-1,1	0,489	-1,1	4,5	0,022	-0,7	0,12	-0,02	0,489	1,033	-0,02	0,12	0,022

Figure 11: The resulting factor and combined factor results of the manual calculations

The resulting regression model representation of the experiment looks as follows:

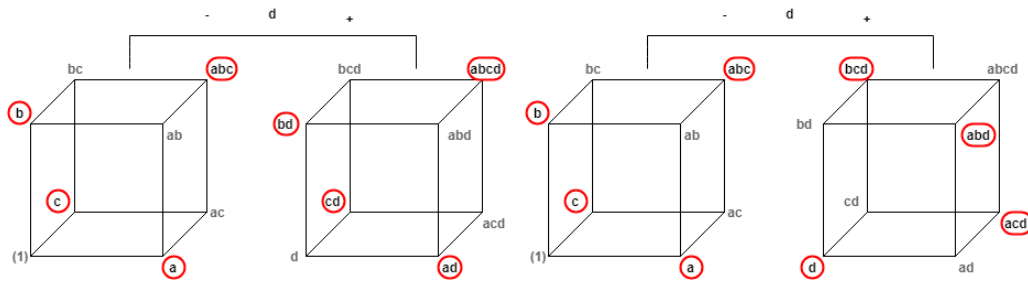
$$y = 4.5 + \frac{1.033x_1 + 0.489x_4 + 1.033x_2x_3 + 0.12x_2x_4 + 0.022x_3x_4 + 0.22x_1x_2x_4 + 0.12x_1x_3x_4 + 0.489x_1x_2x_3x_4}{2} - \frac{0.696x_2 + 1.098x_3 + 1.1x_1x_2 + 0.7x_1x_3 + 0.02x_1x_4 + 0.02x_2x_3x_4}{2} + \epsilon$$

Where x_1 , x_2 , x_3 and x_4 represents the high and low values of the factors cost, personal contact, adaptability and size respectively and ϵ is a random error term.

5 Conclusions and Discussion

In our interview study we found that *adaptability*, *cost* and *personal contact* were more important than the *size* of the service provider. The results from the conjoint analysis confirms this result. From the results we can also draw a conclusion that the adaptability is the most important followed by cost when a service provider engages with a customer from this customer segment.

When generating which cards to be ranked through IBM SPSS the generator $I = ABC$ was chosen. This fractional factorial design leads to some two-factor aliasing effects influencing the results. Namely $A = BC$, $B = AC$ and $C = AB$. If the generator $I = ABCD$ would have been used, the lowest level of aliasing that affect the experiment would have been three-level aliasing. A possible cause for this is that SPSS first generates a design based on three factors, makes a fractional factorial design based on $I = ABC$ and then copies the current design and adds the fourth factor as shown in Figure 12a. If instead the generator $I = ABCD$ would have been chosen we would have a design as shown in Figure 12b. A possible cause for this is the fact that in conjoint analysis the combined factor effects are usually very small. As the effect of this might influence the results and the step to avoid this effect is not a big one it should be looked into further.



(a) A $I = ABC$ fragmented factorial design (b) A $I = ABCD$ fragmented factorial design

Figure 12: Dimension representation of a fractional factorial design with two different generators

Finally there are reasons why our results are not representative of the real world. The factor levels are very specific and might not be representative of how the companies makes their decisions in this case. To investigate this further more research should be performed.

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