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Enhancing Sustainability in Pharmaceutical Supply Chains in Switzerland

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ABSTRACT

This research discusses means for enhancing sustainability in the global pharmaceutical supply chain operations. The sustainability topic has gathered importance in recent years, influencing business operations and decision making in most industries. The unique nature of the pharmaceutical supply chain spreading over various regions and functioning under different regulations presents several challenges and opportunities for sustainable operations. The long development times and patent expiry pressures result in the pharmaceutical supply chains being less agile and flexible than those of other industries. This research collects data from various stakeholders in the pharmaceutical supply chain, including manufacturers, suppliers, distributors, contractors and industry research associations to present a holistic description of the pharmaceutical supply operations, and to discuss sustainability related concerns from different perspectives. Through identifying the sustainability drivers affecting the economic, environmental and social sustainability dimensions, this research identifies means to enhancing sustainability in supply chain operations. The findings of this research contribute to business and empirical research in realizing sustainability drivers in the pharmaceutical supply chains, as well as suggests measures for enhancing sustainability in the pharmaceutical supply chain operations.

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1. INTRODUCTION

1.1. Scope and Background

The aim of this Master Thesis is to examine sustainable supply chain practices across Swiss pharmaceutical companies, through conducting a case study and by comparing strategic approaches in handling the different sustainability standards between Switzerland's international contractors and distributors, as many of these partners are located overseas in regions that may have different social, environmental, ethical and health and safety standards, when compared to Switzerland.

Recently, the issue of sustainability and Corporate Social Responsibility (CSR) has become prominent, and the pharmaceutical industry has allocated more resources to the study of this topic. Many companies have dedicated sections to sustainability in their annual reports detailing their efforts for a better society, environment, in addition to the economy. In fact, a study by (Stiller & Daub, 2007, p. 484), which gathered experiences from three years' assessments, concluded that there was an emerging trend in Swiss companies towards integrating information on the social and environmental performance into annual reports. Furthermore, 'The Responsible Business Initiative' was launched in April 2015 in Switzerland, calling for companies to be legally obliged to incorporate respect for human rights and the environment in all their business activities, and for mandatory due diligence to be applied to Swiss based companies' activities abroad (Konzern-Initiative.ch, 2017). This initiative had gathered over 140,000 signatures less than a year after its launch (Konzern-initiative.ch, 2016), clearly indicating that there is a strong imperative for Swiss companies to enforce sustainability measures, in Switzerland, in conjunction with their business dealings overseas. On the other hand, companies are facing increased customer demands, competition, and development costs, no matter what type of business they run, resulting in businesses

constantly trying to explore and enhance their operations in order to achieve and maintain competitiveness and profitability, while delivering what the customer wants when they want it, and at an affordable price in the desired location. Hence, companies aim to review and optimize their supply chains to enhance efficiency and deliver value continuously.

Additionally, previous studies have indicated the importance of supply chain (SC) operations on the general business outcomes: Ismail and Sharifi debate that to manage a successful business, strategic approaches are required for designing products 'with particular attention to the characteristics of the supply chain and its dynamics' (Ismail & Sharifi, 2006, p. 441), while Suman argues that supply chain activities, such as innovative sourcing and logistics can 'grow revenue, reduce risk, increase profitability and sustain prosperity' (Sarkar, 2017, p. 1). Other studies have highlighted the importance of responsive and effective management of all supply chain parties and the impact of such management on the success of a business organization (Christopher & Peck, 2004); (Lummus & Vokurka, 1999); (Vastag, et al., 1994). Furthermore, it is important to note that the Supply Chain of a business is strengthened by the possession of a strong supply chain orientation of its management in its entirety, whereby the management can see the implications of managing the upstream and downstream flows of products, services, finance and information across their suppliers and customers (Shanmugan & Kabiraj, 2012, p. 1). This indicates the importance of involving all stakeholders in the Supply Chain processes, and ensuring understanding across all those parties of the benefits of Supply Chain operations to business success. Further studies have concluded that one of the main objectives of Sustainable Supply Chain is to enhance business performance (Bag, 2014, p. 11).

This is particularly important in the pharmaceutical industry due to long product development and lead times and the use of multiple supply chain networks. Studies have indicated that

most pharmaceutical industries have supply chains that are not flexible nor cost effective, and that this, combined with reduced economies of scale that the industry leaders previously enjoyed through the blockbuster drug 'paradigm' because of increased generic competition, has led to many traditional pharmaceutical companies refining and redefining their supply chains. (Pricewaterhousecoopers, 2011, p. 3). When it comes to the pharmaceutical supply chains, there is a general trend for companies to divest excess capacity that came about from having many local manufacturing sites, and move towards a global supply chain. This brought many complex coordination issues (Shah, 2004, p. 930). Furthermore, CSR in the supply chain puts an emphasis on engaging and monitoring suppliers with unethical business practices (Jonker & Witte, 2006, p. 224). By linking the sustainability topic with the pharmaceutical supply chain practices, this research will look into the social and ethical aspects of Pharmaceutical Supply Chains in Switzerland, with the purpose of comparing strategic approaches of different companies when dealing with these topics.

1.2. Definition of Terms

Supply Chain Management (SCM): According to literature, the term Supply Chain Management (SCM) emerged in the 1980s as a new integrative philosophy to manage the total flow of goods from suppliers to the ultimate user (Cooper, et al., 1997). However, this definition did not identify the detailed activities that describe the flow of goods, nor did it include the management of services from a supply chain perspective. Further review noted that the terms 'logisitcs' and 'supply chain management' are used interchangeably in the literature, despite the fact that that logisitcs management is a part of SCM (Lummus & Vokurka, 1999). Several journals have offered various definitions of the term, detailing the processes that SCM entails, as well as the stakeholders involved in the process. The Council of Supply Chain Management Professionals (CSCMP) offered the definition of the term as

'planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, who can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies' (Council of Supply Chain Management Professionals, 2017). Research review has revealed this definition to be the most descriptive and inclusive of the process and the activities it entails, and therefore, will reflect the term SCM in the proposed research.

Sustainable Supply Chain Management (SSCM): Many definitions for sustainable supply chain management have been proposed, which led to Seuring and Müller conducting a review of literature on sustainable supply chains to identify the gaps in the exisiting literature, and which directed them to introduce a new definition on sustainable supply chains based on the triple-bottom-line approach of sustainable development, i.e. economic, environmental and social sustainability (Seuring & Müller, 2008). However, later research has provided a definition of the term which included further business sustainability characterestics (such as resilience and long-term focus) and SCM characterstics (such as value, efficiency and performance issues). This research, by Ahi and Searcy, presented an inclusive and detailed definition of the term sustainable supply chain as "The creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term." (Ahi & Searcy, 2013, p. 339). This definition is particularly chosen for this research since

it is inclusive of both business and sustainability aspects, which is held to be most relevant to the research on hand, and since it provides a description of the effect SC operations have on a running business. In addition, the UN Global Impact defined supply chain sustainability as "the management of environmental, social and economic impacts and the encouragement of good governance practices, throughout the lifecycles of goods and services, with the objective of creating, protecting and growing long- term environmental, social and economic value for all stakeholders involved in bringing products and services to market" (United Nations Global Impact, 2015, p. 5), while other research papers, such as the one conducted by (Youn, et al., 2012), elaborated on means of making supply chains 'greener' through practices such as enhancing terms of production, and explained that the basis of going "green" is to optimize the production of goods and services while minimizing waste. Further, companies can make their supply chain "greener" by embedding modularity into the product design, using more environmentally friendly materials, and increasing the recyclability of products. The research concluded that evidently, firms can design their supply chains to be greener and thus to fit in with the diverse needs derived from managing internal operations, suppliers, and customers.

Pharmaceutical Supply Chain (PSC): The pharmaceutical industry is defined as "a system of processes, operations and organizations involved in the discovery, development and production of drugs and medications" while the pharmaceutical supply chain signifies the route through which essential pharmaceutical products are distributed to the final end users at the right quality, at the right place, and at the right time (Mehralian, et al., 2012); (Enyinda, et. al., 2009). Pharmaceutical supply chains continue to increase in complexity, due to the network of companies that exist in almost every country of the world, and on-going macro-economic and regulatory events that are constantly changing the shape of the competitive

and operational environment in which supply chain managers make their strategic and tactical decisions (Rossetti, et al., 2011, p. 602). Although this research will focus only on pharmaceutical companies in Switzerland, it is important to note this definition, to understand some of the challenges that are faced by companies in the industry due to this complexity.

1.3. The Pharmaceutical Industry in Switzerland

The pharmaceutical industry is significantly important for the Swiss industry and is one of its key driving forces: As of 2015, more than 40,000 people in Switzerland work directly for pharmaceutical companies (Interpharma, 2015, p. 6), resulting in the pharmaceutical industry being one of Switzerland's most important employers. Furthermore, the latest Switzerland Pharmaceuticals and Healthcare Report mentions that the high per-capita spending on medicines, as well as the growing demand for medicines as a result of the country's ageing population makes Switzerland an attractive market in which to launch innovative medicines (BMI Research, 2016, p. 7). Both the exports and imports of Switzerland have been driven by pharmaceutical and chemical products: With a value of CHF50.3 billion (up to 3.2 billion or 6.8% so far in 2017), pharmaceutical and chemical goods continued to dominate the Swiss export sector, while the value of imports rose to an eight year high of CHF90.7 billion (+4.8%) (Swiss Info, 2017), leading up to fact that the pharmaceutical industry is the Swiss export leader, at 42% of total Swiss exports (The Federal Council , 2017). Figure 1 summarizes the importance of the pharmaceutical industry in Switzerland, and its effect on the country's employment, productivity levels, and exports, reflecting the steadily increasing pace it has had during the last decade.

	1995	2000	2005	2006	2007	2008	2009	2010
Persons								
Employed	22,900	27,100	31,700	33,200	33,900	34,800	35,600	36,700
As % of the overall economy	0.6 %	0.7 %	0.7 %	0.8 %	0.8 %	0.8 %	0.8 %	0.8 %
Added value, nominal								
In million CHF	4,200	5,800	9,600	11,300	12,600	13,700	14,600	14,800
As % of the overall economy	1.2 %	1.5 %	2.2 %	2.4 %	2.6 %	2.7 %	2.9 %	2.9 %
Productivity								
In CHF per person employed	183,600	215,100	303,900	339,400	372,700	392,700	410,500	402,200
Overall economy	89,300	96,200	103,100	106,700	110,600	113,200	110,700	112,500
In CHF per hour worked	106	118	169	191	210	222	236	232
Overall economy	53	57	62	65	68	70	69	69
Exports								
In million CHF	11,970	22,070	39,790	46,620	51,140	55,270	58,180	60,640
As % of total exports	13.0 %	17.4 %	26.3 %	26.3 %	25.9 %	26.8 %	32.2 %	31.4 %

Figure 1: Direct Importance of the Pharmaceutical Industry in Switzerland (Vaterlaus, et al., 2011, p. 29)

These figures highlight the vital role pharmaceutical companies operating in Switzerland play, and the notable effect they have on the country's economy, making it an increasingly interesting field of research in today's world.

In addition, many initiatives and programs are being implemented as driving forces for further improvements in sustainable supply chain practices, such as the Pharmaceutical Supply Chain Initiative (PSCI) which describes its operations as 'joining efforts to promote responsible supply chain management and better business conditions across the pharmaceutical industry' (Pharmaceutical Supply Chain Initiative (PSCI), 2017), besides the aforementioned Responsible Business Initiative. Such initiatives indicate that there is a need to review supply chain operations, and ensure that they are managed in a sustainable and responsible manner.

Therefore, this research might be beneficial in identifying gaps in current practices, and assisting in further industry improvements.

1.4. Research Objectives

This research provides a detailed analysis of the supply chain operations in pharmaceutical companies in Switzerland, and an understanding of the processes that are unique to the industry. In addition, it explains how those operations are managed from a sustainable perspective. Especially when it comes to managing overseas suppliers and contractors who might conduct business under different ethical, social and health and safety standards than those followed in Switzerland, the purpose of this multiple case study is to identify and analyse operational and strategic challenges that pharmaceutical supply chains are presented with, and the means by which they currently face them. This will be followed by an assessment of the strategic approaches of different companies used to face those challenges. It will also evaluate whether the current practices are effective enough to ensure sustainability measures are met. These objectives will guide the research into concentrating on the relevant context in literature review as well as to serve as a structure for further analysis for the empirical research. The interviews will provide further empirical insights towards the current strategic approaches in place in order to gain thorough findings and present recommendations for enhancing sustainability within the supply chain operations in the pharmaceutical industry.

1.5. Assumptions, Delineations and Limitations

The success of this research hinges on the expectation that the required interviewees and supply chain professional experts within the pharmaceutical industry would be willing to take part in this study, and answer the questions honestly and in a timely manner. The study also assumes that the researcher is able to understand and analyse the collected data in the

manner they were meant to be understood. Hence, this is a general limitation for qualitative study approaches.

In addition, the objective and scope of sustainability is broad, but the main focus of this study is on the social, ethical and health and safety standards under which overseas manufacturers and contractors conducting business with Swiss pharmaceutical companies operate. A further limitation of this study is the lack of specific research on the social and ethical aspects of pharmaceutical supply chains in Switzerland in literature. Therefore, the conducted interviews will focus on the pharmaceutical industry in Switzerland, and the literature will refer to other industries or geographical regions that can be useful for this study.

Finally, another potential limitation is a possible distinction in supply chain practices in the pharmaceutical industry among companies of different sizes, but it would be beyond the scope of this study to analyse these distinctions separately, and therefore, it is assumed that the supply chain practices are generally similar and uniform across pharmaceutical companies, regardless of their size.

1.6. Overview of the Chapters

The first chapter of this thesis starts by briefing the aim of conducting this research as in presenting a comparison among sustainable supply chain practices across Swiss pharmaceutical companies, in order to present recommendations for improving the social, environmental, ethical and health and safety standards when dealing with overseas manufacturers and contractors. Furthermore, and in order to provide an understanding of the topic, the introduction includes an elaboration on the importance of the sustainability matter in recent years, and outlines the significance of the supply chain operations for a business, and how these operations affect the overall business outcome. Next, a general background of the pharmaceutical industry in Switzerland is outlined, which provides the

basis of choosing this industry for research. Thereafter, and in order to provide an understanding of the thesis scope, a definition of the common terms is presented, and reference is made as to which ones will be referred to in this study. The second chapter presents the theoretical framework of this thesis based on a thorough and detailed literature review on the sustainability elements of the pharmaceutical supply chain, with an emphasis on the social, ethical and health and safety standards. Sustainable supply chain theories are defined and outlined, and a framework is proposed, including metrics of measurement for operational practices. In addition, an overview of the current sustainability trends in the pharmaceutical industry in Switzerland is outlined, noting the roles of several stakeholders, followed by an summary of the current means of measuring and auditing suppliers' sustainable performance by Swiss pharmaceutical companies. The results of this will assist in producing the main foundations of the study which will be analysed in the empirical research and in supporting the findings of this study at a later step. The third chapter presents the methodology of the thesis, as well as the research strategy followed in order fulfil the research objective. The fourth chapter revolves around the findings, presenting a comparison between the primary data presented in the theoretical framework and the secondary data collected through the case study and will examine the similarities and differences as a support for the preparation of any recommendations. This will be presented in the fifth chapter, which will answer the research question by suggesting means for enhancing sustainability in supply chain operations in the pharmaceutical industry. Finally, chapter six concludes this thesis and presents suggestions for future potential research.

2. THEORETICAL FRAMEWORK

Due to the complex nature of its business, the pharmaceutical industry is facing many challenges such as quality standards, patent expiration and increased service requirements. To face these challenges, pharmaceutical firms have to reduce costs, become more agile and improve their response to a changing market. Furthermore, and because of this complex environment, a holistic sustainability approach would be necessary, linking economic, ecological and social factors through the ethical business culture of the company management (Vitezić, 2010, pp. 58-59). In other words, all stakeholders of the supply chain, including suppliers and contractors, have key roles and should be monitored and audited to ensure sustainability standards are met. Additionally, total transparency is not easily achievable in complex industries such as the pharmaceutical one, for not only is there typically no single entity responsible for the whole supply chain, but also there may be a lack of systems in place to share information and permit effective cooperation between all the players of the end-to-end supply chain (Charles, et al., 2010, p. 736).

Besides this, because of the growing power of the global pharmaceutical industry, as well as the Swiss pharmaceutical industry as presented earlier, the ethical and social responsibility of pharmaceutical companies in production and distribution of medicine is of growing importance, especially with societal pressure and demand, such as the previously mentioned Responsible Business Initiative.

Therefore, a number of operational and strategic issues become apparent due to its complex nature. Some of these issues as mentioned in research by (Shah, 2004, p. 932) are as follows:

A- Operational Issues:

- Demand Management

- Inventory Management
- Secondary Planning and Scheduling

B- Strategic Issues:

- Pipeline and Development Management
- Process Development
- Capacity Planning
- Plant Design

These issues may be studied to identify potential improvements from a supply chain perspective; enhancing the tendering process and forward forecasts, for example, may lead to improved demand management. These potential enhancements will be presented later in the recommendations of this thesis.

In addition, and according to Kesic, due to the increasingly globalised nature of the pharmaceutical industry today, additional challenges have been added to the mix such as the huge investments needed for research and development, increased competitiveness, the world reforms of health care systems, as well as the increased importance of regulatory issues (Kesic, 2009, p. 67)

The research question aims accordingly to find an answer to identify the means through which the pharmaceutical industry can reach sustainability within its supply chain management. This can also be linked to identifying whether or not supply chain management can be used as a tool for delivering competitive advantage and added value, and to address future business challenges.

This chapter will therefore present an overview of the existing literature and propose a theoretical basis on sustainable supply chain practices. In presenting these theories, an

attempt will be made to highlight their relevance to the pharmaceutical industry. The first section will examine four organizational theories, the Resource-Based Theory (RBT), the Stakeholders Theory, the Institutional Theory, and the Social Network Theory.

2.1. Organizational Theories

2.1.1. The Resource Based Theory (RBT)

Building on competitive advantage theories of Porter and Rumelt, Barney came up with the resource-based theory in 1995, and presented the framework in figure 2 below, that suggested that firms 'obtain sustained competitive advantages by implementing strategies that exploit their strengths, by responding to environmental opportunities, while neutralizing external threats and avoiding internal weaknesses' (Barney, 1991, p. 99).

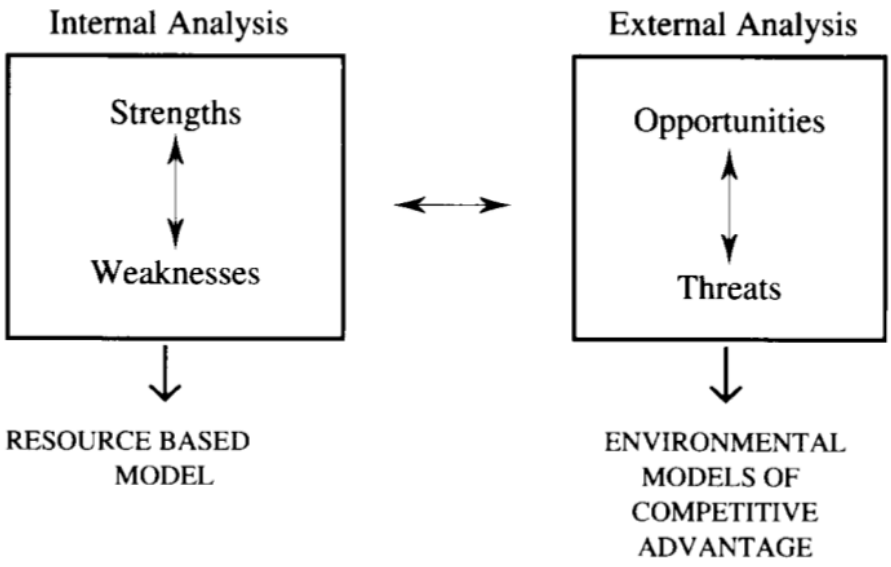

Figure 2: The Relationship between traditional 'strengths- weaknesses- opportunities- threats' analysis, the resource-based model and models of industry attractiveness (Barney, 1991, p. 100)

As cited by (Morris, et al., 2010, p. 4), resource-based theory (RBT) conceptualizes the firm as a portfolio of resources, where the quality and amount of resources in this portfolio are a major determinant of organizational performance (Barney, 1991), (Makadok, 2001), (Sirmon, et al., 2007). Such resources can include assets, capabilities, processes and the knowledge

that firms possess and utilize to implement strategies and improve competitiveness. In addition, (Hart, 1995) introduces the natural resource-based view of organizations, highlighting the sustainability risks and opportunities, and discusses how environmentally and socially sustainable economic activities can build competitiveness for organizations (Varsei, et al., 2014, p. 245). This means that for organizations to succeed in implementing strategies and achieve a competitive advantage, its resources, as well as its activities that support sustainability must be measured. In adopting this theory to this research, pharmaceutical organizations ought to review their suppliers' practices and performance, as part of their resource management, and measure their sustainable activities along with their own, in order to achieve a stronger competitive advantage. This was evident by the research carried by (Fan & Xiongfei, 2017), whereby they stated that sustainable supplier selection, sustainable supplier monitoring and sustainable supplier collaboration have positive influences on buyer-supplier relationship and buyer competitive advantage. Therefore, organizations can monitor their suppliers to ensure adherence to social expectations, conduct audits, or use certifications provided by an independent third party (Awaysheh & Klassen, 2010, p. 1247). Furthermore, the Global Reporting Initiative (GRI) has identified the social dimensions of sustainability, based on four categories: Labor Practices and Decent Work, Human Rights, Society, and Product Responsibility (G4 Global Reporting, 2017), which can additionally be used as means to measure the organizations' own operations, as well as it's suppliers'.

2.1.2. The Stakeholders' Theory

As mentioned by (Carter & Easton, 2011, p. 55), the stakeholders' theory is one of the most prevalently mentioned theories in sustainable supply chain management literature. Introduced by Freeman, the theory mentions that an 'organizations' stakeholders include suppliers, customers, employees, stockholders, the local community as well as management,

and argues that each of these stakeholder groups must participate in determining the future direction of the firm in which they have a stake' (Freeman, 2001).

Further research by (Maignan, et al., 1999, p. 464) indicated that the stakeholders' perspective suggests that businesses need to address the responsibilities placed on them by their stakeholders, while (Matos & Hall, 2007) further emphasized the stakeholder impact on an organization's adoption of social and environmental practices across supply chains. Due to this impact, the pharmaceutical organizations face increasing pressures by stakeholders such as customers and the local community to ensure that their supply chain operations, including sourcing, manufacturing, distribution and waste disposal are all done in accordance with environmental, social and ethical standards, and as such, those organizations need to improve capabilities and implement strategies that meet the requirements of such stakeholders, thereby considerably enhancing their sustainability standards.

2.1.3. The Institutional Theory

Campbell explains that corporations tend to act in socially responsible ways if normative or cultural institutions are in place that create the proper set of incentives for such behavior (Galaskiewicz, 1991), (Campbell, 2007). This is the core of the institutional theory, which explains that companies tend to conduct operations under sustainable conditions when pressured by the institutions (such as governments, media or public associations). Furthermore, and as cited by (DiMaggio & Powell, 1983, p. 150), organizations compete not just for resources and customers, but for political power and institutional legitimacy, for social as well as economic fitness (Carroll & Delacroix, 1982). In Switzerland, there is a multitude of such institutional pressures, such as the country taking part in the Sustainable Development Goals 2030 (The Federal Council, 2017) and the Responsible Business Initiative currently under study to be implemented into Swiss law (Konzern-Initiative.ch, 2017), among others.

Therefore, Swiss pharmaceutical companies may feel pressured to ensure their operations, including those of supply chain, are conducted under the highest possible sustainability standards, not only to enhance the likelihood of their survival, but to be secured against the possible consequences of environmental and social misconduct, including penalties and sanctions (Varsei, et al., 2014, p. 245), (Videras & Albertini, 2000). Meyer and Rowan questioned in a study published in 1977 whether managers would plan differently if they were designing organizations for more or less institutionally elaborated environments (Meyer & Rowan, 1977, p. 360), and in the current day and as most companies are now publishing annual reports that include detailed sustainable reporting sections, one can argue that their question was valid. Therefore, organizations are likely to adopt this reasoning when designing supply chains and ensure sustainable practices are indeed followed, because of such institutional pressures.

2.1.4. The Social Network Theory

As explained by Rowley, 'the primary focus of social network analysis is the interdependence of actors and how their positions in networks influence their opportunities, constraints, and behaviours' (Rowley, 1997, p. 894). Furthermore, and according to Coombs, ''the theory of social network is grounded in two elementary postulates; 1) people are in some sense ''linked'' by ties of effect, trust, right, obligations or expectations; 2) ties exert an influence on the behaviour and cognition of the participants'' (Coombs, 1973, p. 96).

Implementing this analysis to the research on hand, one can argue that the strength of an organization's stakeholders may be determinant and affect the behaviour of others. According to Connelly et al., the diffusion of sustainability practices occurs through networks of interconnected firms (Connelly, et al., 2011, p. 88). From a supply chain network perspective, and according to Handfield, organizations need not only to manage their internal

processes, but also need to be involved in managing the network of all upstream and downstream firms (Handfield, 2002). This means that the pharmaceutical companies in Switzerland should ideally be involved in their suppliers' and distributors' operations, monitor their sustainability standards, and use their strong position in the supply chain network to improve those standards. In addition, and as cited by Seyfang, a study by Norberg- Hodge et al. which was conducted to examine food networks concluded that sustainable supply chain practices are boosted when developing connections between consumers and manufacturers, increasing ethical and social capital, educating customers about the source of their products and the impact of different production methods, and creating feedback mechanisms (Seyfang, 2006), (Norberg- Hodge, et al., 2000). One can argue that a similar perspective can be applied in the pharmaceutical industry due to the similarities in the consumer perception towards both industries, and the impact they have on social health.

Finally, it is worth adding that organizations with a greater number of locations, customers, suppliers and general awareness in the public eye are more likely to be more vulnerable to stakeholder pressures in favor of socially responsible purchasing practices, as mentioned by Maignan and Mcalister (Maignan & Mcalister, 2003). This adds to the notion that the social network in which a supply chain functions is of great importance when it comes to implementing sustainable practices, according to the strength of its members.

2.2. Linking Organizational Theories to Pharmaceutical Sustainability

It is important to note that the organizational theories mentioned above complement each other and are not mutually exclusive. For example, effective stakeholder management with suppliers and customers provides firms with intangible assets such as a good reputation and high-quality relationships (Verbeke & Tung, 2013, p. 535), displaying an example of how the stakeholder's theory intersects with the resource-based theory, as well as the social network

theory. Another example would connect the Social Network Theory, explained earlier to influence the behavior and of the participants, to the institutional theory with governmental or social institutions being one of those participants affecting the business behavior and therefore outcome.

From a sustainable supply chain perspective, the institutional pressures of certain sustainability initiatives, such as the Responsible Business Initiative, might result in effects on sourcing or distribution decisions of the pharmaceutical supply chains in Switzerland. According to Figure 3 below, pharmaceutical and chemicals imports and exports to China, for example, are continuously on the rise, with the Swiss exports of pharmaceutical products rising by 28.8% between 2014 and 2015 (Embassy of Switzerland in the People's Republic of China, 2017, p. 9).

Bilateral Trade Switzerland - P.R. China, Jan - Dec 2014/2015										
	Class of goods	Import in Mio. CHF		Δ	Import	Export in Mio. CHF		Δ	Export	Trade balance
		Jan - Dec 2014	Jan - Dec 2015	in %	share %	Jan - Dec 2014	Jan - Dec 2015	in %	share %	Jan - Dec 2015
1	Agricultural products	177.80	151.50	4.0%	1.2%	93.42	99.86	15.0%	1.1%	-51.64
2	Energy carriers	0.79	0.27	-65.8%	0.0%	10.85	19.62	80.8%	0.2%	19.35
3	Textiles, apparel, shoes	2'160.59	2'083.48	-3.6%	16.9%	150.17	140.75	-6.3%	1.6%	-1'942.73
4	Paper, paper products, printed matter	81.51	94.39	15.8%	0.8%	26.83	28.56	6.4%	0.3%	-65.83
5	Leather, rubber, plastics	542.50	544.92	0.4%	4.4%	139.73	118.40	-15.3%	1.3%	-426.52
6	Chemicals, pharmaceuticals	921.42	958.67	4.0%	7.8%	2'971.51	3'358.05	13.0%	37.5%	2'399.38
7	Stone and Earth materials	132.67	128.70	-3.0%	1.0%	52.47	51.18	-2.5%	0.6%	-77.52
8	Metals and metal products	599.95	587.61	-2.1%	4.8%	466.25	397.11	-14.8%	4.4%	-190.50
9	Machinery, apparatus, electronics	5'271.07	5'187.16	-1.6%	42.0%	2'444.41	2'167.98	-11.3%	24.2%	-3'019.18
10	Vehicles	115.67	207.70	79.6%	1.7%	86.60	79.70	-8.0%	0.9%	-128.00
11	Precision instruments, w atches, jew ellery	1'236.12	1'451.37	17.4%	11.8%	2'346.18	2'460.76	4.9%	27.5%	1'009.39
12	Div. Goods, musical instrument, furniture, toys, etc	907.69	950.10	4.7%	7.7%	25.56	32.88	28.6%	0.4%	-917.22
	Total	**12'147.78**	**12'345.87**	6.5%	**100%**	**8'813.98**	**8'954.85**	1.5%	**100%**	**-3'391.02**

Figure 3: Chemicals & Pharmaceutical Trade Exchange between Switzerland and China (2014- 2015) (Embassy of Switzerland in the People's Republic of China, 2017)

These figures bring to question how sustainability measures would be implemented and measured across supply chains between Switzerland and China, and where the gaps might be in unifying those standards.

2.3. Drivers of Sustainable Supply Chain Management

The UN Global Impact report has identified main drivers for Supply Chain Sustainability, including sustainability related risks, growth and advantaged growth (See Figure 4) and

explained some of these drivers and how they are related; for example, the different stakeholders' expectations drive companies towards more sustainable supply chain management.

Figure 4: Business Drivers for Supply Chain Sustainability (United Nations Global Impact, 2015, p. 15)

Building on these drivers and based on the above mentioned organizational theories, four main drivers influencing the sustainability practices in supply chain can be identified (Varsei, et al., 2014):

2.3.1. Resources

Research has shown that resources are defined so broadly that nearly anything associated with a firm can be a resource. Other than assets and the tangible possessions that an organization owns, intangible belongings such as expert managers can be viewed as a valuable resource, when improving a company's competitive situation (Swink & Priem, 2012). Furthermore, combining a firm's resources with those of another can result in strategic alliances between the two firms, resulting in stronger performances and outcomes than either one might have achieved alone. Therefore, and when properly utilized and managed, a company's resources can be a solid driver that affects its performance.

2.3.2. Institutional Pressures

Institutional pressures are considered another driver that is likely to affect an organization's strategy implementation. As debated by Goodstein, 'Strategic responses will be affected by the characteristics of the constituent groups, such as public agencies and employees, creating institutional pressure on an organization' (Goodstein, 1994, p. 353). When it comes to sustainability matters, environmental and social agencies are applying rising pressure on organizations to conform to higher sustainability standards. Due to the highly democratic atmosphere in Switzerland, activists have launched the Responsible Business initiative, gathering 140,00 signatures, as previously mentioned, and are in the process of moving the initiative into Swiss law, if approved. Such initiatives, calling for Swiss companies to only deal with organizations that respect human rights and conduct business in line with solid ethical and environmental standards would act as strong drivers for organizations to re-assess their suppliers, distributors and partners and ensure that they function under those standards. Clearly, such institutional measures are therefore drivers that may shape the supply chain strategic decisions differently.

2.3.3. Stakeholders

Stakeholders are often identified as resilient drivers when it comes to forming sustainable supply chain strategies. In fact, and as cited by Golicic & Smith (Golicic & Smith, 2013), studies have indicated that research and practitioner interest in sustainability emerged in part because of concerns over the impact of regulatory compliance and stakeholder pressure, which may impact planning and management decisions, and consequently on corporate financial performance (Vachon & Klassen, 2006) (Porter & Van der Linde, 1995). As such, stakeholders may play a vital role in an organization's supply chain strategic decisions; for example, major shareholders of a firm may have opinions on sourcing or distribution

channels. Furthermore, institutional pressures are considered an additional stakeholder when it comes to sustainable practices, and are therefore another example of the stakeholders' drive and its influence on a supply chain. The figure below showcases examples of stakeholders that an organization may be connected to.

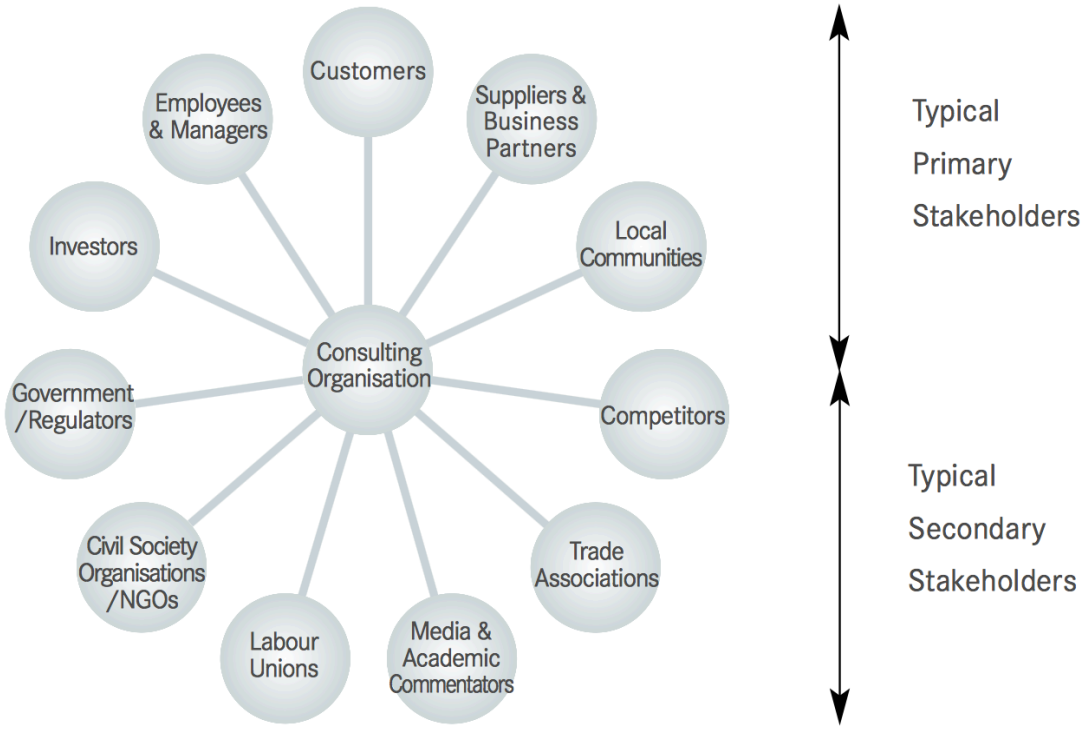

Figure 5: Typical Primary and Secondary Stakeholders (Stakeholder Research Associates Canada Inc., 2005, p. 12)

The figure, extracted from The Stakeholders Engagement Manual, (Stakeholder Research Associates Canada Inc., 2005, p. 11), cites the differences between primary and secondary stakeholders, defining primary stakeholders as those who have a direct stake in the organization and its success, and secondary stakeholders as those who may be very influential, especially in questions of reputation, but whose stake is more representational than direct (Wheeler & Sillanpaa, 1997). While this research would not delve into differentiating primary stakeholders from secondary ones in pharmaceutical companies, it is

clear according to these definitions that both categories are influential on an organization's performance, and accordingly on its strategic decisions.

2.3.4. Information Exchange Between Supply Chain Participants

As cited by Kembro and Selviaridis, 'information sharing is critical for improving the performance of supply chains' (Forrester, 1958), (Lee & Whang, 2000), (Hult, et al., 2004) (Kembro & Selviardis, 2015, p. 1). Examples of information than can be shared across the supply chain members include daily demand and shipment data, or sales forecasts between retailer and the vendor (Angulo & Nachtmann, 2004, p. 106). Such information can improve the business performance of the supply chain, and assist in planning resources and measuring outcomes effectively. Information on previous sales history can also be considered crucial information for a supply chain, and may assist in sales forecasts and vendor management as well. From a sustainability perspective, members of a supply chain can also share information on whether businesses conduct their trade in accordance with sustainability standards (or not), and therefore share resources and performance history with one another. Accordingly, the information sharing factor is considered an important performance aid to driving performance, and should be considered when exploring any means to enhance sustainability in supply chain operations.

2.4. Previous Frameworks in Literature

Varsei et al. accordingly, developed the below framework for sustainability development and assessment:

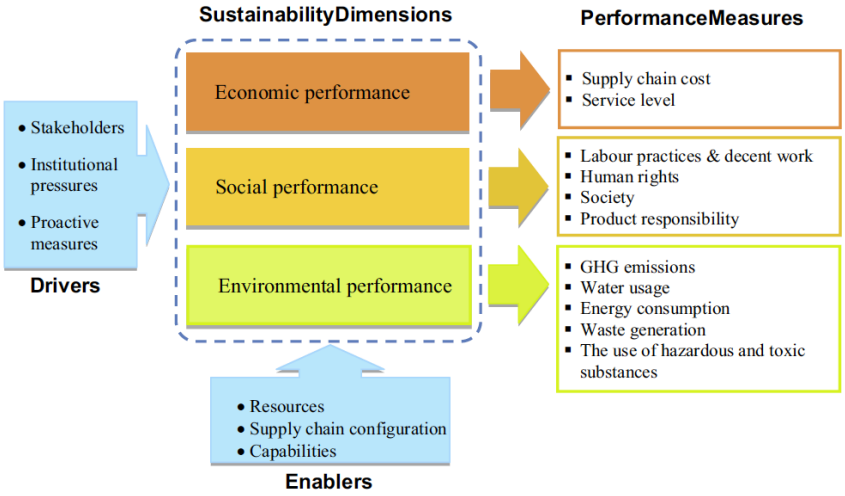

Figure 6: Foundations for Sustainability Performance Assessments of Supply Chains (Varsei, et al., 2014, p. 248)

The above framework referred to the sustainability dimensions based on social dimensions of sustainability, based on four categories: Labor Practices and Decent Work, Human Rights, Society, and Product Responsibility, as defined by G4 Global Reporting (G4 Global Reporting, 2017), categorizing them into the dimensions of Economic, Social and Environmental performance, and later created performance to enable supply chains to measure their relevant performances, accordingly.

Further reference was made to the below metrics for Pharmaceutical Sustainability Performance, in a framework created by Vitezić, while conducting a research to shape a framework for measuring corporate social responsibility in the pharmaceutical industry in Croatia.

Driver	Objectives	Metrics
Human		
users	- to insure highly quality products (health care and safety) - to prevent and reduce diseases in order to increase life expentancy - to increase the efficiency of clinical tests	- indicators of drug effectiveness (benefit and risk) - indicators of each drug impact on patient health and extension of life expectancy
employees	- to invest in impowerment of work conditions - to insure long life education - to encourage better effectiveness with team work and new knowledge in the science and profession - to present funds allocation for employess	- technology investment indicators - knowledge investment indicators (hours) - productivity indicators - average gross and net salary
Social	- to extend public health activities and other sorts of aids - to initiate cooperation with scientific and research institution - to publish brochure and other notification and media issues - to increase philanthropic activity (donation and sponsorship) - to emphasize legality and connfotming with regulations (corruption)	- number and efficiency of public helth and other activites - the value and the structure of cooperation and its effects (joint activity) - amount and content of publications - amount and value of philantrophic efforts - number of active processes, penalties and sanctions
Environmental	- to manage, dispose and recycle Toxic waste, packaging and raw material - old drugs disposal - to reduce wastewaters, noise, harmful gases, pollution etc. - to respect of quality standards (ISO, HACCP i sl.) - to invest in environmental protection	- amount and the way of managing and recycling - quantitative and descriptive - numerical indicators - number and description of non-observance - value indicators
Economic	- to express revenue and income growth - to express profitability growth rate - value added calculation	- sales and income - growth rate of net income/investments and/or equity - EVA and MVA

Figure 7: Metrics for Pharmaceutical Sustainability Performance (Vitezić, 2010, p. 65)

In comparing both frameworks, one can note that the drivers as defined by Varsei et. al are also visible in the framework of Vitezić, albeit in a less obvious way. Resources include employees, products, technology and information on suppliers. Institutional Pressures are visible under the media effect and respect of quality standards; Stakeholders include customers, suppliers, employees, the media and investors, and Information exchange is shared across all these stakeholders.

Vitezić adds to the afore mentioned framework by Varsei et al. in creating measures that are specifically defined for the pharmaceutical industry. Therefore, reference was made to her framework. However, this research will combine the frameworks of both Vitezić and Varsei et al. s' and propose a new one, combining both, for two main reasons: Firstly, while Vitezić's framework refers to the pharmaceutical industry, it also presents metrics for measuring CSR

in general, but not SCM sustainability as needed for the purposes of this research. Secondly, both presented frameworks assume quantitative metrics of measurement, while the research on hand deals with a qualitative methodology, and therefore, the data collection will be carried out and measured differently.

2.5. Proposed Theoretical Framework

To conclude this chapter, Figure 8 is proposed and consolidated to present a joint framework, extracting measures from both aforementioned frameworks, and aligned with the research objectives. Attention is placed on the drivers of sustainable supply chain management, presented earlier in the chapter, which affect the three sustainability dimensions, and consequently present measures to enhance sustainability in the pharmaceutical supply chain. The identified measures will serve as the base for the interview questions with business experts and supply chain professionals. The information gathered in response will assist in performing the targeted comparison of strategic sustainable supply chain practices between Swiss pharmaceutical companies. Furthermore, the responses will assist in identifying the gaps within the pharmaceutical supply chains, and would therefore indicate areas for potential improvement in order to enhance sustainability.

Although the presented model may not entirely address the research objectives in full, it provides a framework which would be further analysed in the empirical research. Therefore, this model will work jointly with the empirical research to tackle the objectives, and in order to assist in realizing the required findings. The methodology chapter to be presented next will provide further information on the empirical research of this study.

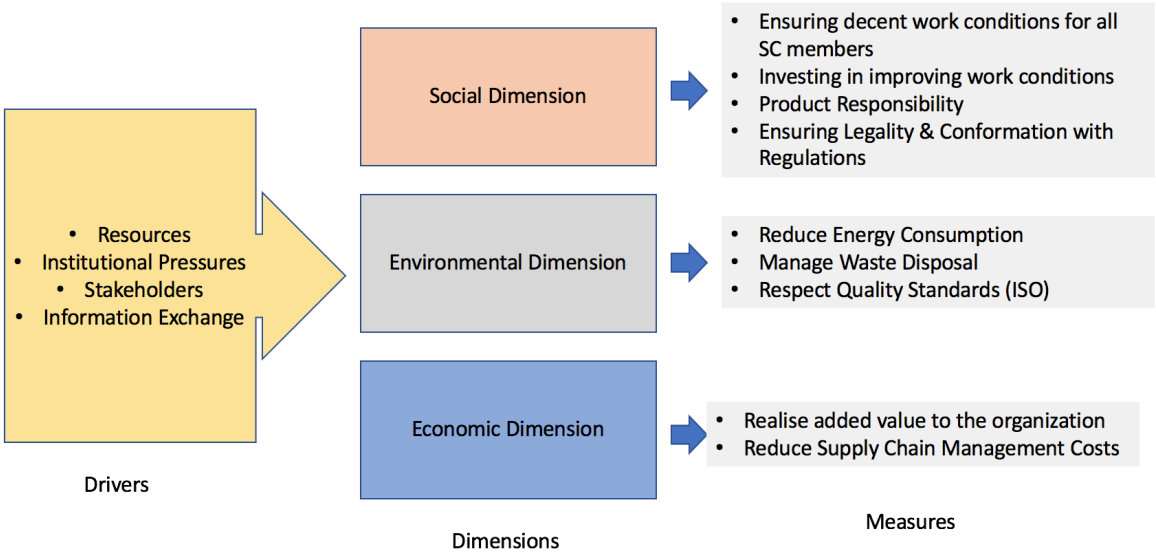

Figure 8: Followed Framework for Research on Hand

3. METHODOLOGY

3.1. Introduction

This chapter will present an outline of the methodology of this research. As cited by Ishak and Alias, "methodology is generally a guideline for solving a problem, with specific components of phases, tasks, methods and tools, and benefits managers by providing information to plan, review and control projects" (Robson, 1997), (Klein & Hirschheim, 2001) (Ishak & Alias, 2005, p. 326). This chapter will start by describing the problem in literature, and follow with a definition of the research questions, to emphasize the focus of this research. Thereafter, the research strategy will be presented and provide an understanding of the research design. The data collection process will be displayed next, with an explanation of the data validity and reliability. In addition, the role of the researcher will be defined, including the ethical considerations. Finally, this chapter will discuss the delineations and limitations of this research.

3.2. Problem in Literature

Previous research has mainly focused on the environmental and economic sustainability dimensions in supply chain management, when it comes to the pharmaceutical industry. A study by Laguna mentions that research guided by the concept of sustainability has historically been overwhelmingly focused on the environmental dimension of sustainability, resulting in social sustainability being an under-authorized concept with academics from various disciplines being in disagreement about how to conceptualize and measure social sustainability (Laguna, 2014, pp. 1-2). Furthermore, while the social sustainability dimension may be referenced in the sustainability standards of the pharmaceutical companies (as in their annual reports or sustainability reports), it is noted that less attention is given when it comes to the social sustainability dimensions of the other participants in the supply chain of

these companies. On the other hand, institutional pressures (such as the Responsible Business Initiative in Switzerland) are on the rise and may result in major influences to pharmaceutical procurement and other supply chain operations. However, there has not been a lot of research carried out to measure the supply chain sustainability performance after the implementing such initiatives. This literature gap prompted this line of research. In addition, this research presents potential improvements to sustainable supply chain practices in the pharmaceutical industry from several stakeholders' perspectives, including pharmaceutical companies and their operations as well as with distributors, business experts, and market researchers. The aim will therefore be the acquisition of more knowledge that may be utilised by any of such stakeholders in the future.

3.3. Research Questions

This Master Thesis aims to compare sustainable supply chain practices across Swiss pharmaceutical companies, in an attempt to assist the industry in achieving sustainability in its operations and will compare strategic approaches in handling the different sustainability standards between Switzerland and the overseas contractors and distributors. Therefore, the research question that this thesis aims to answer is:

"**How can the pharmaceutical industry enhance sustainability within supply chain management**?"

Further sub questions that will assist in answering the research question, and provide a comprehensive look into this topic are:

1) What are the unique characteristics of a supply chain in a pharmaceutical company?
2) How do pharmaceutical supply chains deal with different sustainability standards of over-seas participants?

3) What are the benefits of enhancing sustainable supply chain practices in the pharmaceutical industry, as perceived by business experts?
4) What challenges and opportunities do pharmaceutical supply chains face when incorporating sustainable practices in their operations?

3.4. Research Strategy and Design

This research was carried out in the form of a case study. Yin defines a case study as an 'empirical inquiry that investigates a contemporary phenomenon in depth and within its real-world context, when the boundaries between phenomenon and context may not be clearly evident' (Yin, 2014, p. 16). Therefore, a research strategy of a case study was most appropriate for this research, since it aims to look into the contemporary topic of sustainability in the pharmaceutical supply chain, and since the studied phenomenon (sustainability in supply chains) and the context (sustainability within pharmaceutical supply chains) are closely related in this study and interactive with each other, and therefore may not always be clearly distinguishable. Alternatively, Mupepi cites Given in defining quantitative research techniques as 'a systematic empirical investigation of observable phenomena via statistical, mathematical or computational techniques' (Given, 2008), and further explains that quantitative techniques are part of a research methodology that applies surveys or questionnaires and other large data collection techniques to predict results and identify factors viewed as universal in the organization (Mupepi, 2017, p. 311). Accordingly, a quantitative research would not have satisfactorily served the purpose of this research; Firstly, the data collection methods that are followed in this study are direct observations of sustainability in the supply chain as well as interviews with supply chain professionals in the pharmaceutical sustainability field, both of which are qualitative methods (Yin, 2014, p. 12) and neither of which is a large data collection technique, similar to surveys or questionnaires,

since the researcher aims to gain an in-depth knowledge of the topic and understanding of the phenomenon. Finally, this study does not aim to predict results, but rather it aims to focus on observing practices which are currently followed in pharmaceutical supply chains, and identifying means of enhancing sustainability through this observation and further analysis.

The pharmaceutical sector was chosen as a business environment for this study due to its ongoing importance to the Swiss and global economy, and since it presents a unique supply chain that is distinguishable from others in the corporate business world. While the majority of the sample organizations chosen for this study are of Switzerland, this research may be considered an international study since Switzerland offers a very globalized environment when it comes to the business sector, as well as the fact that all the pharmaceutical companies considered in this study have global operations. Furthermore, a 2012 report by Science Industries mentioned that the Swiss chemicals and pharmaceutical companies have direct investments in more than eighty countries (Science Industries Switzerland, 2012, p. 14) (See figure 9), and therefore, and especially from a supply chain perspective, this illustrates the international effect the Swiss pharmaceutical sector may have in the global international market.

World map of direct investments

Swiss chemical and pharmaceutical companies have direct investments in more than 80 countries.

Figure 9: World Map of Direct Investments of Swiss Chemical and Pharmaceutical Companies (Science Industries Switzerland, 2012, p. 14)

In addition, this research was designed to consist of literature review to examine previous frameworks and form one that is suited to fulfill its purpose, in addition to the empirical research in form of interviews. Hence, it follows an inductive approach. As explained by Given, 'rather than beginning with a theory, and explanation or an interpretation and then seeking evidence to confirm, disconfirm or test (in a deductive mode), inductive thinking starts with the evidence- the particulars- and builds theories explanations and interpretations to reflect or represent those particulars. The close relationship between empirical observation and conceptual formation guides most inductive approaches' (Given, 2008, p. 15). Furthermore, 'the inductive process starts with research and then a search for patterns that then generates the theory', as explained by Thyer (Thyer, 2010, p. 33), which is the process this research follows through literature review and framework formulation, after which interviews are carried out with pharmaceutical supply chain professionals. Next, the collected data will be analyzed and coded to find patterns and trends, that would finally answer the research question. This followed inductive approach aims to present descriptive results, which would assist in understanding the phenomenon under study. The results of this study will contribute to the existing knowledge in sustainable supply chain practices in general, and sustainable pharmaceutical supply chain practices in specific and may assist in enhancing the currently followed performance measures. In addition, the results of this research, as well as the literature, may provide a basis for further research in the future.

3.5. Data Collection

3.5.1. Literature Review

To fulfill the objectives of this research and reach the aimed-for outcomes, multiple data sources were observed and utilized. In addition, these sources were examined to ensure that

an inclusive and comprehensive idea is formed on the topic, and at where it currently stands in the research field. The literature referred to in this research is therefore obtained from previously published sources including academic journals, articles, books, websites and business reports. In addition, the literature review was conducted carefully to follow a pattern of argument, and to ensure various opinions and theories are taken into consideration.

3.5.2. Primary Data

The primary data collected for this study was in the form of semi-structured interviews. As described by Schensul, Shcensul and LeCompte, 'The questions on a semi-structured interview guide are pre-formulated, but the answers to those questions are open-ended, and can be fully extended at the discretion of the interviewer and the interviewee, and can be enhanced by probes' (Schensul, et al., 1999, p. 149). The purpose of following this data-collection method was to allow the interview partners to elaborate on issues they believe to be important when it comes to the topic, and to enhance the flexibility of extending a topic to another, if deemed necessary during the course of the interview, which would therefore enrich the collected data. In addition, in semi-structured interviews, the questions are worked out in advance, but depending on the context of the interview, the interviewer is able to adapt the schedule from one interviewee to the next, through providing explanations, or omitting particular questions or adding further questions as appropriate with particular interviewees (BPP Learning Media, 2015, p. 153), which was suitable for this study since the interview partners covered various members of a pharmaceutical supply chain, ranging from manufacturers, distributors, business consultants, researchers as well as suppliers. Therefore, questions for each of these categories had to be adjusted to suit their business operations, and extract as much knowledge as possible from their fields of expertise. The primary contacts for interviews were supply chain professionals in various pharmaceutical companies

as well as experts in the sustainable pharmaceutical supply chain operations. The contacts were selected based on their contributions in published business reports, and contacted explaining the purpose and objectives of the study. In addition, the selected companies were chosen upon reviewing annual reports and previous business reports published by pharmaceutical researchers, to gain insight into companies that are active and interested in the topic of pharmaceutical supply chain in Switzerland. Furthermore, some of the participants referred others, who in their business opinion can add value to the results of this study, and provide the sought-after information. Emails were sent to potential participants, explaining the research objective, and requesting an interview partner. In some cases, initial informal telephone conversations were also carried out, to explain the nature of the study, and touching on potential discussion topics. Those phone calls, joined with the literature review and discussions with the research supervisor, presented the foundation for the interview guideline. Furthermore, a contact from Science Industries, whose contacts were sought through a published report on their website, assisted in reaching contacts in pharmaceutical companies who were identified as experts in the field of sustainable supply chain. Similarly, a contact from Pricewaterhousecoopers (PWC), whose contacts were likewise on a report published by PWN on pharmaceutical supply chain practices in Switzerland, connected the researcher to two PWC consultants, both of which are experts in the topic. Such contributions assisted the researcher in reaching the sought-after business experts, and enriched the data collected, through ensuring the right interview partners are contacted.

Interviews were conducted face-to-face with eight experts, and Skype calls were conducted with three experts, as shown in Table 1. In addition, two short interviews were conducted via email, since one of them was carried out with an additional source at Novartis, as

recommended by the Novartis contact during the initial face-to-face meeting, for follow up purposes. The second email interview was with a contact at Science Industries (the business association of the chemical, pharmaceutical and biotech industry in Switzerland), to gather some information on the business standards in general.

Sr. No.	Company	Contact	Duration	Mode	Location
1	Novartis	Head of Supply Chain Management	45 mins	Face-to-face	Zug
2	Novartis	Global Responsible Procurement (RP) Operations Manager	NA	Email	Basel
3	Biogen AG	Senior Director International Commercial Supply Chain	50 mins	Face-to-face	Zug
4	Pricewaterhousecoppers	Director and Team leader, Consulting / Sustainability & Climate Change	1 Hr. 15 Mins.	Face-to-face	Zurich
5	Galexis AG	Head Business Sector Services	55 mins	Face-to-face	Bern
6	Siegfried AG	Global Head IT, Business Excellence & Procurement Senior Vice President	50 mins	Face-to-face	Aargau
7	Interpharma	Director of Management team, Registration, Production, Quality, Environmental Protection	1 Hr. 15 Mins.	Face-to-face	Basel
8	Lonza Group	Vice President Global Strategic Sourcing, Supply Chain and Logistics	55 mins	Face-to-face	Basel
9	Alloga AG	Chief Executive Officer	1 Hr. 15 Mins.	Face-to-face	Bern

10	Glatt AG	Head of Business Development at Glatt Pharmaceutical Services	1 Hr. 15 Mins.	Skype Call	Basel
11	Science Industries	Environmental Protection & Responsible Care	NA	Email	Zurich
12	Pricewaterhousecoppers	Director, Supply Chain & Operations, Pharma Sector	1 Hour	Skype Call	Zurich
13	Roche	Procurement & Compliance	1 Hr. 15 Mins.	Skype Call	Basel

Table 1: Overview of Interview Partners (source: Own).

Most of the interview experts had a background from the pharmaceutical industry (with the exception of the contact from Science Industries), while all firms were Swiss, with global operations. In addition, all the firms contacted had regularly published sustainability reports or business reports that included sections on sustainability, related to the pharmaceutical industry. These interviews, ranging with durations from 50 minutes to 75 minutes, were utilized as tools to gain practical insights into the researched topic, and to provide an overview of supply chain practices followed in the pharmaceutical industry.

3.5.3. Secondary Data

In addition to the collected primary data, company sustainability reports were reviewed and analyzed to obtain further understanding of the topic on hand, and to provide an overview of the strategic and operational approaches deployed internally to enhance sustainability. Furthermore, reports published by industry service provider associations (such as Interpharma and Science Industries) were referred to and analyzed, to gain insight on current topics relating to sustainability in the pharmaceutical supply chains.

3.6. Data Analysis (Coding)

To avoid data loss and ensure all data is captured accurately, all interviews were recorded in audio format. In addition, a journal was kept during the interviews to note general impressions, and to "record any non-verbal contextual information while it is still in the researcher's mind" (Dahlberg & McCaig, 2010, p. 137). Once collected, the data was transcribed prior to analysis, to "help with the detailed searches and comparisons of the data" (Denscombe, 2014, p. 277). This was a necessary step for the qualitative content analysis which would follow, via a Computer-Aided Qualitative Data Analysis Software (CAQDAS), and accordingly, the interview transcriptions were uploaded into the a chosen CAQDAS software, ATLAS.ti. Next, and based on the research questions, the theoretical framework and the interview guide, codes were created, as displayed in Table number 2, which presents a summary of the created code names, as well as introduces a definition describing the meaning of each.

Sr. No.	Code	Meaning
1	Resources	Assets and tangible possessions of an organization, intangible belongings such as management expertise
2	Manufacturing Sites	Location where drug manufacturing takes place
3	Reputation	Collective judgments of an organization based on financial, social and environmental impacts attributed to the organization over time
4	Employees	Staff hired by an organization to perform tasks
5	Product Stocks	Number of products an organization owns in inventory
6	Institutional Pressures	Constituent groups, such as public agencies creating pressure on an organization
7	Regulations	Rules made and maintained by authorities
8	Patents	Licence giving the sole right to an organization to exclude others from making a drug or a drug component.
9	Audits	Official Inspection of an organization's practices or finances
10	Information Exchange	Sharing information and data across SC members

11	Transparency	Honesty and Openness in information sharing across SC members
12	Reliability	Accountability of the shared information between SC members
13	Stakeholders	All members involved in a pharmaceutical supply chain
14	Management	Decision makers and executives of the organization
15	Suppliers	Providers of manufacturing material or services required for production
16	Manufacturers	Makers of the drugs or drug components
17	Research & Development	Scientific research conducted to improve an existing drug or lead to the development of a new one
18	Procurement	Process of sourcing, agreeing terms and acquiring goods or services from external sources.
19	Logistics	Process of planning, implementing, and controlling the flow and storage of the drugs from originating point to point of consumption.
20	Seller	Agents authorized to sell the drug in the market
21	Social Sustainability	Business impacts, both positive and negative, on people, including patients, as well as the organization's staff
22	Working Conditions	Working environment and circumstances affecting labour in the workplace
23	Product Responsibility	Aspects of drugs that directly influence customers, such as health and safety, information and labelling, marketing, and privacy.
24	Environmental Sustainability	Business impacts on living and non-living natural systems, including ecosystems, land, air, and water.
25	Energy	Sources of power derived and consumed to produce light or heat or to work machines and vehicles
26	Waste	Discarded materials or drugs that are no longer fit for use
27	Economic Sustainability	Business impacts on the economic conditions of its stakeholders and on economic systems at local, national, and global levels.
28	Added Value	An improvement to the organization that makes it worth more than its tangible cost
29	Cost Reduction	Processes used by organizations to reduce their costs and increase their profits
30	Operational Challenges	Pressures associated with routine tasks of an organization or department
31	Strategic Challenges	Pressures that may have long-term effects an organization's likelihood of future success or ability to produce

32	Improvements	Approaches to help organizations redesign their existing operations to accomplish significant improvements, financially or from a sustainability perspective

Table 2: Coding Scheme (source: Own)

Those codes were created combining an inductive manner, through generating them from the data level, and a deductive manner, according to existing ideas referring to the theoretical framework, as deemed necessary during the process. Furthermore, the ATLAS.ti software assisted in noting data patterns, through observing the recurrence of codes, which at a later stage assisted in reaching thorough findings, as well as ensuring a comprehensive structure during the process of answering the research questions. According to Friese, a carefully conducted, computer-assisted qualitative data analysis increases the validity of research results (Friese, 2014, p. 1), which is an additional reason as to why ATLAS.ti was chosen as an analysis tool for this research. Therefore, the created codes were reflected upon rigorously, and analyzed in detail, to support the final outcome of a structured presentation and discussion of findings.

3.7. Validity and Reliability

Academic studies have emphasized the importance of rigor in research, and mentioned that "without rigor, research is worthless, becomes fiction, and loses its utility, and hence, a great deal of attention is applied to reliability and validity in all research methods" (Morse, et al., 2016, p.14). Therefore, special attention was given to emphasize the data was collected in a coherent manner. This included ensuring that the interview partners were selected to represent different stakeholders of a supply chain, including manufacturers, suppliers, distributors, agents and industry associations, to conclude a holistic assessment of the topic on hand, and to serve as a future step for further research. Furthermore, the performance measures that were selected in the theoretical framework earlier hereby, were thought to

provide consisted results when applied in numerous supply chain settings, since they are believed to present universal methods that can be appropriate in different setups. Hence, the reliability of this research is built on the belief that consistent results would be produced, as repeated measures are made. Furthermore, the choice of semi-structured interviews was considered an additional means to warrant reliability, since the questions were pre-formulated, and patterns were found in the interview partners' responses, to capture those topics that arise repetitively within the pharmaceutical supply chains, therefore implying their importance and value. However, one can argue that a researcher cannot be sure that there was no change in minor influences (such as attitude changes) which would lead to a difference in the responses (Golafshani, 2003, p. 599), which adds to the perplexity of this topic.

The subject of validity is of a more complex nature, as it relates to accuracy, and implies that the research methods measure what it is intended to measure, which may not always be easy to assess. Some researchers argue that validity is, for instance, influenced by the researcher's perception and understanding of validity (Creswell & Miller, 2000), and therefore, this perception is wholly dependent on the researcher's comprehension's choice of the model's assumption. This research aimed to minimize the threats to validity, as advised by Cohen et al., right at the design stage, through ensuring there are adequate resources for the required research, by interviewing multiple supply chain stakeholders, for example. Another followed means was through selecting an appropriate methodology of a qualitative design to answer the research question, in addition to selecting appropriate instrumentation for gathering the collected data, as explained both in the primary and secondary data collection methods (Cohen, et al., 2011, p. 198). Guba and Lincoln noted that "the criteria to reach the goal of rigor (in research) are internal validity, external validity, reliability and objectivity" (Guba & Lincoln, 1989, p. 234). Internal validity was of specific importance in this research, since a

consistent line of argument was established throughout the study. First, the research questions were formed and led to establishing a theoretical framework that fits. Secondly, the theoretical framework, as well as the research questions, comprised the base for forming the interview standards. The interviews as well as the secondary data collected in form of company and industry reports were then analyzed to reach the findings. Finally, the findings were linked back to the theoretical framework to conclude the research objectives. On the other hand, external validity may have not fully been guaranteed in this study, since it is unclear whether the results can be applicable in other contexts, for example, for non-pharmaceutical industry related supply chains. However, in a different setting, other outcomes may be reached when following this research design, that would still beneficial for that particular setup. Finally, Patton mentions that "triangulation strengthens a study by combining methods, such as using different kinds of data" (Patton, 2014, p. 247). In this sense, this research combined multiple data sources, in the form of the previously explained primary and secondary collected data, to strengthen the study, and therefore the findings and the outcome, at the final stage. Furthermore, the responses received from interview partners were compared, both to the other responses, as well as to the published reports, to validate the data as much as possible.

3.8. Researcher's Role

The role of the researcher is considered an important one, when conducting a qualitative study. To avoid bias and consequently arrive at objective and solid findings, the researcher needs to acquire a basic list of attributes. Such attributes, as listed by Yin, include being a good listener, through the interviews' phase. In addition, the researcher is advised to stay adaptive, so that newly encountered situations can be interpreted as opportunities, rather than threats. Furthermore, the researcher is advised to have a firm grasp of the issues being

studied (Yin, 2014, p. 73). These attributes were taken into consideration when collecting the primary data for this study. For example, the literature review conducted prior to the data collection phase, enabled the research to direct the interviews and ask relevant and current-topic questions to the interviewees. Furthermore, qualitative research requires a degree of experience on the part of the researcher, and stronger qualities of reflexivity (Ritchie, et al., 2013, p. 84). The researcher displayed those qualities through starting all interviews by clarifying what is meant by the term "sustainability" in this study to ensure the understanding of the topic, and by adapting certain interview questions according to the role of the interviewee, or according to the flow of conversation, to ensure as much relevant and valid data is collected. Questions were amended when interviewing business consultants, for example, since they provide a holistic view on the pharmaceutical industry, rather than an individual company's view, and therefore, can provide information on general practices and based on observations. Furthermore, prompts were used in the interviews. Those are the questions that "come directly from the researcher, rather than from what the interviewee has said, and are used when the researcher wants to ask the interviewee to reflect on something else" (Ritchie, et al., 2013, p. 209). This occurred as the interviews progressed, and as the researcher became more aware of the current issues and the relationship between several stakeholders for the pharmaceutical supply chain. Additional measures to ensure that the interview partners were comfortable were taken, such as starting by sending an email describing the research topic and objectives, and sending them a list of the questions prior to the interview, to familiarize them with the topics to be discussed. Furthermore, copies of the interview transcripts were sent to the interview partners once completed, to ensure the precision of the information collected, and that it was understood in an accurate manner. In addition, Lee mentions that "Because no method is bias-free, corroboration with multiple

methods implies negation of many biases" (Lee, 1999, p. 168), which was an additional reason the researcher followed a triangulation method when collecting the data.

3.8.1. Ethical Issues and Confidentiality

To ensure the confidentiality of the interview partners, all contributors and their respective companies were given the option to remain anonymous in the study. In addition, interview transcripts were sent to the interviewees once the interviews were concluded and transcribed. In two cases, the interview partners requested the removal of certain data, which was given as an example during the course of the interview, and contained product names or brand names. Such requests were respected and the information removed the transcripts as requested, to ensure a level honesty and trust is maintained between the researcher and the interview partners. In addition, the researcher promised all interview partners copies of the study findings at a later stage, as an appreciation token for their time and effort in taking place of this research. Finally, the researcher strained to conduct the research carefully, thoughtfully and correctly in terms of the set standards, in order to enhance the confirmability, dependability and credibility of the research findings (Miles, et al., 2014, pp. 64-65).

3.9. Delineations and Limitations

The choice of the interview partners was based on their relevance roles and experiences within the pharmaceutical supply chain, and the knowledge that such experience brings, which would assist in enriching the findings of the study. However, it was not always possible to secure an interview with the requested partner, and therefore the researcher interviewed only those partners who were available and willing to take part in this study. In addition, the researcher aimed to interview more than one of each of the supply chain stakeholder's, but in the case of pharmaceutical suppliers, only one interview partner, Glatt Pharmaceutical

Services, was available. Nonetheless, the researcher still included this partner in the data collection phase, considering other stakeholders played simultaneous roles (manufacturer and supplier, supplier and distributor), and therefore, the choice of this partner still was appropriate for this research objective. Furthermore, this may also serve as an indication for a further study, focusing on the pharmaceutical industry suppliers in the future.

Since the researcher conducted this study in a pre-set time frame, this was an additional limitation that may have affected some potential findings, and recommendations, at a later stage. Finally, the confidentiality of certain information, some of which were even discussed in the interviews, set a limitation to the data that was subsequently suitable for use for this research.

4. DISCUSSION OF FINDINGS

4.1. Introduction

In the first part of this chapter, the research questions will be addressed based on the interview findings and supplemented by the theoretical framework. Through discussing the findings, facts and evidence collected from theory and interviews will be presented, to provide a detailed understanding of the sustainability topic in the pharmaceutical supply chains. In addition, and since multiple data sources were used, including stakeholders' interviews, sustainability reports and theory, triangulation will be followed to propose arguments and highlight consistencies and variances in the data.

The first section will examine the sustainability dimension drivers, previously identified in the theoretical framework (Resources, Institutional Pressures, Stakeholders, and Information Exchange) and discuss whether or not these drivers were visible through the empirical research, to what extent, and the influence these drivers have on supply chain operations.

The second section will address the specifics of a pharmaceutical supply chain and highlight the main attributes that differentiate it from those in other industries. The following section will discuss the benefits and the added value of implementing sustainable supply chain operations and the positive influences, if any, that this may bring to the business. The fourth section will describe how pharmaceutical supply chains deal with different sustainability standards across different locations and regulations, and the means by which these differences are captured and measured. The fifth and final section will address the challenges and opportunities for improvement that pharmaceutical supply chains face when incorporating sustainable practices within their supply chain operations. These six sections will therefore discuss the four sub-questions of this research, and will ultimately assist in

answering the main research question of how to enhance sustainability within supply chain management.

4.2. The Sustainability Dimensions Drivers

This section will look into the four sustainability dimensions drivers, identified in chapter two as part of the theoretical framework, Resources, Institutional Pressures, Stakeholders, and Information Exchange, and assess their visibility in Swiss pharmaceutical companies, to what extent, and the influence these drivers may have on supply chain operations.

When it comes to raw materials, it is notable through the empirical research that pharmaceutical companies are often obliged to single-source some materials from the only available source, which may not always be the most sustainable one. In addition, the single-sourcing of certain products, such as antibiotics, seems to be centred in certain geographical areas, such as Hyderabad in India, and is resulting in environmental and health impacts that seem to have no solution at the moment. As described in the interview with Dr. HVS from Roche:

"*With India, regardless which antibiotic you take, you will find that the vast majority of them is manufactured today by a number of companies in the Hyderabad area. And they need to follow strict GMP compliance requirements, and they have also other strict requirements, like, they must not produce any liquid outlets, and still it happens that you can almost detect every single antibiotic in the river water downstream, from the plants. There is, of course, the reason also that people and the population do not have sufficient education on how to safely and properly use antibiotics, and if they overdose, if they dispose of antibiotics, then they may end up in the water closets and go down the drain, and that way arrive in the rivers. That creates a new problem, and the problem is that you will have then the creation of multi-resistant*

bacteria that are resistant to all antibiotics. We are creating a problem here that the industry has currently no simple solution to" (Interview No. 13, Lines 30-40).

On the other hand, while one can argue that single sourcing may not be the most efficient sourcing method, it may sometimes be unavoidable, such as when the products are still under patent, or when there are no other sources. This was mentioned by Mr. Koester, from PWC, when he said: "*if (sic. a product) is still in license, and patents have not expired, then, this by itself already limits the number of potential suppliers*" (Interview 12, Lines 105-106). Annual reports of some companies also mentioned that sourcing and manufacturing are spread in areas worldwide, and focused in geographical areas such as India, China and Taiwan, (Lonza, 2017), (Siegfried Annual Report 2016, 2017)which provokes thoughts about the sustainability of these sources, and how compliant they are when compared to local Swiss sources.

Reputation is also considered an important resource when it comes to the pharmaceutical industry. Companies are more aware of stakeholders' judgement, be it shareholders or consumers, when it comes to their sustainable operations in general. This may be one reason why companies are reporting their sustainable operations as main sections of their annual reports. For example, Mr. Neubaur, from Siegfried, mentioned that "*If I now look into the market, and see what is going on there, we see that normal customers are asking questions (about sustainability) and want to assure by doing so, (…) not only our part but also our suppliers do finally fulfil certain standards*" (Interview No. 6- Lines 33-39). Furthermore, the reputation of pharmaceutical companies, becomes a crucial factor in supplier selection, whereby companies ensure only suppliers that abide with sustainability measures in their operations are dealt with, to ensure that the company's own reputation is not tarnished by association. This notion was sensed in each of the carried-out interviews, whereby business experts mentioned supplier selection is heavily related to the suppliers' sustainability

awareness in their operations, as well as their reliability and reputation. The reason being, as mentioned by Dr. Pfenninger from Interpharma: "*First of all the companies not to run into problems with their reputation, they tend to go with suppliers and contractors which are as reliable as themselves*" (Interview No. 7- Lines 295- 296), and went on to explain that one of main audits, which suppliers go through in the pre-selection phase, is an environmental audit, ensuring all operations are managed sustainably.

Employees, another resource of a pharmaceutical company, can also play a role in ensuring sustainable operations within supply chain. Some companies have created platforms whereby employees can submit sustainable ideas, leading to savings for the company, and furthermore, whereby the employees with any compliance concerns can speak up through different channels and express those concerns. Roche, for example, has reported in their 2016 annual report that "10 agreements with business partners were terminated on the grounds of unethical behaviour, in 2016, based on compliance feedback from employees" (Roche, 2017, p. 101) which indicates that employees feedback plays a role in investigating and taking action against suppliers or business partners that may not be compliant, including sustainability measures' compliance.

As mentioned earlier, resources are defined broadly and can cover nearly anything associated with a firm. However, the above resources were listed specifically as it was noted they were most dominant in the interviewee answers and in annual reports, and since other resources may be discussed in the following sections.

For the purposes of discussing the findings of this research, regulations as set by the authorities and industry were considered part of the institutional pressures that drive sustainability in the Swiss pharmaceutical industry. Additionally, The Responsible Business Initiative was given as an example of an institutional pressure in the interview questions, since

it is a current topic, and is an example of the power that agencies or groups can impose on businesses. While most interviewees in the pharmaceutical supply chains claim that such an initiative would not bring much change to their business operations since they already operate in a sustainable manner, business experts from consulting agencies such as PWC or research institutions like Interpharma implied that such an initiative might have big impacts on pharmaceutical companies and their supply chains, such as headquarters relocating to other countries or that the supplier qualification processes might be affected and result in some suppliers' change (Interview No. 7, Lines 486- 487; Interview No. 12, Lines 119- 124). Furthermore, the pharmaceutical supply chains are heavily affected and driven by regulations, whereby supplier selection is not only dependant on sustainability audits carried out by supply chains, but also, "*based on whether or not those suppliers operate within Switzerland's regulations in general, which already provide a high sustainability standard*" (Interview No. 9, Lines 200-201). Other regulations that have an impact on the pharmaceutical supply chain operations include following global distribution practices, following the clear rules on temperature and tracking such issues (when transporting drugs), and recording these temperatures (Interviews 1, 3, 5 and 7), as well as the fact the pharmaceutical supply chains have to abide with the regulations in each and every country in which they work (Interview No. 7, Lines 106- 108), which may add to the complexity of the operations, depending on the size of their global footprint. Some organizations, such as Biogen, for example, have even introduced a "Global Serialization Program to meet the increasing global regulatory requirements for managing supply chain operations, in a secure and a traceable way" (Biogen, 2017, p. 58).

As such, one can argue that institutional pressures and regulations as such are obvious drivers for sustainable performance, since supply chain operations are highly affected by the presence of regulations, and sustainability standards.

As indicated earlier in previous literature, stakeholders may play a vital role in an organization's supply chain strategic decisions, including those relating to sustainable supply chain decisions. In discussing the stakeholders' effect on such decisions with the interviewees, this influence was mentioned, and became even more evident. On its "Supplier Code of Conduct" website, for example, Roche, mentions that "it promotes innovation and strives for economic, social and environmental sustainability in order to ensure the long-term success of Roche and its stakeholders" (Roche, 2017). A number of business experts also discussed the positive effects of business collaborations across several stakeholders, especially sharing supplier audit results across those stakeholders (Interview No. 4, Lines 227- 232; Interview No. 6, Lines 181- 183), which is one of the services that Interpharma, as a research association and a stakeholder in the pharmaceutical industry, actually offers (Interview No. 7, lines 389-394). Such collaborations, if followed, may prove to be a more effective way of auditing suppliers or distributors than each stakeholder carrying out all audits on their own, and may assist with the lack of transparency between some suppliers and supply chains. Another form of collaboration can be gained through pharmaceutical companies joining initiatives such as PSCI (The Pharmaceutical Supply Chain Initiative), under which member companies have agreed on common principles of sustainable supply chain, written down in the PSCI principles, and the related implementation guidance, offering even to educate their suppliers (Interview No. 13, Lines 57- 59). Other organizations, such as Science Industries, through its Responsible Care Program, liaise between different authorities and the pharmaceutical companies, to

enhance the environmental sustainability standards across these companies (Interview No. 11, Lines 25- 29), (Interview No. 4, Lines 57- 59).

On the other hand, the presence of too many stakeholders, such as many health system regulators, may present a challenge for some pharmaceutical supply chain players, as expressed by one business expert: *"...and for the pharmaceutical industry it's a challenge to discuss, to negotiate with all the health care systems, because you cannot just discuss with one. And then it will be applied to all the countries, so you have to go through a very complex release process, to get the product on the market*", (Interview No. 9, lines 147- 149). But whether the stakeholder conversation is of positive collaborations, or if it presents a challenge, clearly it indicates an impact on business operations, and that can also extend to sustainability operations within the supply chain.

Additionally, one main topic that came up during the interviews was the lack of transparency between supply chain stakeholders, especially on issues of information exchange between suppliers and procurement departments. It is not always easy to provide a clear picture on what really takes place, especially from a sustainability perspective. (Interview No. 4, Lines 232- 235; Interview No. 7, Lines 376- 381). One business expert described one benefit of sharing information across multiple supply chain stakeholders, on the issue of supplier sustainability standards, as eliminating suppliers whose standards are below the required norms (Interview No. 6, Lines 185- 190). This in turn applies collective pressure on other suppliers to abide to sustainability standards.

These were all visible topics during the conversations with the business experts, as well as when examining sustainability reports, therefore making it apparent that these are indeed drivers of the sustainability dimensions and measures followed by the pharmaceutical supply chains in Switzerland.

4.3. The Specifics of a Pharmaceutical Supply Chain

The Pharmaceutical Supply Chain is rather complex in its nature, due to several factors such as long product development lead times, and the involvement of multiple supply chain networks. Those networks are illustrated in the below figure:

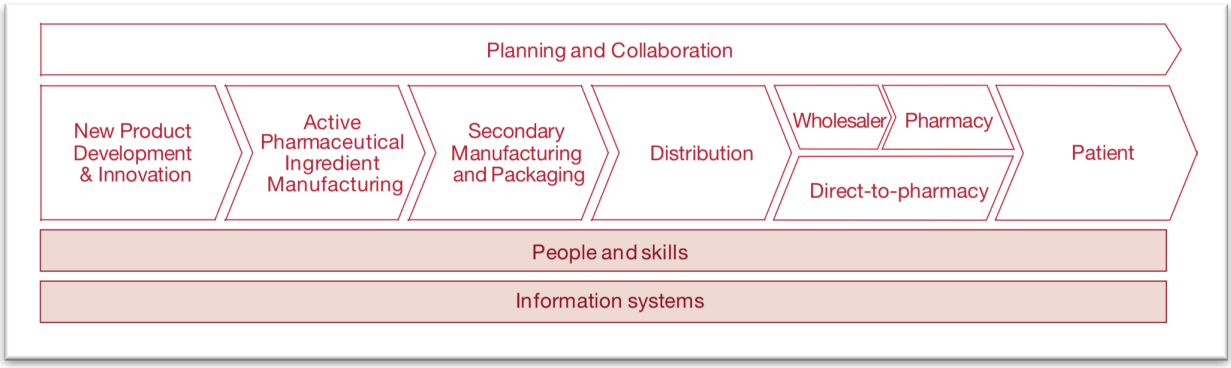

Figure 10: Example of a generic Pharmaceutical Supply Chain (Pricewaterhousecoopers, 2011, p. 3)

The above image displays the pharmaceutical supply chain relationships for all the participants and activities required from the development phase of the drug, until delivery to the patient. This indicates that each of these players, therefore, relies on their own supply chains, when playing their role in moving the drug forward through each phase, which further increases the complexity. Furthermore, as explained earlier, the heavily regulated nature of the pharmaceutical industry, as well as the differing regulations between one country and another, are additional factors adding to the complexity of pharmaceutical supply chain operations.

In the interviews with industry experts, many of the interviewees agreed that the individual pharmaceutical supply chain organizations differ in their characteristics and specifics, depending on the type of product or service that is offered, e.g. different means of production between over the counter products, generics, or hardware, or when the produced drug follows a cold chain, for example, requiring specific temperatures during production, transportation and distribution, as well as track and trace requirements tracing back the

product into batches (Interview No. 4, Lines 46- 54; Interview 12, Lines 11-14). Furthermore, one business expert explained the multiple locations of production, starting from the pre-product phase and until the final product is ready and takes its final shape (which again may vary):

"*When we start where the pharmaceutical molecule begins, it's with the synthesis of the product, … which go through 20-30 steps of synthesis and .. are not made in one single location. So, the product, or the pre-product, might be shipped around during that stage of the production process (…). When we have the active pharmaceutical ingredient (API), (…) It is then somewhere stored, it's released for the next step of production. In the biotechnical, biotechnological manufacturing it's a little bit different. (…). The API is then shipped to the next site. This might be in a completely different geographical region, where you do then the production of pharmaceutical form, so when its liquid form then it's going into vials, it's going into pre-filled syringes, those might be in different locations, or it might be in the same location. When we have a product, which goes into a solid form then you can have tablets, you can have capsules, there is also powder which is sterile filled, which is then a very different form, (..) So, we have all sizes, dedicated, multi-purpose and different locations, product is shipped around between, so it's really multi-faceted, it's not unique and you have all kind of aspects and complexitie*s". (Interview No. 7, Lines 39- 77).

These differences and unique characteristics across such phases as production, transportation and distribution, along with the various regulations and legislations that pharmaceutical supply chains have to abide with depending on the locations, add to the complexity of the pharmaceutical supply chain. Furthermore, many of the interviewees referred to the pharmaceutical industry as 'heavily regulated' and that compliance with these regulations forces the supply chain to be less agile or lean than when compared to other

industries (Interviews 3, 5, 7, 8, a0, 12 and 13). The heavy regulated nature of the business, due to the sensitivity of its products, translates into less innovation in the provision of supply chain services at times, and may also lead to limited room for enhancements and improvements, due to the tight restrictions imposed upon on it. On the other hand, those regulations also ensure that the supply chains are run according to very high industry standards that do not compromise on the quality of the drugs, and therefore, on the health of the industry. This is borne out by comments from several interviewee partners, who highlighted that supply chain operations are generally run under high and strict GMP (Good Manufacturing Practice) and GDP (Good Distribution Practice) guidelines (Interviews 1, 3, 4 and 13).

In addition, some interview partners expressed another unique characteristic about the pharmaceutical supply chain, by stating that since the pharmaceutical industry is a highly profitable one, "*to secure supply is more important than to bring down the cost*" (Interview No. 6, Line 119; Interview 13, Line 189). Therefore, while the focus in procurement negotiations, for example, in other industries may be on cost reductions, the same is not applied when referring to the pharmaceutical supply chains, due to the high profitability which allows a certain cost flexibility, as well as the highly sensitive nature of the sourced products, and the strictly no-quality-compromise policies followed. However, a counter argument was presented by another business expert who stated that the pharmaceutical production is characterized by batch and bulk production, and that this means that decisions have to be taken carefully to determine how big the batches should be, and optimize stocks, since changing production form one product to the other might require large investments in setup costs (Interview No. 9, Line 122- 131). This brings into question the profitability of the pharmaceutical industry. One may argue that this is determined by the product portfolio of a

pharmaceutical company, as well as its patent ownership, all of which are additional factors that make the pharmaceutical supply chain a rather unique and exceptional one, when compared to other industries.

4.4. The Added Value of a Sustainable Supply Chain

Since the pharmaceutical supply chain is a highly complex one, driven by multiple resources and influencing factors, and dependent on external parties such as regulators, legislators and other stakeholders, it is important to note the role it plays in an organization, and the value it brings into that organization through implementing sustainable supply chain operations.

Through an overview of the annual reports of pharmaceutical companies, it is noted that sustainability reports mention the added value of sustainable supply chains mostly in terms of setting up codes for conducting business, selecting suppliers and evaluating their performance based on their sustainability performance, and their responsible actions in compliance with economic, social and environmental standards, (Biogen, 2017, pp. 46, 64); (Siegfried Annual Report 2016, 2017, p. 77); (Roche, 2017, p. 101) ; (Novartis Group, 2017, p. 48) and mention that supply chains "Maintaining sustainability standards in the delivery chain represents an elementary value adding factor" (Siegfried Annual Report 2016, 2017, p. 77).

However, when it came to the interview analysis, most interview partners mentioned the most apparent value added of a sustainable supply chain in terms of the economic sustainability dimension through cost reductions, while some mentioned 'sustainability' as a means for sustained production. Reference was also made to supplier evaluation as one of the added values that a supply chain brings, among others, as explained hereafter.

When it came to cost reductions, several interview partners indicated that this was the main responsibility of a supply chain, especially when it comes to procurement department. In fact, one partner mentioned that the primary criterion for supplier selection was "*price, price,*

price" (Interview 6, Line 213). Other business experts indicated that cost savings for the company as a whole, as well as effective supply chain management are main value adds that a supply chain can bring into a company, thereby focusing on economic sustainability (Interview No. 4, Lines 72- 74; Interview No. 8, Lines 70-73). Another business expert gave an example of an added value to the organizations as facilitating logistics services and centralizing warehouses (Interview 5, Lines 76- 82), therefore saving costs of managing multiple locations or outsourcing several logistics service providers.

One can argue that supply chains in general focus on cost reductions and running operations in an optimum way to increase savings and centralize efforts. This focus in the pharmaceutical industry may be even more evident, due to the single sourcing practice that is unavoidable in some instances, as mentioned earlier, due to patent rights and limited resources, which may apply even more pressure into cost reductions in other areas, where possible.

From an operational perspective, many business experts expressed that their understanding of an added value of a sustainable supply chain was in keeping a continuous production and ensuring no stock-outs; continuous, stable delivery of the products, as well as maintenance of inventory, and safety stocks, and even providing backup solutions when needed. All were seen as sustainable attributes of a sustainable supply chain operation (Interview No. 1, Lines 36- 40). In addition, fulfilling market demands as well as risk management for materials, in terms of controlling and maintaining a smooth transfer from the initial stage of raw materials sourcing, through production, packing and finally distribution, were also seen as added values that a sustainable supply chain brings into a pharmaceutical supply chain (Interview No. 7, Lines 108- 109; Interview No. 12, Lines 17-24; Interview No. 10, Lines 43- 53).

These responses were collected despite explaining to the interviewee partners that reference to sustainability in this research refers to the three sustainability dimensions, (economic,

social and environmental) and brings to attention the difference in management perspectives of supply chain sustainability, as expressed in sustainability reports provided to the public, and the operational executives as part of their daily operations, as there seems to be a gap between both perspectives. This gap may be understandable, at times, due to the faced operational pressures, and having to deal with daily challenges and tasks, however, it may also indicate room for improvement of sustainable operations.

Finally, it was noted that many interview partners referred to supplier selection criteria, and ensuring supplier compliance to regulations as well as codes of business as added values of a sustainable supply chain (Interviews 1, 3, 4, 6, 7, 13), all of which were in accordance with what was mainly mentioned in the company sustainability reports.

4.5. Dealing with Suppliers in Different Locations

In an attempt to compare the different means by which pharmaceutical supply chains deal with different sustainability standards across different locations and regulations, the annual reports of the pharma companies were analyzed, as well as the responses received by the interviewed business partners.

Most pharmaceutical supply chains referred to audits as their most common standard of evaluating sustainable operations of their suppliers, as was clearly noted in the annual reports. Those audits, as mentioned, would be “carried out periodically at supplier locations” including interviews with the suppliers, continuous monitoring of the quality of the supplied material and inspections of suppliers’ production sites (Siegfried Annual Report 2016, 2017, p. 78). Other companies mentioned that those audits are conducted routinely, to ensure that they continue to meet sustainability standards (Lonza, 2017), and that they are transformed into assurance visits, when needed (Roche, 2017, p. 100).

In the discussions on those audits with the interview partners, it was explained that they are run either internally (through internal audit departments) or externally (through audit service providers) depending on required capacities (Interview No. 1, Line 43), and that those audits are usually carried out on supplier site, and enclosed in the form of a contractual framework thereafter (Interviews No. 3, 6, 7, 9, 10 and 13). Furthermore, several suppliers also mentioned that the decision to carry out those supplier audits is mandated for suppliers in locations where sustainability standards may differ, such as China and India (Interview No. 6, Lines 65- 67; Interview No. 8, Lines 1780 179) or because of the critical nature of the purchased products (Interview No. 3, Lines 475- 477).

Other means of managing supplier sustainability standards across different locations included running due diligence when selecting new suppliers, ensuring suppliers' adherence to codes of conduct and contractual requirements, site visits and educating and working with suppliers on the findings of such practices (Interviews No. 2, 6, 7, 8, 10 and 13). Some interview partners mentioned they rely on suppliers' certifications, such as ISO or EcoVadis ratings (Interview No. 6, Line 59; Interview No. 9, Line 195), while others also mentioned that they rely on the suppliers' compliance to the regulations of the country where they operate, as an assurance of their sustainable operations' standards (Interviews No. 6, 7 and 9). This may seem to be an effective way of monitoring suppliers' sustainability performance, especially due to the heavily regulated nature of the pharmaceutical industry. However, suppliers' compliance to the regulations of the country where they operate may be considered more convenient when evaluating suppliers that operate in countries of high sustainability standards, such as Switzerland, and less effective in other regions of the world, such as India or China, where the regulations are less strict and less adhered to. In fact, one of the supplier gave an example of how realistic are the GMP compliance requirements in areas like Hyderabad, since they need

to be followed there, however, due to the lack of safety education and proper disposal, there still seems to be consequences of misconduct in the region (Interview No. 13, Lines 30- 36).

When it comes to audits, however, a counter argument that came up from several interview partners was the extent to which these audits are actually effective, when run by external auditors, as auditors can only audit and evaluate what they have access to. Since transparency in information exchange is an ongoing issue in pharmaceutical supply chains, as mentioned earlier, then the effectiveness and reliability of those audits remains to be questioned (Interviews No. 3, 6 and 8). Furthermore, another criticism of external audits to supplier sites maybe the lack of cultural understanding or political environments of the norms of the country where the supplier operates, especially when it comes to social issues such as working conditions, minimum wages, or child labor, understanding that the differences in those topics are vast between the Western and the Third World's perspectives. Therefore, what might be considered 'unsustainable' on one end, may be viewed as normal and accepted on the other.

4.6. Challenges and Opportunities

The complexity of the pharmaceutical supply chain presents many challenges when attempting to incorporate and enhance sustainability within its operations. Through discussions with the interview partners, it became apparent that one of the main challenges that face those attempts was the lack of transparency preventing effective and appropriate information exchange across the supply chain stakeholders.

One interview partner mentioned that the biggest challenge was '*Understanding and mapping how each player/supplier are linked to another*' (Interview No. 2, Lines 13-14), which may be rooted back to the transparency issue. Especially when it comes to suppliers revealing their own sources (such as second and third tier suppliers), information is not easily exchanged and such sources are seldom revealed, for confidentiality reasons (Interview No.

4, Lines 259 -263; Interview No. 8, Lines 141- 146). This lack of transparency may be extended to include information exchange between distributors and production, when it comes to packaging, or lack of communication, in general, across different players within the supply chain (Interview No. 5, Lines 205- 208; Interview No. 10, Lines 163- 164).

However, this drawback in information exchange and the lack of transparency may be taken advantage of, and transformed into opportunities for improvement, through collaborations across different supply chain stakeholders. Several interview partners mentioned that their organizations are members of supply chain platforms that provide information sharing services (such as PSCI) or supplier sustainability ratings (such as EcoVadis) (Interviews 2, 3, 4 and 11). Other forms of collaboration that may be beneficial in terms of enhancing sustainability include collaboration in utilization of facilities, or distributor collaborations with other industries that require similar transportation environments, such as the food or media industries which would reduce the carbon footprint of the transportation vehicles through less usage (Interview No. 3, Line 110; Interview No. 5, Lines 300- 313).

In addition, enhancing supplier sustainability evaluation methods is another area which can be improved, potentially through automation of the used systems and tools or through using risk-based approaches that can be streamlined across all suppliers rather than self-assessment tools or questionnaires, as well as sharing supplier sustainability audit results with other companies, depending on the severity of the audit results (Interview No. 4, 6, 8 and 10).

Finally, due to the importance of the pharmaceutical sector and its relation to public health and provision of medication, big player companies of the pharmaceutical industry, such players can use their influence and reputation to initiate discussions on regulatory changes in countries with lesser sustainability standards where they operate (Interview No. 3, Lines 242- 250; Interview No. 4, Lines 252- 256).

5. RECOMMENDATIONS

In this section, additional recommendations for enhancing sustainability in the pharmaceutical supply chain will be presented, based on the findings both from the literature review, as well as the empirical research and will be presented in accordance with the sustainability measures defined earlier in the theoretical framework of this study, and based on their presence, or its lack thereof, as per the empirical research findings. Furthermore, these recommendations will be presented based on the three sustainability dimensions: Economic, Environment, and Social.

1) Economic sustainability in the pharmaceutical supply chain may be enhanced through collaborations with other companies, in terms of the utilization of facilities, for example, or distributorship collaborations. Such collaborations would assist in reducing supply chain management costs (as well as profit maximizations), such as warehouse rentals or vehicles' cost, through sharing these costs across collaborators. Furthermore, pharmaceutical supply chains may additionally consider shifting towards increasing sea-freight, instead of commonly used air-freight, which would not only reduce costs, but also enhance environmental sustainability through minimizing carbon footprints. Although sea-freight options require more time than air-freight, it should still be manageable to use, with proper planning, and especially for non-critical drugs.
2) Environmental sustainability in the pharmaceutical supply chain may be enhanced through reducing energy consumption levels, such as through the aforementioned air-freight shipping options, as an example. It is noted that the annual reports of pharmaceutical companies mostly refer to the efforts in minimizing waste, as well as quality certifications. However, enhancements are still possible, especially in countries

with lesser environmental sustainability standards. Here, pharmaceutical companies can use their presence, power and reputation as resources to influence legislators and regulators into enhancing the environmental conditions under which production and delivery takes place. Pharmaceutical companies can also enhance sustainability in their supply chain operations through guiding their suppliers in these regions into better sustainable operations, and requiring transparency by the suppliers from their own second and third tier suppliers, to ensure the entire supply chain is operating in an environmentally responsible and sustainable manner.

3) Finally, when it comes to social sustainability in the pharmaceutical supply chain, all pharmaceutical companies in Switzerland provide decent working conditions for its employees, in accordance with the country's regulations. Those companies can work with their supply chain partners in other regions, and assist them in enhancing such work conditions for their own staff. In addition, and when it comes to supplier on-site visits and audits in other regions, proper cultural training should be provided to the supply chain members prior to such visits, to ensure a better understanding of the norms, environment and standards in those other locations, and to work with the suppliers on the audit results in an optimum manner.

Such recommendations, in addition to previously mentioned enhancements such as improving information exchange across the supply chain, ensuring continuity in drug stocks and conformance to regulations could all be means to enhancing sustainability in the pharmaceutical supply chain.

6. CONCLUSIONS AND FURTHER RESEARCH

6.1. Conclusion

The Pharmaceutical Supply Chain is complex in nature, and differs in its operations and processes based on which products are being produced. These complexities and differences are critical to consider when developing means for enhancing sustainability within the supply chain operations. This study looked into the different drivers that influence sustainability in the pharmaceutical supply chain, and referred to known organizational theories to study the extent of these influences.

The research overall findings answered the research question and its sub-questions, through providing descriptions of the pharmaceutical supply chain, which emphasized its main characteristics that make it unique, in comparison to other industries. Furthermore, an explanation of the value it adds was presented, as understood by the interview partners, all of whom are supply chain stakeholders, which provided an insight to the perception of the same from a practical perspective. Similarly, an understanding of the different means by which suppliers are dealt with in multiple locations was presented, and finally, a summary of the opportunities and challenges that face the pharmaceutical supply chain was presented. All of these findings and insights provided a base for the final recommendations of this research, which assisted in answering the research main question on enhancing sustainability within the pharmaceutical supply chain.

Accordingly, the research presented recommendations for enhancing economic, environmental and social sustainability within the pharmaceutical supply chain, keeping in mind its main drivers, as well as the conditions under which it operates. This research indicated earlier in the literature review that previous research has focused on the economic and environmental aspects of sustainability within the supply chain, with less attention given

to the social dimension. The empirical research has indicated that the same applies to the understanding of the supply chain stakeholders and decision makers, as more attention is seemingly given to the economic and environmental dimensions in comparison to the social one, and indicating accordingly that there may be a considerable room for improvement in that direction.

Finally, the research concluded that due to the heavily regulated nature of the pharmaceutical industry, as well as conforming to varying regulations across multiple regions, there seems to be a tendency to be less innovative and less flexible when it comes to enhancing sustainability, when compared to other industries. While this is understandable, due to the sensitive nature of the pharmaceutical products, there are still ways to enhance flexibility and give way to even more sustainability within the supply chain operations, under those regulations.

6.2. Contribution to Academic Literature

This research may considerably contribute to business research in realizing what drives sustainability within pharmaceutical supply chains, as well as shedding light on what measures may be taken to enhance and improve it. Furthermore, this research provides practical insight from multiple Swiss pharmaceutical companies, whereby sustainability standards are relatively high, yet, displays how there are always additional measures that may be taken for improvement. Finally, this research emphasizes how complex the pharmaceutical supply chain, and how more efforts are needed to enhance the social sustainability aspect of the industry.

6.3. Suggestions for Further Research

Based on the findings of this research, multiple future research projects may be considered, in the aim of further enhancements of sustainability in the pharmaceutical supply chain, and include:

- The topic of transparency and information exchange between Supply Chain stakeholders was clearly visible in this research, and seems to have considerable influence on enhancing sustainability. Therefore, future research focusing on transparency within the supply chain players, including transparency through second and third tier suppliers, may prove to be beneficial, in hopes of developing means of enhancing it.
- A debate on the effectiveness of audits and self-assessments of suppliers to the pharmaceutical supply chain was visible through empirical research, raising questions on whether the current means of supplier sustainability audits are sufficient, or are they merely carried out as a mandatory requirement without real benefits to the practice. Therefore, future research on developing frameworks to enhance supplier audits and discussing detailed means of doing so may assist in the bigger question of enhancing sustainability within the supply chain.
- Finally, it becomes evident through this research that the pharmaceutical supply chain differs depending on the type of production it is involved in (Generics vs. Off the counter drugs, for example). Future potential research may highlight those differences, and tailor means of enhancing sustainability of either product as best fits its relevant supply chain operations.

7. BIBLIOGRAPHY

Ahi, P. & Searcy, C., 2013. A Comparative Literature Analysis of Definitions for Green and Sustainable Supply Chain Management. *Journal of Cleaner Production,* Aug, Volume 52, pp. 329-341.

Angulo, A. & Nachtmann, H., 2004. Supply Chain Information Sharing in a Vendor Managed Inventory Partnership. *Journal of Business Logistics,* 25(1), pp. 101- 120.

Awaysheh, A. & Klassen, R. D., 2010. The Impact of Supply Chain Structure on the Use of Supplier Socially Responsible Practices. *International Journal of Operations & Production Management,* 30(12), pp. 1246- 1268.

Bag, S., 2014. Impact of Sustainable Supply Chain Management on Organization Performance: Mediating Effect of Leadership. *Indian Journal of Management Science,* Dec, 4(3), pp. 10-25.

Barney, J., 1991. Firm Resources and Sustained Competitive Advantage. *Journal of Management,* 17(1), pp. 99- 120.

Barney, J. B., 1991. Firm Resources and Sustained Competitive Advantage. *Journal of Management,* 17(1), pp. 99-120.

Biogen, 2017. *2016 Global Impact Report,* s.l.: Biogen.

BMI Research, 2016. *BMI Research.* [Online] Available at: https://search.proquest.com/docview/1792732088/37206700EFA44831PQ/2?accountid=15920 [Accessed August 2017].

BPP Learning Media, 2015. *Business Essentials Research Project: Study Text.* Illustrated ed. s.l.:BPP Learning Media.

Campbell, J. L., 2007. Why Would Corporations Behave in Socially Responsible Ways? An Instituitional Theory of Corporate Social Responsibility. *Academy of Management Review,* 32(3), pp. 946-967.

Carroll, G. R. & Delacroix, J., 1982. Organizational Mortality in the Newspaper Industries of Argentina and Ireland: An Ecological Approach. *Administrative Science Quarterly,* Jun, 27(2), pp. 169- 198.

Carter, C. R. & Easton, L. P., 2011. Sustainable Supply Chain Management: Evolution and Future Directions. *International Journal of Physical Distribution & Logistics Management,* 41(1), pp. 46-62.

Charles, A., Lauras, M. & Luk, V. W., 2010. A Model to Define and Assess the Agility of Supply Chains: Building on Humanitarian Experience. *International Journal of Physical Distribution & Logistics Management,* 40(8/9), pp. 722-741.

Christopher, M. & Peck, H., 2004. Building the Resilient Supply Chain. *International Journal of Logistics Management,* 15(2), pp. 1-13.

Cohen, L., Manion, L. & Morrisson, K., 2011. *Research Methods in Education.* 7th ed. New York: Routledge.

Connelly, B. L., Ketchen, D. J. & Slater, S. F., 2011. Toward a "Theoretical Toolbox" for Sustainability Research in Marketing. *Academy of Marketing Science. Journal ,* Feb, 39(1), pp. 86- 100.

Coombs, G., 1973. Networks and Exchange: The Role of Social Relationships in a Small Voluntary Association. *Journal of Anthropological Research,* Jul, 29(2), pp. 96-112.

Cooper, M. C., Lambert, D. M. & Pagh, J. D., 1997. Supply Chain Management: More Than a New Name for Logistics. *The International Journal of Logistics Management,* 8(1), pp. 1-14.

Council of Supply Chain Management Professionals, 2017. *CSCMP Supply Chain Management Definitions and Glossary.* [Online] Available at: http://cscmp.org/imis0/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx?hkey=60879588-f65f-4ab5-8c4b-6878815ef921 [Accessed 9 Aug 2017].

Creswell, J. W. & Miller, D. L., 2000. Determining Validity in Qualitative Inquiry. *Theory into Practice,* 39(3), pp. 124-130.

Dahlberg, L. & McCaig, C., 2010. *Practical Research and Evaluation: A Start-to-Finish Guide for Practitioners.* 1st ed. London: SAGE Publications Ltd..

Denscombe, M., 2014. *The Good Research Guide: For Small-Scale Social Research Projects.* 5th Edition ed. Berkshire: McGraw Hill House.

DiMaggio, P. J. & Powell, W. W., 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review,* Apr, 48(2), pp. 147-160.

Embassy of Switzerland in the People's Republic of China, 2017. *China 2016 Final Economic Report,* Beijing: The Swiss Confederation.

Fan, Y. & Xiongfei, Z., 2017. The Impact of Sustainable Supplier Management Practices on Buyer-Supplier Performance: An Empirical Study in China. *Review of International Business and Strategy,* 27(1), pp. 112-132.

Forrester, J. W., 1958. Industrial Dynamics a Major Breakthrough for Decision Makers. *Harvard Business Review,* 36(4), pp. 358- 368.

Freeman, R. E., 2001. *Stakeholder Theory of the Modern Corporation.* [Online] Available at: http://academic.udayton.edu/LawrenceUlrich/Stakeholder%20Theory.pdf [Accessed 12 Sep 2017].

Friese, S., 2014. *Qualitative Data Analysis with ATLAS.ti.* 2nd ed. s.l.:Sage.

G4 Global Reporting, 2017. *G4 Sustainability Reporting Guidelines.* [Online] Available at: https://g4.globalreporting.org/specific-standard-disclosures/social/Pages/default.aspx [Accessed 12 Sep 2017].

Galaskiewicz, J., 1991. Making corporate actors accountable: Institution-building in Minneapolis-St. Paul. *The New Institutionalism in Organizational Analysis,* Volume 293, p. 310.

Given, L. M., 2008. *The Sage Encyclopedia of Qualitative Research Methods.* s.l.:Sage Publications.

Golafshani, N., 2003. Understanding Reliability and Validity in Qualitative Research. *The Qualitative Report,* 8(4), pp. 597-606.

Golicic, S. L. & Smith, C. D., 2013. A Meta- Analysis of Environmentally Sustainable Supply Chain Management Practices and Firm Performance. *Journal of Supply Chain Management,* Apr, 49(2), pp. 78-95.

Goodstein, J. D., 1994. Institutional Pressures and Strategic Responsiveness: Employer Involvement in Work-Family Issues. *Academy of Management Journal,* Apr, 37(2), pp. 350-382.

Guba, E. & Lincoln, Y., 1989. *Fourth Generation Evaluation.* 1st ed. s.l.:Sage Publications.

Handfield, R., 2002. Writing the Ideal Paper for JOM: A New Editor's Perspective. *Decision Line,* 33(1), pp. 6-7.

Hart, S. L., 1995. A Natural-Resource-Based View of the Firm. *The Academy of Management Review,* 20(4), pp. 986- 1014.

Hult, G. T., Ketchen, D. J. & Slater, S. F., 2004. Information Processing, Knowledge Development, and Strategic Supply Chain Performance. *Academy of Management Journal ,* 47(2), pp. 241- 253.

Interpharma, 2015. *Pharmaceutical Hub Switzerland / Zurich- Zug- Lucerne,* Basel : Interpharma.

Ishak, I. S. & Alias, R. A., 2005. Designing a Strategic Information System Planning Methodology for Malaysian Institutes of Higher Learning (ISP-IPTA). *Issues in Information Systems,* VI(1), pp. 325- 331.

Ismail, H. S. & Sharifi, H., 2006. A Balanced Approach to Building Agile Supply Chains. *International Journal of Physical Distribution & Logistics Management,* 36(3), pp. 431-444.

Jonker, J. & Witte, M. D., 2006. *Management Models for Corporate Social Responsibility.* Berlin: Springer.

Kembro, J. & Selviardis, K., 2015. Exploring Information Sharing in the Extended Supply Chain: An Interdependence Perspective. *Supply Chain Management,* 20(4), pp. 455- 470.

Kesic, D., 2009. Strategic Analysis of the World Pharmaceutical Industry. *Management : Journal of Contemporary Management Issues,* 14(1), pp. 59-76.

Klein, H. K. & Hirschheim, R., 2001. Choosing Between Competing Design Ideals in Information Systems Development. *Information Systems Frontiers,* 3(1), pp. 75-90.

Konzern-initiative.ch, 2016. *Over 140'000 Signatures for the Swiss Responsible Business Inititative.* [Online]
Available at: http://konzern-initiative.ch/over-140000-signatures-for-the-swiss-responsible-business-initiative/?lang=en
[Accessed 13 Sep Sep].

Konzern-Initiative.ch, 2017. *The Initiative.* [Online]
Available at: http://konzern-initiative.ch/initiativtext/?lang=en
[Accessed 13 Sep 2017].

Laguna, J. M., 2014. *Institutional Politics, Power Constellations, and Urban Social Sustainability: A Comparative-Historical Analysis (Order No. 3638021).* [Online]
Available at: https://search.proquest.com/docview/1617974013?accountid=15920
[Accessed 20 Sep 2017].

Lee, H. L. & Whang, S., 2000. Information sharing in a supply chain. *International Journal of Manufacturing Technology & Management,* 1(1), pp. 79-93.

Lee, T., 1999. *Using Qualitative Methods in Organizational Research.* 2nd ed. s.l.:SAGE.

Lonza, 2017. *Investing in Responsible Sourcing.* [Online]
Available at: http://annualreport.lonza.com/2016/company/sustainable-values/investing-responsible-sourcing
[Accessed 15 Nov 2017].

Lummus, R. R. & Vokurka, R. J., 1999. Defining Supply Chain Management: A Historical Perspective and Practical Guidelines. *Industrial Management and Data Systems,* 99(1), pp. 11-17.

Maignan, I., Ferrell, O. C. & Hult, G. T., 1999. Corporate Citizenship: Cultural Antecedents and Business Benefits. *Academy of Marketing Science. Journal,* 27(4), pp. 455- 469.

Maignan, I. & Mcalister, D. T., 2003. Socially Responsible Organizational Buying: How Can Stakeholders Dictate Purchasing Policies?. *Journal of Macromarketing,* 23(2), pp. 78-89.

Makadok, R., 2001. Toward a synthesis of the resource-based and dynamic capability views of rent creation. *Strategic Management Journal,* 22(5), pp. 387-402.

Matos, S. & Hall, J., 2007. Integrating Sustainable Development in the Supply Chain: The Case of Life Cycle Assessment in Oil and Gas and Agricultural Biotechnology. *Journal of Operations Management,* Nov, 25(6), pp. 1083- 1102.

Mehralian, G., Gatari, A. R., Morakabati, M. & Vatanpour, H., 2012. Developing a Suitable Model for Supplier Selection Based on Supply Chain Risks: An Empirical Study from Iranian Pharmaceutical Companies. *Iranian Journal of Pharmaceutical Research,* 11(1), pp. 209-219.

Meyer, J. W. & Rowan, B., 1977. Institutional Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology,* 83(2), pp. 340- 363.

Miles, M., Huberman, A. & Saldaña, J., 2014. *Qualitative Data Analysis: A Methods Sourcebook.* 3rd ed. s.l.:SAGE Publications.

Morris, M. H. et al., 2010. Resource Acceleration: Extending Resource-Based Theory in Entrepreneurial Ventures. *Journal of Applied Management and Entrepreneurship,* April, 15(2), pp. 4-25.

Mupepi, M., 2017. *Effective Talent Management Strategies for Organizational Success.* 1st ed. Hershey, PA: IGI Global.

Norberg- Hodge, H., Merrifield, T. & Gorelick, S., 2000. *Bringing the Food Economy Home: The Social, Ecological and Economic Benefits of Local Food,* Sartington: ISEC.

Novartis Group, 2017. *Novartis Corporate Responsibility Performance Report 2016,* s.l.: Novartis AG.

Patton, M. Q., 2014. *Qualitative Research and Evaluation Methods.* 4th ed. s.l.:SAGE Publications.

Pharmaceutical Supply Chain Initiative (PSCI), 2017. *Creating a better supply chain in the pharmaceutical and healthcare industry.* [Online] Available at: https://pscinitiative.org/home [Accessed 14 Nov 2017].

Porter, M. E. & Van der Linde, C., 1995. Green and Competitive: Ending the Stalemate. *Harvard Business Review,* 73(5), pp. 12-133.

Pricewaterhousecoopers, 2011. *Pharma 2020: Supplying the future Which path will you take?,* s.l.: s.n.

Ritchie, J., Lewis, J., Nichols, C. M. & Ormston, R., 2013. *Qualitative Research Practice.* 2nd ed. London: Sage.

Robson, W., 1997. *Strategic Management and Information Systems: An Integrated Approach.* London: Pitman Publishing.

Roche, 2017. *Annual Report 2016,* s.l.: Roche.

Roche, 2017. *Supplier Code of Conduct.* [Online] Available at: https://www.roche.com/sustainability/what_we_do/for_partnership/suppliers/supplier_code_of_conduct.htm [Accessed 17 Nov 2017].

Rossetti, C. L., Handfield, R. & Dooley, K. J., 2011. Forces, Trends, and Decisions in Pharmaceutical Supply Chain Management. *International Journal of Physical Distribution & Logistics Managemen,* 41(6), pp. 601-622.

Rowley, T. J., 1997. Moving Beyond Dyadic Ties: A Study of Structural Influences in Stakeholder Networks. *The Academy of Management Review,* 22(4), pp. 887- 910.

Sarkar, S., 2017. Successful revolutions need suppliers. *Industrial Management,* 49(5), pp. 34-39.

Schensul, S. L., Schensul, J. J. & LeCompte, M. D., 1999. *Essential Ethnographic Methods: Observations, Interviews, and Questionnaires (Ethnographer's Toolkit).* 1st ed. California: Altamira Press.

Science Industries Switzerland, 2012. *The Swiss Chemical and Pharmaceutical Industry,* Zurich: Science Industries.

Seuring, S. & Müller, M., 2008. From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management. *Journal of Cleaner Production,* Oct, 16(25), pp. 1699-1710.

Seyfang, G., 2006. Ecological Citizenship and Sustainable Consumption: Examining Local Organic Food Networks. *Journal of Rural Studies,* Oct, 22(4), pp. 383- 395.

Shah, N., 2004. Pharmaceutical Supply Chains: Key Issues and Strategies for Optimisation. *Computers and Chemical Engineering,* Volume 28, pp. 929- 941.

Shanmugan, J. & Kabiraj, S., 2012. A Case Study Approach for Understanding Supply Chain Orientation in Indian Pharmaceutical Firms. *Kuwait Chapter of the Arabian Journal of Business and Management Review,* 1(9), pp. 45-78.

Siegfried Annual Report 2016, 2017. *Sustainability Report (Annual Report 2016),* s.l.: Siegfried.

Sirmon, D., Hitt, M. & Ireland, R., 2007. Managing Firm Resources in Dynamic Environments to Create Value: Looking Inside the Black Box. *Academy of Management Review,* 32(1), pp. 273-292.

Stakeholder Research Associates Canada Inc., 2005. *The Stakeholder Engagement Manual, Volume 1: The Guide to Practitioners' Perspectives on Stakeholder Engagement ,* Ontario: Stakeholder Research Associates Canada Inc..

Stiller, Y. & Daub, C., 2007. Paving the Way for Sustainability Communication: Evidence from a Swiss Study. *Business Strategy and the Environment,* Nov, 16(7), pp. 474- 486.

Swink, M. & Priem, R. L., 2012. A Demand-side Perspective on Supply Chain Management. *Journal of Supply Chain Management,* Apr, 48(2), pp. 7-13.

Swiss Info, 2017. *Pharma remains king of Swiss exports.* [Online] Available at: https://www.swissinfo.ch/eng/record-sales-abroad_pharma-remains-king-of-swiss-exports/43347088 [Accessed 8 Aug 2017].

The Federal Council , 2017. *The chemical and pharmaceutical industry is Switzerland's leading exporter..* [Online] Available at: https://www.eda.admin.ch/aboutswitzerland/en/home/wirtschaft/taetigkeitsgebiete/chemie-und-pharma.html [Accessed 8 Aug 2017].

The Federal Council, 2017. *Sustainable Development Goals.* [Online] Available at: https://www.eda.admin.ch/agenda2030/en/home/actualite/news.html/content/agenda2030/en/meta/news/2017/1/17-ziele-fuer-nachhaltige-entwicklung [Accessed 13 Sep 2017].

Thyer, B., 2010. *The Handbook of Social Work Research Methods.* 2nd ed. Florida: SAGE Publications.

United Nations Global Impact, 2015. *Supply Chain Sustainability,* s.l.: UN Global Impact.

Vachon, S. & Klassen, R. D., 2006. Green Project Partnership in the Supply Chain: The Case of the Package Printing Industry.. *Journal of Cleaner Production,* 14(6/7), pp. 661-671.

Varsei, M., Soosay, C. & Sarkis, J., 2014. Framing Sustainability Performance of Supply Chains with Multi-Dimensional Indicators. *Supply Chain Management: An International Journal,* 19(3), pp. 242-257.

Vastag, G., Kasarda, J. D. & Boone, T., 1994. Logistical Support for Manufacturing Agility in Global Markets. *International Journal of Operations & Production Management,* 14(11), pp. 85-73.

Vaterlaus, S., Suter, S., Fischer, B. & BAK Basel Economics, 2011. *The Importance of the Pharmaceutical Industry for Switzerland,* s.l.: Interpharma.

Verbeke, A. & Tung, V., 2013. The Future of Stakeholder Management Theory: A Temporal Perspective. *Journal of Business Ethics,* Feb, 112(3), pp. 529- 543.

Videras, J. & Albertini, A., 2000. The Appeal of Voluntary Environmental Programs: Which Firms Participate and Why?". *Contemporary Economic Policy,* 18(4), pp. 449- 461.

Vitezić, N., 2010. A Measurement System of Corporate Social Responsibility in the Pharmaceutical Industry of the Region. *International Journal of Management & Information Systems,* Fourth Quarter, 14(5), pp. 57-68.

Wheeler, D. & Sillanpaa, M., 1997. *The Stakeholder Corporation.* s.l.:Pitman.

Yin, R. K., 2014. *Case Study Research: Design and Methods.* 5th ed. Los Angeles: SAGE Publications Inc..

Youn, S., Roh, J. J. & Yang, M. G., 2012. Extending the Efficient and Responsive Supply Chains Framework to the Green Context. *Benchmarking: An International Journal,* Volume 19.4/5, pp. 463-480.

8. CONFIRMATION OF AUTHENTICITY

I, the undersigned, hereby declare that I have independently written this term paper. Any text passages which were not written by me are quoted as citations and specific references to their origins are made.

All used sources (including images, graphics, etc.) are included in the bibliography.

Olten, 1st of December, 2017

Salma Lüchinger

9. APPENDICES

9.1. Interview Request Letter

Dear Sir,

My name is Salma Lüchinger, and I am a currently pursuing a dual Master's degree in International Management in FHNW University in Switzerland. My Master Thesis, which I am currently undertaking, is on the topic of 'Sustainability within the Pharmaceutical Supply Chains in Switzerland'.

My thesis aims to look specifically into the social and ethical aspects of Pharmaceutical Supply Chains (PSC), since some suppliers of Swiss pharma companies are located overseas in places such as China and India, and may have different means of handling toxins, or different health and safety standards, and may be hired as contract manufacturers. My research objective is to identify gaps in these standards, and means of trying to close them, to improve sustainability.

In this case, the demand for sustainable supply chain solution would be because of this gap in the social, ethical or health and safety standards between Switzerland, and the contracted manufacturer, overseas. The study would compare practices, for example, between some pharma companies stating that business is conducted while observing the highest legal and ethical standards in business activities and others, and identify differences, if any, with other Swiss pharma companies.

The research's objective is presenting a detailed analysis of the supply chain operations within the pharmaceutical companies in Switzerland, and gaining an understanding of the processes that are unique to the industry. In addition, it aims at comprehending how those operations are managed from a sustainable perspective. Especially when it comes to managing overseas suppliers and contractors who might conduct business under different ethical, social and health and safety standards than those followed in Switzerland, the purpose of this multiple case study is to identify and analyse operational and strategic challenges that pharmaceutical supply chains are presented with, and the means by which they currently face them. This will be followed by comparing strategic approaches of different companies in facing those challenges and evaluating whether the current practices are effective enough to ensure sustainability measures are met.

Therefore, I would highly appreciate it if I can get an appointment for an interview with yourself or a nominated member of your team, for a brief 45- minute interview, to assist me with my research. If possible, I am planning my interviews during the second half of September, and would appreciate you allocating some time for me then, at your convenience.

Should you require any further clarifications on this, please don't hesitate to let me know.

I look forward to hearing back from you,

Thank you and Best Regards,

Salma Lüchinger
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9.2. Interview Transcripts

9.2.1. Interview No. 1- Novartis

Interview with Mr. Bruno Stillhart, Head of Supply Chain Management, Novartis- Zug, 22nd of September, 13:30

Stillhart (S): One point before we start. Now you record the topics we discuss, and later on you will write your thesis, I think. Will we have the chance to read it, our statement, before it will be published? Or what is the process?

Lüchinger (L): It depends on your request. If you would like, you can preview the transcript.

(S): That would be good, to ensure everything is really correct in the statement in your thesis. And to avoid misunderstandings.

(L): Sure, my thesis is quiet long, and includes many companies, so may I clarify if you would like to read the thesis or would you like me to send you the transcription of this interview?

(S): Just the things from our company. The rest would be interesting to read for sure, but it is your thesis, and you can decide how you want to share the information. So, of the things about Novartis, it would be good to read them before you publish.

(L): Of course, no problem. Please provide a brief description of your organization and what role do you play.

(S): I was the head of supply chain of Sandoz pharmaceuticals in Switzerland, and then for one year I was global operations manager also for the division for Sandoz, for the generics, and now in this position (Head of Supply Chain Management, Novartis), I have been for two months, so, quite new in the role of country pharmaceutical organization supply chain (for the Swiss CPO)

(L): What does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique to the pharmaceutical industry?

(S): Meaning as opposed to automotive or some other supply chains? Specific for us is clearly the GDP guidelines we have to follow. You know it, the global distribution practices, which defines clear rules on temperature, on tracking, on such issues, that's specific from my point of view.

(L): So, it has to do with the chemical side of the material? I didn't exactly get it, I am sorry.

(S): No, also if the product is finished, an FDF product, you need to record the temperature during transportation. And in the other businesses, you don't have these environments.

(L): What added value do you believe your supply chain department brings to your organization?

(S): Well, the supply chain is from my point of view crucial, because it's a link between the sales and marketing, and the production. And the supply chain enables, depending on the structure, to have a really good forecast, how many products we will sell, this is crucial, to enable stable supply. To avoid stock outs. So, supply chain is really ensuring the product is available over time, and avoid stock-outs.

(L): What sustainability measures is your organization taking?

(S): Well, the expression sustainability is really big. From my point of view, sustainable is if a product is continuously delivered. Stable delivered, this is for me sustainability. Therefore, we try to keep safety stocks, safety organizations, backup solutions if a supplier is not delivering, or if there is a block for any reason to switch to another supplier. This is the responsibility of supply chain, to have a backup.

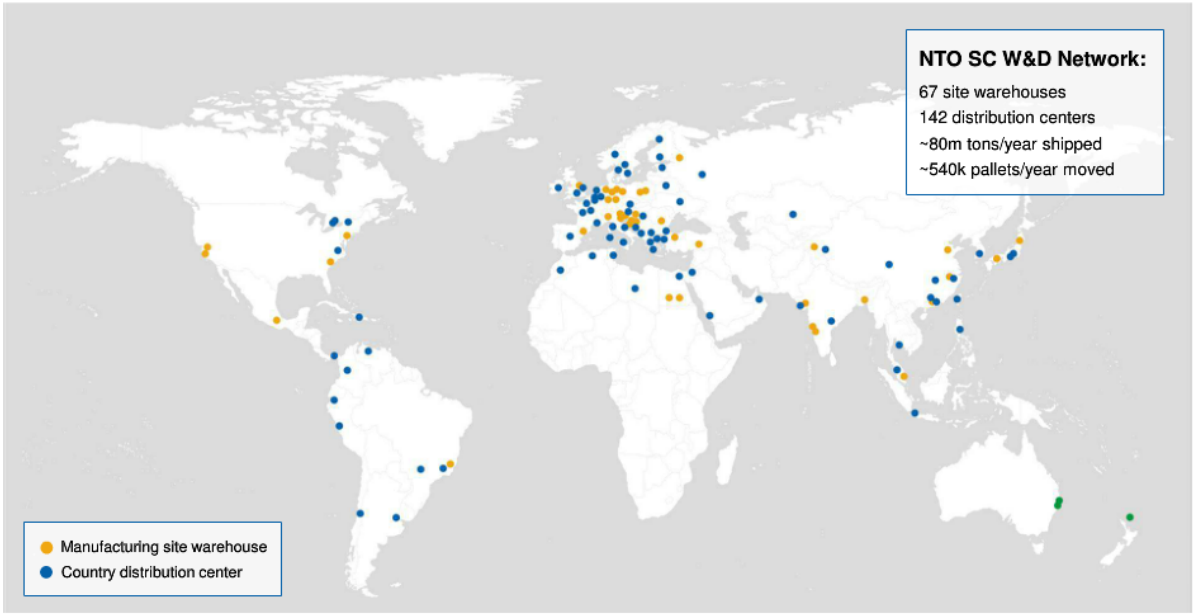
(L): I was more referring to the sustainability measures in terms of environmental or economic or social responsibility.

(S): Good, good. In this point of view, we have in the beginning the responsibility to include the departments we have, we have clear departments, controlling and auditing the supplier so that they fulfil our requirements, so we are not doing the audits, we trust the audits are done, by either internal or external auditors, depending. If we have the resources, its internal, if we don't have the resources, its outsourced to an external company.

(L): Does your organization have local manufacturing sites, or global supply chains?

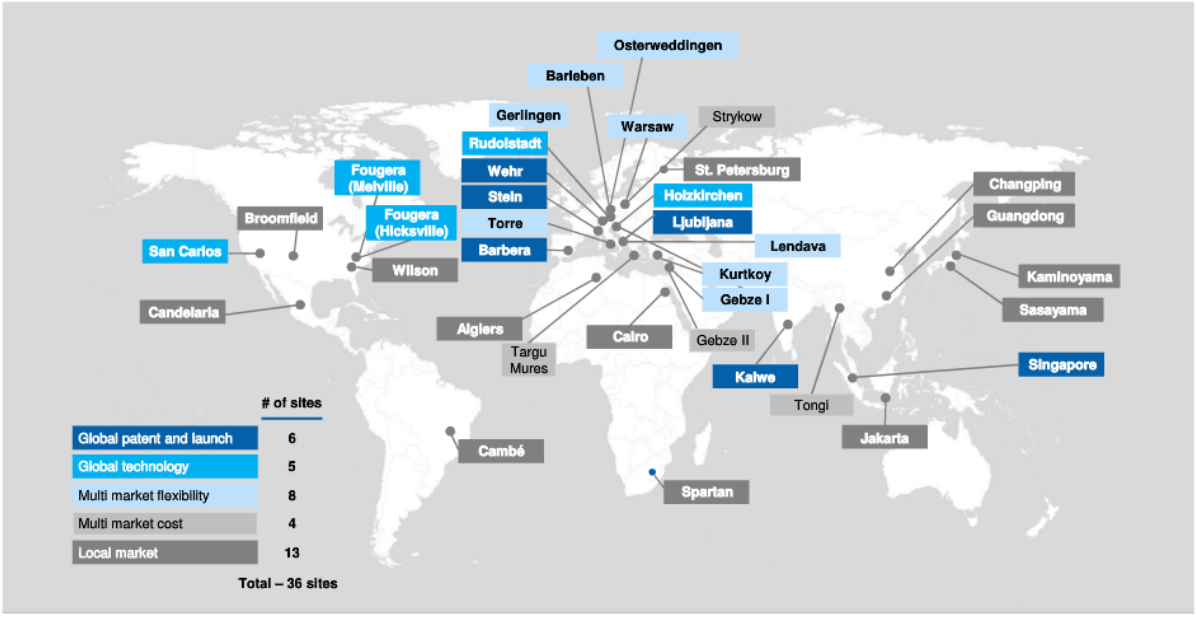
(S): Most production, 90% of our production is global. Should I show you the plan, (on the projector).

Supply Chain footprint



This shows the geographical situation of our solids portfolio (*Source: Received through follow-up email*).

NTO Solids encompasses 36 sites: 26 from Sandoz and 10 from Pharma



(Source: Received through follow-up email).

We have the structure here, the different divisions, and we have the map, something like 80, let's go directly to the footprint. Here. You see here, we have 36 solid sites (meaning they are

producing tablets, not liquids, not the injectable). I will check, If I am allowed, I will share the technical operations handbook with you, because it really is everything is in here, you see also the structure and we have the chemicals, solids, septic's, anti-infective, biologics and external supply. This is the NTO structure. Or at least I can make a copy of the slide you're interested in. Here you see the footprint, it's incredible, we have so many points. And the yellow dots are manufacturing sites, most of them are in Europe, but we have some in Japan, in India. And all these are internal sites, Novartis owned or managed companies.

(L): So, do each of these companies in their locations source materials from these locations or do you have a global department which sources for whichever site?

(S): The structure is that we have a global hub in Basel, Muttenz, and all the products are ordered from the CPOs, from the country organizations, into this hub, and the hub is then consolidating the deliveries and sends it to the countries.

(L): Why does it have to go through Basel?

(S): For tax reasons. There are different rules but Novartis pharma decided to have this hub.

(L): What operations/ strategic challenges does your supply chain encounter? (Also, specifically when managing your suppliers/ distributors/ contractors)?

(S): Well, generic is much more challenging than the originator, the generic companies have more volatile sales, and the price pressure is much higher on the generics than in the original. Therefore, in generics the tendency is more to outsource and to find cheap companies, the pressure is higher and you have then more risk linked to the supplier. Not to the product itself, the product is stable, and wherever the product is sourced it's the same guidelines used, but the places produced are different, maybe more in low cost countries in the generics than in the origins.

(L): How are those challenges faced?

(S): With safety stocks, with close monitoring, weekly monitoring of the supply situation, the orders, and we have people located close to the companies so that if something happens we have the people visit the companies to ensure the products are produce according to our guidelines.

(L): So, you don't have a major sustainability challenge, in the environmental, economic or social sense.

(S): You mean challenging actual burning topics. (Ah, ah) I assume all the companies have challenges in such topics, it's a question of how open the companies are talking about it, maybe I can give one example. It's also in the news, I imagine. It's the product pip tazo, Piperacillin/tazobactam called, and for this molecule, we almost have one supplier, worldwide, the company is called Qilu, and this company sourcing the molecule of pip tazo had an explosion of one tank in the company, in China, and then, the company was not able to continue producing. They found a backup solution, but the legal situation in China, they forbade them to restart the production, because they had the feeling that some waste was in the air out of this explosion. And this is and was quiet a big challenge for the company, for all the big companies, such as Pfizer, producing pip tazo, had the challenge with that.

(L): How did Novartis deal with it?

(S): Yeah, we are dealing with it, to have a close contact with the company, and they are producing certain amounts of volume and we are getting the products.

(L): Was there a delay in your production?

(S): Yeah, yeah for sure, big delays. And you can read it in the newspaper. Germany being in stock out and so on. And it is now an infective product so it's an important one. So, I assume all the companies have challenges. And I am normally really open, I tell the things if they are really not ok, and Qilu is one, which is showing the challenge with outsourcing to one company, and because of the price they offer, to all companies, a low price, but the risk of monopoly is incredible. The advantage here in these cases, because it is an important product, in Switzerland, we have the system of Helvecura, the mandatory Swiss army stock, maybe you know it. So, we had, from a legal standpoint, 3 months of coverage that we need to keep, of certain molecules, we had the chance to use up this stock, so that we were able to deliver to the patients.

(L): But then you need to replenish that amount.

(S): Yeah, but we have time to replenish.

(L): I am looking at sustainability standards, such as the effect on the environment, the working conditions of the suppliers you work with, I understand that sustainability from your perspective is the product continuation. There has to be no break in that.

(S): Yes, for the patient. It's crucial

(L): But are there any challenges from that perspective? Maybe certain toxins, waste management?

(S): This is the health safe and environment topic, and maybe you have seen it on the internet, here the CSR report, it is written there what we are doing and we really live it. We make the audits, and this is not supply chain, we have different departments (QA) controlling the quality of the products, of the processes, we have the labour audits, we have outdoor companies auditing suppliers, it's really specific and we have these audits in place and I trust they do a good job. I receive the goods.

(L): Does the procurement department fall under your category then?

(S): No, procurement is different, its NBS (Novartis Business Services), I will drop my colleague here in Switzerland an email, that he can give you the criteria, which he creates, he is business and development in Sandoz and he knows if we outsource production, he knows the criteria.

(L): Have you heard about the Responsible Business Initiative in Switzerland?

(S): You need to help me.

(L): It's an initiative that was started 2015, and last year gathered 140,000 signatures, and now it's in the process of being launched, and if so, would be included in the Swiss law, and it basically says that any Swiss company dealing with an overseas company has to make sure this company they're dealing with is respectful of human rights and labour conditions, otherwise they would be subjected to court.

(S): I heard about it.

(L): In your opinion, do such initiatives affect the business operations?

(S): I don't expect, because we are already really good at that, so I don't expect any impact on our business and I don't think we would have any changes.

(L): Thank you, this was it.

(S): Sure, and if you have additional questions later on don't hesitate to call me, we can also have a phone call.

(L): Thanks a lot.

9.2.2. Interview No. 2- Novartis

Interview with Ms. Connie Low, Responsible Procurement (RP) Operations Manager RP & Labor Rights Manager, RoW Cluster

(Email as received from Ms. Low, upon being forwarded some questions by Mr. Stillhart.)

Lüchinger (L): Please provide a brief description of your organization and what role do you play in it.

Connie (C): I work within Novartis Business Services – Procurement. I look after the operations of the Responsible Procurement program as well as the labour assessments of suppliers, along with my team who sits globally.

(L): How do you think (your) sustainable supply practices in the pharmaceutical industry can be improved?

(C): By working with our peers in the industry and also players in other industries in a more collaborative manner to address suppliers together. This means more leverage but also more joint communication and development opportunities for both internally and with suppliers.

(L): Where, in your opinion, are the main gaps when implementing a 'sustainable' supply chain?

(C): Understanding and mapping how each player/supplier are linked to another, this is still very much difficult to track.

(L): What selection measures does your organization's procurement department follow when selecting suppliers?

(C): There are many measures incorporated into the selection process. I will only point to the ones that is related to "ethical" factors. There are several standards we define in these areas: Labour Rights, Health and Safety, Environment, Animal Welfare, Anti-bribery and fair competition, Data privacy, avenues for reporting breaches as well as management systems. The detailed standards can be found in our Novartis Supplier Code. Adherence to the standards contained in this Supplier Code is one of the evaluation criteria in the Novartis supplier selection process. Novartis expects suppliers to adhere to applicable legal standards and work toward the higher standards contained in the Novartis Supplier Code. Under some circumstances, where the suppliers or third parties have shown and continue to show a material commitment to improvement, Novartis is willing to work with them to bring about improvements through engagement and collaboration. This may include audits, development

and progress monitoring of corrective action plans, referring suppliers to external experts, and other reasonable improvement plans.

(L): How does your organization evaluate institutional pressures (such as the Responsible Business Initiative) and what changes to your organization, in general, and to your supply chain/ procurement department, in specific, would it bring, if implemented?

(C): These external requirements are being monitored internally regularly through assessment of our own processes to check if they enable us to adhere to external requirements. We make sure that any changes are then embedded systematically into our day to day operations so that every associate understands the importance of these requirements but also will be trained on how to carry out processes to assess supplier standards. Currently, this is being done through a project focusing on evaluating and elevating our practices on third party governance, systems, external intelligence and process standardization. If implemented, this will bring about more visibility and clarity in terms of hot spots we can focus on, areas that can affect our strategy in certain parts of supply chain and ultimately an overall improved standard for our supply chain – better social and environmental conditions throughout the supply chain.

9.2.3. Interview No. 3- Biogen

Interview with Mr. Oliver Krug, Senior Director International Commercial Supply Chain, Biogen- Zug, 28th of Sep, 9: 30 am.

Lüchinger (L): Please provide a brief description of the company in general, and what role do you play.

Krug (K): My name is Oliver Krug, I'm the Senior Director International Commercial Supply Chain, here at Biogen. Biogen is a company with a turnover of approximately USD 11 Billion/ year. We have approximately 7,000 employees, a little bit more than 7,000. It's a US company headquartered in Cambridge, Massachusetts, but with the international headquarters here in Zug, so in Zug we are responsible for supply to all international markets. So, we do everything except the US, so including Canada, it's my group that does that, it's the customer facing piece on the supply chain. The footprint of Biogen compared to a lot of other larger companies is not so big, let's say the global footprint. And this is driven largely by the portfolio that we have, so if you look at the portfolio that Biogen has, Biogen is the market leader of Multiple Sclerosis (MS). MS is largely a western disease. So, we have a very robust footprint, obviously in North America, in Europe, in Australia. To a lesser extent Latin America and in Asia Pacific, very limited. So, we have very limited footprint in the Asian pacific region. The portfolio currently is 10 products, 7 of them are MS, we have two products which are referred to as Bio-similar products, which means they are essentially copies of a drug that is already on the shelf, patented, so we have copy of Remicade and a copy of Enbrel, these we market only in European Union (EU), so we have the rights to the product in the EU, together with the joint venture of Samsung, who are a little bit the leader in the production of Bio-similar and is actually making a copy of a biologic drug. And we have our tenth product, which is essentially an orphan drug which was launched in Europe only 3 months ago, it's for spinal muscular atrophy which is something which if a child is born with, then they're generally dead by the age of 2, it's a very rare disease, so if you look at Europe you're talking about primary patient base of probably 2,000 patients, it's very small, it's very expensive, and this is, I'm going to say this is the third pillar of Biogen. So, we have our MS, we have our Biosimilars, and now we have the spinal muscular drug, so it's a relatively small portfolio if you compare it to larger companies, that are marketing 150-200 products globally, so it's actually a pretty small company.

(L): You mentioned working in a couple of other pharmaceutical companies before. Have you ever worked for a supply chain not in a pharmaceutical company?

(K): I've worked in supply chain of a chemical company, a small specialty chemical company, and I also did 2 shorter stints really in logistics in the shipping industry.

(L): The reason I ask is do you think a supply chain is different, in another industry, and if so what would be the main differences that make it unique?

(K): So, I think there is definitely a difference, a very very big difference. And it is the amount of regulations that come with pharmaceuticals, so we operate in a good manufacturing practice and a good distribution practice environment, everything is documented, everything is controlled. It is a highly-regulated industry so I would say we are clearly different in how we basically secure our products through the supply chain to make sure there is no tampering, to make sure that the temperature stays within range, so it doesn't affect the quality or the outcome. I mean at the end of the day, you are providing something to human beings who either ingest it or inject it in. If that is been tampered with, if that is not a good quality, you have very serious ramifications. So, I would say the outcome of that is that we tend not to be very agile, not to be very LEAN, one of the reasons being that our hands are so tied by the legislation. It is such a heavily regulated industry. I can't switch to a different mode of transport, just because it's cheaper, I need to make sure that that mode of transport is also going to be entirely validated for moving the product from A to B. That's an example.

(L): What added value do you believe your supply chain department brings to your organization?

(K): That's a good question and it is not an easy one to answer. So, I think first of all, I would say the primary value add is that you are getting the product to the patient in a fully compliant manner. You could say its value add, on the other hand you could look at that and say that's not necessarily value add, that's how you must operate, that's how the regulations stipulate you must operate. And it has to happen, you don't have a choice. I would say from a value add perspective, we could look potentially at some things that we do here at Biogen, or things that I've seen at other companies in the past, let's say speed to market. How quickly can you serve the patient? Can you guarantee next day delivery? Can you provide that next day delivery together with a trained nurse to administer in a home environment? I think also providing, from a patients' services perspective, I would say that in the countries where we

operate, no MS patient will go without product because they can't pay for it. There is a patient service program where you're actively, depending on the country you're in, you're either given a kind of a discount or you're helping the patient find ways of paying for that product. That's very patient focused. I think that if we look at other ways that the supply chain can be innovative, for example, we're in the process right now of trying to get (and it's not an easy process), a web-based ordering tool off the ground. So, the pharmaceutical industry, no, the medical industry, I think is very traditional, some pharmacies and physicians and hospitals, they are 99.9% still ordering with a fax. When was the last time you used a fax? So, to try to push these people in the direction of web based order tool I mean, you order a book on amazon, why can't you just order the product like this, if you think about, from a purely pragmatic perspective, it's somebody keying the data in, it goes up, it comes down, it gets interfaced into an ERP system somewhere and it gets processed. And now somebody is sending a fax, and somebody is printing a fax then keying it in, so we are doing some things to be innovative, but again everything you do needs to operate within the boundaries of the legislation.

(L): I was reading in the CSR report about an example of supplier collaboration, with Merck, for the packaging and shipping of filter products. Is that something SC department is in charge of?

(K): Yeah, so I know that we are looking, it's a good question also about sustainability, so, I'm not entirely familiar with that specific example, but I know that we have traditionally, when we talk about shipping qualifications, we have traditionally used, most of our products are cold chain, so meaning they need to be transported at 28 degrees Celsius, we have traditionally used a passive method, for smaller shipments, passive meaning its essentially a box with ice packs in it. There is no electricity, there is no battery, but it works, and its validated for 72 hours, or however long. We have traditionally used a box that was quite bulky, basically took a lot of space, period. And it was quite heavy. And were now moving to a new shipper box where the box is more expensive, the actual material is more expensive, the cooling elements are structured somewhat differently in that, but the actual physical size of the box is significantly smaller. So, while you may pay more for the actual box, and they're reusable, the freight cost will be driven down, because we would be using less volume. Especially when you look at our industry in the big picture, but specifically, we're relatively a

small volume company, so we count the number of patients in tens of thousands, and MS is a pretty narrow therapeutic area, so when we ship, we tend to ship by air, and the smaller the footprint, the better it is for the environment. If I reflect back to my previous employer (at MSD) who were shipping often very high volumes of product, there, there was also an initiative that many pharmaceutical companies are doing now, for the high-volume shipping lanes, they would move from air to a refrigerated container. It obviously takes 3- 4 weeks longer, you have inventory that's in transit, doing nothing, sitting on a boat, sitting at a port, but obviously shipping a full 24 ft. container with material is a lot cheaper on a boat, and a lot more environment friendly than when sticking it all onto an airplane.
(L): I asked that because I thought supplier collaboration with Merck or similar company is an added value that you bring to the company. So, do you have many collaboration agreements with other pharmaceutical companies? In Switzerland or elsewhere.
(K): So, I think if I start with the backend of the question, geographically, I would think we're, and many of our fellow companies here in Switzerland, are geographically agnostic, I mean, we are here for one primary reason, and as such, we collaborate globally, were not tied to the location. Obviously for some activities you'd be collaborating globally, if I need lab services you're not going to get lab services in south Africa, I'll get that in Basel somewhere, but I would say from a supplier collaboration perspective, we, especially as a relatively small company, we collaborate with a number of other larger pharmaceutical companies, but I would say not so much in the supply chain space but we collaborate more on utilization of our facilities and of their facilities. So, Biogen being quite small, we have two facilities right now. We have one in Denmark, and one in the US, and we are in the process of building one in Solothurn. Those facilities are not entirely full of us making products for Biogen, so we use the excess capacity to make products for other companies, and we have the same relationship with other companies where we're using them, to make products for us. So, I think that's very much, when we talk about the environmental footprint, you know, it's also economical, you want the facility to be full, it's a fixed asset, you want it to run as much as possible, but you see, it's quite common in the industry, that people are using each other's facilities to make products.
(L): What sustainability measures is your organization generally taking?

(K): I'm not quite sure it's a measure, but there is one thing that lies above our work more than anything else and it is compliance. So, everything you do must be fully compliant, this is step number one. I think from a sustainability perspective the one thing that I would be very proud of Biogen, and that Biogen is really good at, is that even though we are a commercial company, we are not a nonprofit, there really is an eye for the patient, and making sure the patient gets treatment appropriately, and that is probably the biggest thing that I've seen in my seven months here where I say, wow, I've worked for bigger companies before, even smaller ones, and there was always this financial undertone in everything you did, and that is not yet here. I think that it'll come, as the company gets bigger, I think many people still look at Biogen as a small biotech startup, but when you're doing 11 billion dollars a year you're no longer a small startup, but I think really the focus on the patient and then the lack of focus on cost is something that I have experienced here which is kind of interesting. But I think from a sustainability perspective, this company does everything for the patient, really everything. You see it also with the new drug, I would recommend if you take a look on the internet, the drug is called (Spinraza) if you see how that can let's say, not change lives but save lives, it's really impressive. Now you will also see it has an extremely high price tag, having said that as I said it's a relatively small patient base, and I think again from a CSR perspective, prior to the drug being approved, we had already gotten the green light to treat patients under an early access program. So, it's a special program with additional patient screening but the clinical trials were so good, the results were so good, that we were given the green light to treat patients with the drug prior to formal regulatory approval. Meaning, because it's such a small patient base, and because they're infants, we probably treated a majority of the patient base prior to the product even going commercial, so we did it for free. If you see the children, it's a series of seven injections that goes directly into the spine, so it's also not an easy thing to administer, I think they get 4 injections in the first month, and then after that they get 3 over the course of a year, and you see children who are, let's say not able to stand up, to more or less fully functioning in the course of 3-4 months. It's really incredible.

(L): You've mentioned by email already that you don't have local manufacturing sites, your manufacturing is concentrated in the US and Europe.

(K): Correct.

(L): Was there a reason or more-specifically a sustainability related reason to just decide you're going to do that?

(K): So, I think, I would say of the manufacturing footprint in general, Biogen has outsourced probably 75% of the manufacturing. There's a historical reason for this, so if you go back in time, you go back 5-6 years ago, Biogen was a 2 product Biotech company so it's clear, when you're that small, you don't have your own network, and Biogen has undergone very rapid growth in the last 5 years, and we've basically just continued to use the same model we already had. And the model is actually pretty simple, we try to, in our facilities, we try to supply almost all of our own drug substance, so the API, so the active pharmaceutical ingredient, is largely biological for us, but we make the base raw material, and we give that to all manufacturers, to let's say, make the product, and then pack the product. I think it's been a historical evolution, I think it's probably something that Biogen wants to look at. And I think from a geographical perspective, the portfolio currently is still, again it's a narrow therapeutic area, its relatively small volumes, patient base has been concentrated in Europe, and North America. As such, there has been no driver to go into places like India or China for manufacturing. I think also generally from Biogen risk averse, like most pharmaceutical companies are, and moving things into an area like India or China, even if its raw materials, I think the company does not feel comfortable with that, for the savings that it would give you, and the risk you take, I don't think people here want to do it. I've seen bigger pharma companies do it, really with very high-volume products, they go to India, they go to China, and sometimes, clearly the savings are significant, but the knockback effects of bad inspections or bad GMP practices can have a lot of influence on your portfolio.

(L): But you do have distributors in all of these regions.

(K): Yes, distributors we would have, not in all of the regions, again, we have a relatively limited footprint, North America, Europe, in four Latin American companies we actually have a Biogen entity, a Biogen affiliate, in Asia pacific, Middle East, North Africa, the rest of Latin and Central America we are working through distributors. So, we are sell to a distributor and they take our portfolio of products, which again, compared to their other customers is probably pretty small, and they distribute for us.

(L): what do you think are the main operations/ strategic challenges your supply chain department deals with?

(K): So, I think from my perspective, coming from a somewhat larger company, that was a little more robust in process and system, I would say, the biggest challenge we have, and that it's about the size of the company and the rapid growth, is that five years ago when there when there were two products, it was pretty easier to do everything, in excel, and go talk to the person, three doors down, and sort it out that way. We are now at 10 products, plus 2 products that we, let's say, have spun off into a new entity, but we're still trying to manage it like its two products, and you know everybody next door. So, I think my biggest challenge in SC is process, systems, and getting people to adhere to process and systems. It's so very much, you said out there it's a very good vibe, that's what it's like everywhere. Everybody thinks everything is informal, we can just get it done, over a coffee, and sometimes you have to look yourself in the mirror and you have to say I'm a big company now, I have to act like a big boy. And from a people change management it's not always easy. It's difficult.

(L): How do you then face such a challenge?

(K): I would say probably through, again, in my case, through getting people to embrace the change, getting people to understand the change. Communicate, communicate, communicate. Repeat, repeat, repeat. It's like I would do with my children sometimes. And that's not to be negative towards the group upstairs, but I think sometimes they are so caught up in their way of working, that they don't have time or they don't see it. Having said that, many of them come from other companies here in the area, pharmaceutical companies, and they come here, and they think it's pretty basic the way things get done here. They are manual, so I think it maybe goes beyond the scope of what you're looking for but if you convince people that their job can be more interesting if they standardize the basic things, then I think you've got them, but I think people are so caught up in the very manual stuff. And they see standardization as 'oh you know, you're going to take away my inventiveness, or my entrepreneurial ability, you're just going to pigeon hole me and make me a robot, you need to convince them and say listen, 75% of what you're doing right now is extremely manual and can be either streamlined or automated and you don't have to pass excel sheets back and forth to each other anymore, we have an ERP platform, you can use it, if you get them to understand that 75% is the non-interesting part of their job, and if we get rid of some or all of that, you can focus yourself on things that are actually interesting and tasks that are interesting. No more data entry, no more calling 5 people just because you're not using the

system and the system isn't passing the information back and forth as it should be, that's probably the biggest challenge that I have here, and quite frankly, if I look at where Biogen is going, and I think also from a therapeutic area, Biogen has indicated, or has very clearly stated that we want to be the leading neuro science company in the world so we have a product in phase three clinical trials right now, for Alzheimer's, there is no body on the market yet for this, we had a competitor, they dropped off during clinical trials, just at the beginning of this year, so we're really ahead of the game. But then if we think about the Alzheimer's, and we think about size, and we compare it to our very niche portfolio right now, if you scale up to something like Alzheimer's, where you're talking about potentially 30- 40 million patients, you cannot run that with a process that is made for small volume niche therapeutic area, so I think we have a little bit of time now, two years, but I think really impressing that change upon people, I'd say you have to change, otherwise, this will not work, and the Biogen solution will be: I'll first throw bodies at it, I'll just hire and throw bodies at it, and then at a certain point, it just won't work anymore. And change management is a big piece, if the people are not on board, you can have a great platform or a great idea, but if the people aren't on board, it won't fly. And again, repeat, repeat, repeat.

(L): How do you think sustainable supply practices in the pharmaceutical industry can be improved?

(K): So, I think probably a couple of different ways to look at this, so I think we could look at the distribution and logistics footprint, and I'm talking about environmental sustainability, I mean I think this industry does far too much air freight, really. And I know to move things on to a boat, where you're adding let's say one month of lead time, on sometimes very costly products, not to discount shelf life, right, so I mean the product is sellable for 24 months, if I go on a boat I lost one month, and again, putting it into the marketing, that can be a constraining factor depending on how international your supply chain is. So, I would say from a distribution and logistics perspective, that would be one. The example that I gave earlier about the passive shipper and moving to a smaller footprint. I think when we look at manufacturing practices, I think clearly in Europe and in the US, there is enough regulations and I think also enough self-awareness that you treat your employees well. You don't pollute, you know, you try to be environmentally neutral, you give back to the community, I think that awareness is there. I think once we go into the subcontracting world in Asia, I think the

industry could probably play a bigger part in assuring that our partners, our vendors, our suppliers, in that area, are also somewhat more socially responsible. And environmentally sustainable. And I think also from a sustainability perspective, I don't know how many companies you've been to, but they'll probably all tell you the same thing I told you. Our footprint is in North America, our footprint is in Europe, Australia, New Zealand, Japan and after that it thins out, so I think that as industry when you look at what the margins are, and what the costs are, I think there is a real responsibility that we make drugs available where countries can't afford them. I had a really good experience when I was with MSD, I spent some time in the SC area around HIV and anti-retroviral and MSD partnered with the Bill Gates foundation, for a very big donation program of HIV medicines in sub-Saharan Africa. South Africa, Botswana, Namibia, Zambia, that was really the focus. And the other initiative that I saw at MSD which was really fantastic and doesn't get enough press, and if you want to look online, it's a product called Iver Mectin, this was initially a product that came out of the animal health division, it basically kills parasites in farm animals, and they realized that a lower dose can prevent river blindness in the third world. So it's an extremely inexpensive product, but there are two of the facilities in the MSD facilities in Europe making and packaging Iver Mectin tablets in, you know, you and I go into a pharmacy and we get a little pack of 24 pills and take it home, these are being packed in big 5,000 tablet bottles, dispatched for free into Latin America, Asia and sub Sharan Africa, and they basically go into the local health care system, a local health care worker will go into the village and everyone gets one or two pills, and this prevents river blindness. And you know, I think as you can imagine river blindness is something that ends your life as a functioning individual, and as such extremely easy and cheap to treat, and I think a company that has this social awareness, I think that's really, you know, on the right path.

(L): Are you involved in the process of selecting your distributors worldwide?

(K): I'm going to say the distributor process is largely at Biogen, and it was at Merck as well, largely a commercial decision, I think where the SC gets involved much more heavily is choosing our three PL partners or storage partners, our distribution partners, to some extent even road transport, and I know that my group is heavily involved right now, at you know, really looking at the footprint that we have, in the distribution and logistics area, and to a lesser extent but were also involved, also have a say, in selecting new partners in the

manufacturing area. So, for example, hopefully for our new product, when it goes commercial, we will need a new partner to do some of the manufacturing work and we're involved in selecting those partners, so we're more in the space of distribution and logistics and manufacturing.

(L): So, what are the selection criteria if you have a few of them, what do you make sure they do, or they don't do?

(K): Yes, we would go through a normal tendering process, which I think you would be familiar with, and we will select on a number of categories. I would say again coming back to what is the top priority, you know, it's the fact that the patient gets access to the medicine in a timely fashion, so price is a component, but not the biggest component. And I would say, across the board it's probably, you know, reliability, and compliance probably make up 40% of the weighting, price maybe 25, and there is a couple of other things, you know, ability to scale up, and you know, value added features, you know, can we look at our inventory through an internet portal, you know things like that, but supply to patient is by far number 1, and price is certainly not one of the top ones.

(L): And if an initiative such as the Responsible Business Initiative..., have you heard about it?

(K): No

(L): So, I'm giving it as an example of an institutional pressure, it's not specifically this intuitive. But this initiative came in Switzerland last year, and they collected 40,000 signatures, it's now in the process of launching and may become part of the Swiss law, if approved, and what it actually mentions is that companies in Switzerland can only deal with other companies in the world that respect human rights and ethical labor standards, and if proven that they're not, they can be taken to court, so it's quite serious. From a SC perspective, if such an initiative or something similar comes up, do you think it would affect any of your operations?

(K): I don't think it would affect ours, I think just because I know what the footprint is, I don't think it'll affect ours. For sure when I think about the international nature in Switzerland, and the number of multinationals that are based here, there are certainly companies that are headquartered here, or have a regional head quarter here, that would probably could be put on a tight position. Having said that, I'll be very honest, my experience with Switzerland over the course of the last seven years is that the Swiss are extremely pragmatic, things will change, they will change very slowly, the change will be predictable, the change will be

telegraphed. There will be no abrupt moves. It's the stability that keeps I think a lot of the business world here, and I think the Swiss are smart enough to say well, we can do something, but we will be very pragmatic on how we transition this. And I think also back to a few years ago, what also became part of the Swiss law was the mandatory monitoring of people's work hours. So, this must have popped up in 2014 maybe, and became mandatory, and I know some companies have adopted it, some companies have not yet adopted it, there is a very slow roll how this happens. And then how the company exactly adopts it. I think it's a great initiative, and Biogen is an example where we don't keep track of our hours, so I have a badge, so they know exactly when I come in in the morning, and when I leave in the evening, but nobody has ever shown me a report and said you're here for 42 hours a week or you're here for 46 or you're here for 35, I know a previous employer adopted it, so they started a time registration system, so I think examples like this are an initiative comes from the Swiss grass roots that is approved, gets implemented, but again, I think there are no abrupt changes, I can imagine specifically around this type of initiative companies that are perhaps heavily in mining, right, where perhaps not everything is fantastic in some of the mines globally, they you know, they will have to do something, they will move something, but it won't have to be tomorrow. But I think also from the perspective of the Swiss people this is very very important. And if you look back, just last Sunday they voted on the food safety, right, which theoretically, will make food stuffs more expensive, and the over whelming majority, 75% voted yes. So, there's definitely a core value there about doing things in the right way, which speaks to me personally, and I think most of the companies accept it as well.

(L): One statement that stopped me in the CSR report, 'Biogen monitors environmental, social and governance risks of our supply chain', what does that mean, in reality?

(K): That's a good one, and had you asked this two weeks ago, I wouldn't have been able to really put a concrete, you know, tangible purpose to that, and again, I've been here 7 months, so I don't know everything and everyone, but the last two weeks I've been approached by two different people, one of them about specifically asking me, I need some volunteers from your group, we are implementing a new risk management tool. So, risk management in our industry is standards, but we are implementing a new tool, whereby things are all captured in the central database, something that we've purchased off the shelf, so from a risk management perspective, there is an initiative to streamline the process we have today. And

to be honest I'm not exactly aware what the process is today, how it works, but here there is an initiative from a risk management perspective in SC and manufacturing, that we move to a standardized tool. On top of that yesterday I spoke with someone, also who approached me and said I need a half hour of your time, also talking about documentation, documenting processes, documenting them either locally or globally, also tied into risk management. So, there is an initiative to streamline and for sure, especially in the manufacturing space, risk management is relatively standard. We also have to do an annual update to a supply chain risk management report, which is basically kind of outlining our annual bases, what are our initiatives for next year, where do we see potential risk, do we see potential risk in our current SC, which could be, you know, things as simple as saying maybe one of our logistics partners is bordering on insolvency.

(L): Is there anything else you would like to add?

(K): I think that Biogen is really, it's very much a company about not just getting it done, but it's how you get it done. And I had that at MSD as well, I think in this industry, to be fair, the profit margins are high enough that we can afford to do that, maybe in an industry where the margins are extremely low, there would be less of a push to do things responsibly, but I think in the pharmaceutical companies, let's say the tier one companies, they look at things not only we have to get things done, of course I have to be profitable, I have shareholders, but it's also about how I get it done. So, there is kind of a, sometimes written but also sometimes unwritten set of rules on how we interact with our colleagues, how we interact with our suppliers, how we interact with our partners, which I have a lot of respect for.

(L): Thank you very much, I will send a transcript of this interview for verification, once ready.

9.2.4. Interview No. 4- Pricewaterhouse Coopers

Interview with Mr. Stephan Hirschi, Director, Sustainability and Climate Change- Pharma Sector, Pricewaterhouse Coopers- Zurich, 26th of Sep, 13: 30.

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

Hirschi (H): I'm roughly over 17 years with PWC, working in space of sustainability topics, that means in essence, either being responsible for auditing or assurance work, in relationship to disclosure, for example, all around sustainability, or as well then, the consulting space. And when I started we already had quite a large footprint in the pharmaceutical industry, at the time, so in 2000, but that's still the case today, so it had somehow preceded from there on that the pharmaceutical industry has a stronger footprint in our kind of portfolio, but also when you look at the whole industry in Switzerland, where certainly the pharmaceutical and chemical industry is of significant nature, and also has strong ties to all developments behind sustainability. Because of the incidents, because of the past and the history, that the industry has, where to had they jump in and resolve some of them, as well.

(L): So you're specialized in sustainability in general?

(H): In general, yes, and that includes basically everything that falls under sustainability topics. Maybe environmental, social or also economic.

(L): I wanted to ask if in your line of work, if do you deal a lot with supply chain related issues to sustainability?

(H): As well, also. So, for example, when we review certain topics, which are part of the disclosure, one brief example, if Roche would disclose how many suppliers have been reviewed according to the PSCI standards, or their internal requirements, this goes into a number which is disclosed, then we would also kind of also cover that topic, that we try to find out whether the numbers that are disclosed are correct, and what kind of process behind them would allow them to come up with such a statement. And that has been true for Roche, in the past, where we reviewed that, and also what we have as part of our whole process, when you look at the materiality of certain topics, the SC in particular has a much larger significance than it was like a few years ago, in terms of the perception and how important it is and the relevance, so therefore in relation to review procedures when it's about the materiality of the topics that they go for, their SC issues and procurement also are kind of

reflected. And further on also we have certain services, where SC topics are addressed, in relation to impact calculations and so on.

(L): And when you say you focus, because of the reasons you gave, on the pharmaceutical industry, does that also mean that you cover other industries in your line of work?

(H): It also means that we cover other industries, so we have in our team, not an only industry-focused approach, so our definition of sustainability goes across a number of different industrial sectors. Also with a view of what is actually happening in Switzerland, so you've got the financial services sector, of course, but also industrial production, the pharmaceutical chemical industry, services organizations at the same time as well, and again financial services is kind of separated into the banking business and the insurance business, so basically everything there is. And we got another side topic, we have the Daimler topic as well, Mercedes, they're based in Germany, we do work for them because of some internal reasons in staying independent in our conclusions, but we have a focus on the Swiss based companies.

(L): The reason I ask you that from your opinion and what you do, do you think there are specifics when it comes to a pharmaceutical SC that are different when looking at a SC in another industry?

(H): Yeah, there certainly are. But you also have to consider that not each and every pharmaceutical company has the same kind of service and product offering. That also has quite a significant impact on the SC, so for example, Roche, divided into a pharmaceutical and a diagnostic stream, in the divisions, while pharmaceuticals have the known manufacturing processes behind where you have raw materials and ingredients being used, in the area of diagnostics, it's basically hardware, which is produced, so totally different kind of SC. This is also true for many others, do they have either specific prescriptive things that they have to produce and therefore also the SC has a certain different kind of orientation, or is it over the counter kind of products, which also have a different approach, or generics, which are produced. So, all these kinds of things have kind of an impact. But certainly, they differ to a large extent in comparison to industrial production. I do not like comparing them against financial services. That's a totally different story in terms of impact and SC issues, but certainly industrial production, in general, far more raw materials being used, far more product output usually being produced out of that. Also, when you think about the raw materials being used often, kind of different sourcing strategy which has an impact as well, where the issues

appear, in terms of the SC, so there are differences which need to be considered. On the other hand, the pharmaceutical industry has also some additional issues, which usually are linked not to materials but far more to let's say outsourced kind of services. So, the whole R & D, for example, where you got clinical phase studies happening, not within the company anymore, but which are outsourced to certain parties, or if you got clinical trials and patients being involved, also part of the SC somehow, and therefore another range of issues appear. Or in essence many of the other contracted kind of people which are working in the pharmaceutical industry here but also abroad. Often different issues appear in comparison to let's say ABB, which is pure manufacturing, while in a pharmaceutical business you have manufacturing but also quite a large number of marketing and sales offices with according supply chains being in place, which is certainly different to other industries.

(L): What do you think that an added value of a SC department brings into a company?

(H): I mean there are usually the known things which are all around, costs, to manage your SC and the procurement processes in a consistent manner which should hopefully then result in a cost-conscious kind of environment and therefore also reducing costs along. That's one thing, but then it's also a lot about optimizing the whole SC along, out of my mind Roche for example has roughly 60,000 suppliers all around the world, it's quite a difficult piece to manage. Not all of them are managed on a corporate level but also at all the affiliates all around the globe. So, coming up with a procurement function which takes care of all these difficulties and complexities allows to build up consistency. Consistency in terms of cost decisions, quality decisions, sustainability decisions as well along, so where social and environmental issues are incorporated as well, without doing that it's close to impossible actually, to manage all these different requirements that there are today. I would not know of any company actually that was successful that would not have any kind of procurement function which has a central approach, and which has the complexity as the pharmaceutical industry, and at the same time, needs to be compliant as well. And this is also another area which comes into discussion nowadays, you probably heard of the, what is it called in English, the (Konzern- verantwortungs- initiative)..

(L): The Responsible Business Initiative, I was coming to that.

(H): Yes, so that certainly, for example, right now drives a number of things happening within a number of companies. Not in the way that they will only oppose against that initiative, some

of them do, certainly, but in a way, that they are not against the content, per se, but they just don't want to fall under certain kind of regulations. So, what they do often is, they kind of get prepared, for either the 'as if', it would be the case in a future situation, or as well to have any kind of preventive measure already in place which allows them then to communicate: we don't need that kind of law happening, because we are already ready to take care of such issues. So that's what they do, so its preparing for the situation that may happen in the future.

(L): That was actually going to be my last question, but since we touched on the topic, form your line of work, how do you think the general attitudes towards such initiatives (the current topic at the moment) what do you think the genuine attitude is?

(H): You mean in comparison to the stories they tell you, for example?

(L): I can't say stories, because I don't know, but I sense there is a slight resistance of the idea. Could be for many reasons. I understand resistance to change in general, and also changes from an external source.

(H): If you look at that initiative in particular, there is an issue, it's basically there where companies, not only pharmaceutical companies, that are kind of forced to take care not only of the tier one level, but beyond, and for the time being we have don't have systems in place, on a global scale, which allow to actually do that in an easy traceable documented and therefore also compliant manner. So, I wonder how that would happen in the end, in reality. So therefore, I see good reasons for some kind of resistance, because at the moment no one would really know what is then the expectation towards us. Are we actually even able to do that, or is it just then something which is written in law, but it can't be performed as expected. That's one thing, so it's then written but far to be from real. And the other area is as well, there are certain things and topics in the SC, when while we look at them from a Western point of view, it's also that easy to look at them in the same manner if you go to let's say South America, Latin regions somewhere or in Africa, or South Middle Asia as well, because sometimes either some of these ethical or social issues have their roots on the culture, in the local law which is written, or as well in how societies have evolved over the time. So, while you try to do and implement something down there, you for sure will fail, because you're not meeting something, or won't see something that is being understood in the same manner as if it would be done here in Switzerland. So, one really brilliant example is always child labor. Child labor issues are there, but it is also a matter of how you define that child labor, is it

forced labor? Is it misusing the working power of kids? Is it using in a way that they are not able anymore to go towards education? To learn, as well? And this is a different as when comparing it to what we do here in Switzerland, where each and every kid goes to school, and it's all regulated, while for instance in other societies, kids are part of the family, they have to work, because it's part of the family living wage production, and these are issues which are not yet defined, how to deal with them, and therefore such an initiative, would have a significant impact, on also discussing not only how to do that but also what to be done. And that where we see a little bit the resistance happening. Because there is a lot of uncertainty in how to do that. Comparing now in what people tell you about the stories all around that end, and whether it is really happening, yes to a certain extent there are also mismatches. Because many companies also claim we have everything under control, the whole 60,000 suppliers, are managed according to our internal SC rules, and this may be to certain extent true, but there are also always gaps. Because, just the complexity of the topic does not allow to come up with an absolute statement, that there is everything ready, and in place, so therefore, it always needs to be looked in a little bit cautious manner and way. What they tell, and how they explain and what is actually even possible, because absolute claims are kind of impossible nowadays. And that needs to be considered in areas where we assess companies as well. We are not going for 100% in the end, because we know that is not possible. So, we have to understand where are the gaps, where are the risks along, and are there any preventive or at least detective controls and risk approaches which would allow taking care of these gaps, in the worst case.

(L): What do you think are, in general, the most apparent sustainability measures that pharmaceutical companies abide by in Switzerland?

(H): I mean, one specific measure, it's not in particular towards a topic, per se, but the aspect that many of the Swiss pharmaceutical companies joined the PSCI organization and started to kind of coordinate their efforts. I believe is a strong measure towards more consistency, more transparency, and then better and kind of optimized kind of approaches, which in the end are only for the benefit of all the others, as well. Because that is a lot of sharing happening now. On the other hand, what happens always when you have these kind of approaches, its rather going towards the least kind of thing. So, it's not going towards the best practice there is, but what can we agree on, on a minimal level, so it maybe that in certain areas when you

look at the topics they cover, I would agree, one could do more. Could go beyond. But then this is often a discussion which happens on the individual companies' level, if they are willing to go beyond that. If they have specific aspirations that go beyond that, they're still allowed to do that, it's just not part of that PSCI scheme anymore. But that is not then really transparent anymore, so that is more going and happening in the background of the company. Further on, in the pharmaceutical industry, when it is about measures, I mean, certain things, as I mentioned, in the clinical trials area and outsourced services kind of area, are just NOW kind of happening, because there are still some incidents here, and there, or at least things that are publically discussed, so let's say the example with Roche Egypt, or in China, and organs being used for example for certain testing, and so on, because that has been outsourced and through a third party provider. So, these kinds of issues still pop up, and this is just about to happen, how they're going to deal with all that. Because often there are also different opinions, still the pharmaceutical industries have in certain areas different opinions in comparison to what probably is publically discussed. Because one has to know that the pharmaceutical industry has overall a really bad reputation. Its amongst last ones, when you look at its ratings, it's probably between tobacco industry and weaponry. I know it's really bad, and this is just because the pharmaceutical industry, how the link to the society happens. They're still linked to the individuals. You only need a pharmaceutical product if you're sick, you got into an injury and so on. If you're fit and healthy, you're not one of their clients. So, the only point in time when you use them is when you need them, and there you get a good impression because that kind of specific medicine helped you. Before that, it's only a cost burden. Through the healthcare system. I mean that's really a next course into the reputation but that has also kind of an impact on how SC topics are discussed, they are always looked at a little bit in a way, when I look at these specific outsourced services area, there is far more criticism on the pharmaceutical industry in comparison to probably other industries.

(L): Do you think the majority of Swiss pharmaceutical companies have local manufacturing sites, or global supply chains?

(H): There are some local manufacturing, not that much anymore, like Roche, produces nearby Basel but also in Basel itself. Novartis has also some minor production still in Switzerland, Roche manufacturing also in the diagnostics business in Rotkreuz near Zug. Other than that, it gets really small. Lonza I think also some in the Geneva region towards Valais,

but other than that it's to a large extent globalized. So, in many cases they still manage a number of procurement streams and processes from the corporate headquarters, but also at the same time a lot is happening on the local level, at the same time. So, I mean, they do then procurement and supply chain management in the way that, not only in relation to sustainability topics, but also usually in a risk-managed manner, which means to consider the highly crucial and important products and therefore also the steps when it goes towards assessing sustainability aspects, follows the same kind of routes. Highly important things which are then on the top of the list also, getting things scrutinized more in terms of sustainability issues while at the same time still not insignificant, but if you have something like this pen, not on the top of the list, then it falls back into the processes behind.

(L): So those companies, the majority with global manufacturing sites, where do you think most of their sites and supply chains spread in what regions mostly?

(H): The US, certainly a really significant player, in terms of manufacturing, which is also criticized by the US, not that they produce there but that they also have to import products. Asia, I think is growing still, so we got operations being built up, but also Singapore of those I know. My assumption is also in relation to growing in a future market, so a lot of opportunities still there, while at the same time in Africa there is hardly any manufacturing happening. Usually because of quality issues and lack of capabilities and skills being available so therefore that's only like a final product use over there. Latin, over the time not on the growing end, but rather on the reducing end, I would say. Nowadays, it's also a matter of technology, often manufacturing is changed in a situation where they switch to biotechnology, for example. Because that allows to reduce size-wise capacities, that allows to optimize certain streams as well, you've got a kind of risk exposures in terms of environmental issues, as well. And that for example allows to reduce number of sites and locations which are plain and simple not used anymore. There is no need for that capacity anymore. So, you can start reducing manufacturing capacities in certain areas, and therefore also optimize for example towards what kind of products you have, do you need any kind of logistical distribution network all around that, if it's for example that needs to be frozen or something like that. That all has an impact on where you do the manufacturing.

(L): So, when the manufacturing or SC players are in some of the regions that you mentioned such as Asia, for example, and then the companies that own these sites or deal with these players claim to have high sustainability measures, how real is that?

(H): External auditors can only audit what is visible, what is there, what they can touch probably. And in the case also what is documented. Auditors have significant issues when it's about for example, coming up with a statement whether something is complete. To explain that, if you have something like safety issues, if you are not there at the time when it happens, when an accident happens, you won't be able to say oh that's been reported, that's been accordingly managed, all the measures are in place, afterwards. If you don't know, that it happened. And as an auditor, you always come in afterwards. So therefore, that is one of the most significant issues. That is not only true for our business, but also those who do audit on a SC level. They can of course conclude on certain things, but only to the extent of what is currently there. Also in other areas, when you go to Bangladesh and the textile industry, you won't see if women, men were treated fairly. If you only go there, and look at the numbers and look at the documents. This is where it goes beyond, and actually in a number of incidents, it helps if not only the auditor is reviewing and criticizing sometimes things, but otherwise the stakeholders in general. NPOs, NGOs, who are like an additional layer of scrutiny. An additional layer of stakeholder reviews happening, because they may be able to have different access to certain topics, and give you as being the responsible company, only the opportunity to respond to it. Because you may not have known before, because it's not visible, because it's not always easy to identify anything if you only rely on super duper processes in place and documents, which I said sometimes is not always complete. So, in short, there are probably gaps, sometimes you just don't know.

(L): I think in the example you gave, when it comes to health and safety measures you probably wouldn't know until an accident happens, or the example of the textile labor conditions. But I also think of the environmental conditions. Because I think sometimes there it is more visible.

(H): One thing which is really important is that as a company, as soon as you go into a market with your manufacturing operations, which not to say is studious but it has its challenges, you need to manage these challenges in particular as well. For example, if you go to China, you need to know in what kind of political environment you are in. you need to know what kind

of impact that may have on environmental and social issues, is that in general an environment which is dealing appropriately, aligned with your expectations with dealing with these kinds of issues? Or is it different? And if you accept that actually it is different, you need to come up with counter measures in terms of either you've got risk management procedures in place, or what I actually always recommend is to act as a company as well on the regulatory level. You need to at least initiate the discussions on the regulatory changes. If there is no law, you need to push governments towards certain laws. Because that is in line with your expectations then. And this is often not happening, to be honest. Because sometimes companies are scared a bit to deal with governmental layers. They rather would like to have the freedom of doing what they want to do, and getting less the regulatory influences in their space. But I, this is really my personal view, I would rather see the other way around. As a company, you may be able to shape and drive certain things better, towards your expectations, rather than actually just wait and see what comes.

(L): What do you think are the main operational and strategic challenges that pharmaceutical supply chains have to deal with?

(H): Certainly, the whole topic of transparency overall, is really really difficult to handle. If you look at the topics that fall under environmental and social issues, to what extent do you have on a tier one level access to that kind of information and the reality behind, and if you think beyond, what is possible by tier two or tier three level to really understand where the issues come from. So, if I supply from south America do I really know what happens when I take that XY ingredient from an intermediate dealer who takes the product from south America, which is produced somewhere one way or the other still meeting all the qualifications and so on, good manufacturing practices, but I would not anymore be able to really identify how from a safety point of view things have been produced down there. That's where transparency kind of fails. Because many of these topics are really really complex. And they also fall as I mentioned into areas which are different region by region, country by country, like safety does have the same kind of definition here as it has in Bolivia. And how do I take care of all these issues. That is where, I mean, all over Supply Chains try to become more transparent, also by introducing digitized tools, for example, where you can trace the information as well, where it comes from, from the root down to where it's used afterwards, but in some of these areas it's still not complete. Human rights issues, that is really really difficult to take care of,

how do you create transparency along. This is probably also the reason why for example when you look at human rights issues, companies tend not to go for only trying to find out what their suppliers are doing, but rather to build up a system and a framework around that. So where political risks are assessed, where they try to understand are we working in an environment where some of these issues are managed in a specific way which is in line with our expectations. But it may not mean that they need to know do they have child labor on a tier three level, for example. More is a whole kind of process that we have set up, sufficient to avoid these kinds of issues as well. Because they know in terms of transparency it becomes really difficult at some point. And also, the quality behind what is available, often is not sufficient, that for example often results in any kind of claim or also measures that come on the level of a Swiss pharmaceutical company that they are not able to enforce something but they try to collaboratively work with the companies or the suppliers in order to improve things. So, they know, we're not here to sack certain suppliers, because they're not meeting our expectations, but rather let's work together with them so that we actually meet in future our expectations. Which is also kind of another approach, and in the end, helps to drive some of the stories on the level of the suppliers as well.

(L): So, with the example of transparency being the biggest challenge, how do you think such challenge is faced?

(H): On the one hand, it's that the third parties' kind of jump in, as well, so besides some of these PSCI initiatives, there are also some like EcoVadis, Sedex, these kinds of organizations, which in particular focus on supply chain issues, and assess these suppliers as well, and make them as well go through some kind of ratings, and available to all those who buy products from them. It's one way to address transparency. So instead of addressing one single company going through all the tier levels and try to find out what's happening there, it's kind of separated, so you analyze all of these suppliers individually, but you still then get directly access to (such as Roche here in Switzerland) to those companies and the ratings they received on a tier three level. So, that's one way of handling, or at least addressing the transparency issue, there are other areas where transparency is sort of creating the way that you come up with methodologies on a generic level, understand the impact that you generate, throughout the whole SC, so for example, we are able nowadays to sort of calculate the impact on carbon footprint, throughout the whole SC, because and that's where

transparency is now also created, because we know how the trading streams are happening on a global level. We know what is transferred between Switzerland and Germany, and from South America to Germany, we know if we buy a product like that, what's in here (points at cup), where does it come from, most probably, and then along that we know based on that trading information we know roughly and applying some calculations what is the impact that comes as well. Who has produced something like that, we roughly know. Without actually going to the country it was produced and trying to find out we know based on today's transparency on what is happening on the global level in trade, in general. And therefore, that is also an approach, so you use these kinds of methodologies to understand better the impacts that they generate. What is the economic benefit that you have, for example, what is the environmental impact, that you have as a company, and that kind of information then is used to optimize your SC, in the way that you know better where to shift towards different or other products or also other manufacturing places. Which allows you then to come up with the decision, is it better to use here or here. So, these are things which allow to resolve that and then also I mean it's rather simple, but what you got available nowadays through social media or public channels, which are not under real control as a company, still that's still a really an interesting source to find out what's going on, within your SC, if you're willing to do that, it needs to be framed into a system and process as well, otherwise you float around, as a company, but that's also an interesting source to find out what's going on, and interview that view into a knowledge, or information build up process, on your SC, in the end.

(L): In what areas do you think sustainable supply practices in the pharmaceutical industry in Switzerland need improvement?

(H): For some years, most of the companies were a bit reluctant in actually considering in a systematic way all these requirements, until they were confronted either with legal claims or issues that didn't come out of the Swiss environment, but quite often a US regulatory environment, where certain claims were raised or were also highly critical products and services they used were publically discussed and they would have to give an answer to, as well. That's one area. Where they improved on one hand. I still believe there is room for improvement when it's about simplifying these kinds of analytical procedures, and risk assessments on suppliers. I have my doubts, not knowing actually what the reality looks like, but I really have doubts that when you speak about 60,000 suppliers, that this is a number

where in reality you really know what's going on in there. Because in the end, if you are facing the truth, it still could be that one single pen can result in a big issue. Because it's being produced by someone who is not supposed to be producing something like that. So, the optimization and reducing their approaches where it matters and where it creates impact, what are the areas where they are negatively creating an impact. What are the areas where they need to improve along as well. I believe this is an area where they should still work on, because it's actually in the future not getting easier but even more complex. And if one company starts at that level already in terms of complexity, how will they be able to actually manage something which is even beyond that in future. So, I believe there is a need to reduce that also to something which is manageable. To something which is optimized for their needs. To something which is really addressing material risks and not bunch of all other things as well, which are not totally irrelevant, but probably not on the same level as some other topics.

(L): What would be the reason for this complexity?

(H): The reason is often that when you look at the Swiss pharmaceutical industry, there is a lot of history behind. Most of them have started their business 100 years ago, beyond, they have changed, merged, grow towards the size of today, and as well, how they have organized their business, it's all about either trying to find the right ways to produce or manufacture products, and at the same time distribute them accordingly, and what we have today as well, they need to find future opportunities, which often come along with merging or buying research and development organizational startups, which makes the whole organization itself far more complex. And this is happening throughout all the pharmaceutical companies right now. I believe also one of the reasons why they are now here, the strong discussions all around on where and how could they merge, even the big players. Trying to merge. Or at least collaborate, they sometimes do that now, or exchange parts of their organizations, or one party is switching to the other one and vice versa as well, to kind of simplify certain things as well, because they have realized we have grown into something which in particular when looking at SC issues makes it not easier. Quite a few of the Swiss companies also have the tendency to not have an entirely centralized view, but more of a decentralized organization. Which is also adding another layer of complexity. If you give power to an affiliate abroad, and they organize themselves in a certain way, and you would not exactly know how that is done here, while sitting in Basel, in terms of what I mentioned in the beginning, having something

which is consistent, which is actually managed throughout the whole process, this is not easy. There is also a little bit a tendency within the Swiss companies, to decentralize things, in one way, because the Swiss mentality of managing often means I'm not guiding you, I'm not telling you what to do, I'm only telling you that you have to be there. How you get there, it's up to you. And this is sort of reflected into many of these management approaches they have, not all, I mean there are certain areas where I would say centralization has happened as well, but certainly not everywhere. And also, what comes into the game then is how does the competition look like, supply chain being a cost factor as well, or a factor which creates risks, certainly in comparison to competition, one wants to be better than the other ones. And positioning themselves in better ways so that they are ready for the future, also not in particular the pharmaceutical industry that has these issues but the Swiss companies tend to react slower, not always be forerunners in many areas, ahead of the curve somehow, but they try to react and actually just be behind the thought leaders. Often, they're not entirely thought leaders, they try not to lose contact to the leaders, but also it happens that this Swiss approach also comes into the game, not expose too much, not go beyond, not force a perception which they can't fulfill probably afterwards, and therefore, there is that kind of reluctance somehow.

(L): What would be the main gaps if a pharmaceutical company wants to implement a sustainable supply chain?

(H): Yeah, transparency certainly a thing. One critical aspect which kind of links to all things that I mentioned before is certainly as well, when speaking about a risk-based approach, that risk assessment really needs to happen in a systematic and process- oriented way. Again, if you got that many suppliers, it's close to impossible to manage them individually, so therefore you need to come up with a decent approach. And if you come up with a risk-based approach, that needs to be defined along certain corridors, and pushed through the whole organization on the one hand, but also through all your suppliers. And, also often what we learned in the past, not that much true today, but what we learned in the past was often totally under estimated, in terms of efforts behind, in terms of resources needed, and so on. So, the initial process to kick it off, is crucial, because it sets the boundaries, but when I joined 17 years ago roughly, 10 years ago, some companies started to do that, and they failed entirely, because they were not aware of all the complexities, of how complex their procurement and supply

chain looks like, and they were not succeeding afterwards, so it disappeared. And then it came back roughly 5-6 years ago, again, when it was kicked off again because of some external pressure happening. That there needs to be more transparency in the SC, that there needs to be more accountability on your SC, so you need to manage them, and because there is that complexity and volume wise, size behind, that risk- based approach should be in place. And also, it should be totally clear what that means. So, the different steps, in terms of sustainability, but also the other areas, and who is responsible, so the governments come along as well, the problem often is while it's allocated to procurement functions, many of these decisions that happen are all around the suppliers, are not with procurement, and still those around procurement need to be aware of the requirements, all around the sustainability as well. Otherwise it falls apart again. If line management decides that I need these products, because of so and so reasons, and procurement only is there to decide how much we pay for it, then the whole system doesn't work anymore. So therefore, it's not only about having a consistent signal, function that takes care of it, but also all the actors and interfaces need to be aware of these requirements as well. And this is actually something which is not always there yet. We see still some gaps and not functioning linkages amongst these individual lines towards the line management or operations as well. Sometimes because of awareness issues, because it's not their daily duty and task, to consider what is actually a sustainable supplier, and therefore, they just miss it somehow, and that means sometimes that the topic of sustainability is not entirely integrated into a company. So, it's still allocated to, let's say communications, some procurement things are happenings, and I don't know, anything else. But it's not part of the operations yet. And therefore, it's probably not properly working.

(L): I was talking to Novartis the other day, and they mentioned that there is a company in China, a single source for a certain molecule that goes into one of their products. And that got me thinking about single sourcing in general. Do you think a lot of pharmaceutical companies are forced to single source?

(H): Down to the level of molecules, I don't know, to be honest (laughing). I could pretty well imagine. You've got certain materials considering for example rare earth issues or things like that, just imagining that this also appears in the pharmaceutical industry. That you're totally dependent on single ones. On the other hand, what is also happening, what I think is often

underestimated the suppliers who are also dependent on you being the procurer. So therefore, it's an interactive relationship, which also can be managed, I would not say that either of those is in a stronger position. So therefore, both would be able to have the discussion.

(L): I thought, single sourcing as a procurement practice is generally avoided as much as possible, to ensure standards are met. Of course, there are certain scenarios that you must single source. But then, because he mentioned the supplier was in China, and actually the reason he mentioned was because it was already in the news. So, they source from this single source, then there was a fire in that factory, and it shut down, and now Novartis is now using reserves they had, but there is now a big issue in Germany where the product ran out, so they're facing stock outs generally. And the factory in China is not allowed to reopen yet, because it turned out there was a lot of environmental and waste management issues that came up because of this incident. Which made me think about the sustainability factor.

(H): If that's true, then it's a perfect example for either Novartis or whoever was responsible for kind of ensuring that if you've got a single source, the old different measures all around that need to be secured, that was not there obviously. So, it surprises one how can that happen, because in the end, it's not in particular a sustainability issue, I mean, you got the environmental issues on top of that, but if you're not able to produce, and you run out of products, that's a critical situation.

(L): What do you think are the selection measures that pharmaceutical procurement departments follow, in general? When I ask a pharmaceutical company, I don't influence the question and I try to see if they use sustainability issues are one of the measures. So is it, cost, lead-time, or whatever main criteria for a procurement department. Do you think the Swiss pharmaceutical companies refer to a sustainability minimum standard when looking up a supplier for the first time?

(H): From the ones, I know as a company, I would believe yes. At least a minimum aspect. So, for example, speaking about safety issues, and safety directly links to also to a situation as you just described, if there is an inappropriate safety environment at a supplier, and it is a critical one, in the end it is rather a translation of what safety means. So, it's not a pure sustainability topic anymore. In terms of, you need to secure your people's lives and health status, but you need to secure that in case of an incident, not only people get hurt, but also

your products still can be delivered. So, that for me as I said, knowing these, and knowing their minds somehow, I believe yes. I would not be able to prove. On the other hand, I also believe that there are probably certain issues which are at the initial stage of assessing a supplier, not on top of the list. Which may be followed up afterwards, but where probably when it's a really crucial product, when it's one thing that I don't know for whatever reason, there's no other way of going for it, or in a comparison situation you decide that certainly is the cheapest supplier we have, and therefore, we need to go for it, so that may be a situation where I assume probably sometimes, some of the sustainability topics, do not appear on the front page of those assessment criteria. While at the same time, I know, particularly when looking at Roche, as that's the company I know best, they have highly critical aspects they go for each and every time. So, if one fails already at that stage, it should not even appear somewhere on the potential vendor list. On the other hand, we know nowadays, even though you may think when you got an iPhone, everything is ok, when you deal with apple, when you deal with Lenovo, and so on, everything should be ok, that's a well-known brand, there is still probably an issue. The question is then more if I'm a pharmaceutical company, is there is a risk that I am going to be held responsible for it or not? Or is it just a product that I use accidentally somehow, but it's not part of my critical SC which results into what I produce as a service or as a product. I think that also needs to be a little bit differentiated. Where in my value chain do I have these things appearing. If it's a part of my core value chain, I think you need to be far more cautiously looking at things, and I believe that the ones we deal with, they do that, probably not on the full extent of the list, but what's available. Because when you look at the PSCI framework, and what's in there, I think at the initial stage of when an assessment happens, it's not the full framework which is applied. It is the initial stages that are true, and then you go to the next one. I mean usually what they do is if they identify certain issues and if there is something, they go towards the next stage. Which is probably requesting further information from a supplier. If that's still not resolving a situation, it's about going on-site, doing an on-site audit. That is all enclosed in the framework of a contractual obligation. And this is true for all actors now, so the Swiss companies they have standardized somehow that within their contractual agreements, there is a section on sustainability, code of conduct aspect, which in the end also allows them to go through the whole chain of further stages until it ends at the level of an audit. And there it separates, so

some do that themselves, some others, outsource that, specifically, and sometimes it's also a matter of what can we outsource, if it's something which is not that critical, or is there an area that we need to take care of ourselves, it's not possible that we outsource that, so we have to look at the situation, how it is in reality ourselves, and we send our people. So basically, saying that we would mean health and safety people, and environment people, would be sent from Basel to somewhere to look at the supplier how he's doing that, and not as yes, for example. So, you kind of separate also what as a third party doing an audit, is responsible for, and where are we still interested to actually do that ourselves.

(L): Thank you very much for your time and for sharing your knowledge. I shall send a transcript of this interview once ready, for verification purposes.

(H): Thank you.

9.2.5. Interview No. 5- Galexis AG

Interview with Mr. Christof Amstutz, Head Business Services Sector, Galexis Group- Niederbipp, 27th Sep at 14:30

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

Amstutz (A): I'm Christoph Amstutz, I'm responsible for the business services in the Galenica Group, and I'm also responsible for this company, for the Galexis. So, Galenica has three parts, one is services, containing pre-whole sale, wholesale and medical information, data information. We have a retail chain with about 350 own pharmacies, and we have an OTC (over the counter) department. So, these are the three main pillars of the company, and I'm leading the service part. In Galexis, which is the only wholesale in Switzerland which has three distribution centers, here (Niederbipp) is the biggest one, one in the French part, and one in the Italian part. So, it's my duty.

(L): Which main pharmaceutical companies do you deal with?

(A): With all. So, we have 1,100 suppliers here. So mainly all the companies are delivering to Galexis, and we have full all medications that are more than 8,000 SKUs (stock keeping units) and we have a lot of paramedical, and a lot of products. But we are dealing with, its open for all pharmaceutical companies, there are some specific companies with rare disease, they only deliver directly. Directly from the pre-whole sale or from their own warehouse.

(L): Can you give me an example?

(A): A company with a unique medication for a rare disease, that has to be measured and controlled by the company versus the patient and the doctor using it. Not all doctors can use it. And so, they distribute it directly, from the warehouse, from Alloga, from the pre-whole sale from us, to the patient, via the doctor. And so, there is no whole sale link between it.

(L): And when you see all the pharmaceutical companies, that means not just Swiss pharmaceutical companies?

(A): No no, it's from everybody. So, all Swiss registered medication which is available here.

(L): Can you tell me a bit about your experience before Galexis?

(A): Ah, so I started my studies in pharmaceuticals at a polytechnicum in Zurich, stopped it after some years. And went into the industry, started as a sales rep, I was product manager,

marketing manager, here and in Germany, and I have a degree and Masters in marketing, so that's my base. And after 20 years in the industry I changed into the SC, you can say, so I took over a small company, with 120 people, mainly distributing in the wholesaling and pre-wholesaling, and they had also own products, so a little Galenica. So, after 3 years we sold this company to the Galenica Group, and was brought over to this, and around 4.5 years pre-wholesale business, and in the past two years I'm running the whole part of services and Galexis in special.

(L): What do you think is unique about the pharmaceutical SC? What makes it different from a SC of another industry?

(A): Especially, it's the release of goods in Switzerland. So, of all the goods coming in from abroad, or from a Swiss company, has to be released for the Swiss market. So, if you want, after the registration process, that's clear, that's everywhere the same, so it's also a special case, you have to wait before you can start with your product, before you have to meet the registration procedure and get the acceptance of the Swissmedic, or the European MEA, before you can sell your product in a certain country or in the EMEA, after that, every lot of the product has to be released by the responsible person of the company, and it's always the company has to release it that it fits to the specifications of the product. So, the quantity, the quality and all this has to be specified, and to be controlled. And after this release process, the goods are released into the market.

(L): So, what's the authority that releases them?

(A): The Swissmedic demands from the authority holder that they do the release, following their specifications. So, in the technical industry you have also specifications to follow, about quality of metals and the tests, but in the pharmaceutical industry it's really, it's not one. It's per lot, per production lot. And so, after each entrance of goods into a Swiss area, where you have an own release, the MEA release is not sufficient, so we have to release it in Switzerland. And after release we can sell it in the market.

(L): Does that take a long time?

(A): It can take long time, if there is a deviation, then the company has to show to the authorities that the deviation is not dangerous for the patient, because it's all patient treatment, at the end, there's always a patient behind it, it's not a technical matter, so if a car stops in the industry, it's a problem of your reputation, but here it's really the patient at the

end. Plus, the reputation of the company. And this is special in the SC, I would say, because you're treating people or animals. At the end, it's always living subjects. And that's a little bit difficult, and then we have the regulations about temperature, of transportation or storage, which is not different, far different, from the food industry. For example, food industry has frozen goods, cold products and ambient products, and that's the same with pharmaceutical products. So, there is also the problem of falsified products, not here in Switzerland for example, because we have no transfer via parallel partners, for medication, it's not allowed to do parallel imports, and therefore, normally we get it all from the producer. So, falsified medicine is not a big deal here in Switzerland, but world-wide it's one of the biggest threats for patients, that you don't get what you buy, or even a dangerous mixture of the products, and there we have a certain control role as a wholesaler too, because we have to prove that our goods are bought at the right place, and not bought somewhere in the market that we don't know about the origin of the product.

(L): What added value do you believe your supply chain department brings to your organization?

(A): In the company or the distribution?

(L): On the distribution side. Sorry, when I say company, I'm referring just to your company.

(A): So, we know the example of pre-wholesale, which is a three PL (third part logistics) to the industry. So, the industry doesn't have any storage localities in the country, 3PL makes this storage for them, so the entrance of the goods, control of the goods, storage of the goods, distribution of the goods, it's transferred to a third party, and so we are doing that as Alloga, as pre-wholesaler, and on the other hand the wholesaler, who has all the products from all the companies available or registered in Switzerland, that's easier for a customer like a pharmacy to buy at the same place. Otherwise they have to buy at 150, or 200 or 500 companies which makes it quite difficult. So, this service is really holding stocks, enough stocks, in a good quality, with a certain life- time, and distributing them at the right time to the customer is an added value to the normal SC, for producing companies.

(L): How do you deal with incidents such as stock-outs?

(A): Helvecura is an NGO, they demand the company have to hold a certain reserve stock (a compulsory stock). So, Helvecura is unique in the world, I'm working also for the state of Switzerland as a militia at the BWL (Federal Office of Economic Supply), so I'm working there

and to help them at the department of medication. (I'm not an official of the state, but I'm working for them as a part time work, so I'm not on their pay roll, like we do the military service, we are not professionals, we do it on the side, of course). So, they get the best people knowing the certain aspects of this business and bring them together, to have them as an expert opinion. And we are deciding at this place which medication can be in danger of not being available. And one of the criteria is, is there only a single source? Of this molecule, of the production? Then it can be in danger, and is it very substantial for the Swiss people, if it's a basic medication and people will die when they don't get it, and there is quite a big range of people suffering from a disease, it's important that this molecule is available. And if there is only one producer, and only one company selling this product in Switzerland, it could be in danger. That's an alert, and we could decide that a company has to hold a certain stock of 3 or 5 or 6 months, in Switzerland. And Helvecura is an association controlling this, so it's a self-paying association, it's not a profit center. It's really an NGO. So, this Helvecura has the obligation to check if this storage demand is respected, and the good thing in Switzerland is that the state is not buying this medication, they're only keeping the right to keep this stock available. And it's the normal turning stock, so the goods are always on a good level, on shelf-life and quality, and if necessary, and there is a stock-out or a no availability of the product, the state can open this reserve and say ok now, you can go below the stock of 3 months or 4 months or 6 months, and selling from this stock. And that avoids the non-availability of the products. It's a smart system, and you have on the top all companies which have these compulsory stocks products. They have to hold this stock, or even, we have a watch list of products that can be in danger of getting in a disruption of stock, they have to mention to the state if they get in a problem. And this list is published by the "Bundesamt fuer wirtschaftliche Landesversorgung" (Federal Office of Economic Supply), on their webpage, and you can check there if a product is available or not, or if there's a stock problem or not. So, that's a state duty, to open this list, and the companies have the obligation to inform the state and to keep the stock, and that is a certain security to keep the drugs there.

(L): Are there any sustainability measures that you take in your operations?

(A): Yes, of course. We count if the product is available in the market, if not, we are mentioning that on our order-list, it's not available at the producer. Or its not available because we didn't buy enough goods and store it in the warehouse. And when it's available

again, that's all mentioned in our web-shop. And normally we have for the fast-moving products, we keep a 10-14 days' stock. For the slow-moving it can go up to half a year, a year, and the total turnover in this warehouse is normally 18 times a year. So, we know exactly how long this product should at least be available in our warehouse. And then we have the additional stock in the pharmacies, so in the hospitals, which is normally 5- 10 days for a normal product, for some fast-moving products it can be 1-2 days. So, you have to have this on, and you have to have the stocks in the pre-wholesaler or in the producer's warehouse. And that altogether gives the duration of availability, and then we have producing circles, and so on. So, you can decide when it's available and when not. So, we check that, yes, and it's public for the customers.

(L): Actually, when I refer to sustainability I was referring to sustainability as in economic, social and environmental sustainability. For example, the means by which you ship, do you select manufacturers based on certain criteria, or was there an incident where you said I don't want to deal with this company because of so-and- so measures that you think fit with your values?

(A): You can check our ethical values, that on the internet, on Galenica.com, there is all this suppliers' rights and duties, so you can ask directly, and you can download it. Also, our ethics its available there. So, check that, it would help you. Of course, if there is no registration or no distribution allowance for a company, we can't deal with them. So, they have to fulfill these criteria, we demand a supplier to fill in, and to sign it, that they follow the rules of the Swiss society, and of the registration and all that, for medications. And for the products, that they are in the confirmation that they keep their confirmations, they have to sign it, and then we can open it. Before, we cannot in any supply.

(L): And when you distribute, you distribute only in Switzerland?

(A): Yes, only in Switzerland. And we can only deliver to the authorized persons, doctors have a certain portfolio of products they can order, in Galexis and the wholesale, so they have a narcotics license, yes or no, if no, they will not get any. Do they get the right to have other drugs than parental drugs? And all these limitations are in our database, and the delivery of goods id linked to this, and if they're not fulfilled, and have not the authorization from the Swiss medic, from the state, they will not get any of this drug. So, they're blocked.

(L): How do you make sure that is always monitored?

(A): That's always monitored, it's the base of our ERP system. So, it digitalized and we upload it from the state's web page. And we demand from the new customer, always these papers. So, they have to send in the actual papers from the Swissmedic and all these permits. And then we open it on the system, so it's all system-driven. And the permits are valid for half a year or year, so it's notified by the state, and we have to upload it, on a regular basis. But of course, it can always happen that something is late, but its checked and re-validated every year or half year, and then we check out these people, to get this permit. But it's all electronically based. Not at risk of human error.

(L): What are your biggest operational or strategic challenges when dealing with manufacturers (your suppliers) or with your distribution customer?

(A): That we don't get the goods, that's one of the things. If the product is not available, and there is always the risk that they distribute it on a certain list, that they say we will only distribute it to the doctors, hospitals directly, not via the wholesaler and so we would run out of goods.

(L): But do you not have an agreement?

(A): No, in Switzerland you have no preferred list. Of course, we are the biggest Swiss wholesaler, we have 50% of the Swiss market, and normally we get the goods. But it could be a smaller company, a smaller distributor, and have a problem to really get the goods, because they have only part time orders and not regular orders, and then they take out this, and go to the big distributors. That could happen. But, normally it's working very well. And from the customer side, no, it's not a big deal.

(L): I want to ask again about sustainability. Do you feel the SC practices in the pharmaceutical industry, from a distributor's perspective, can be improved in any way?

(A): For our distribution, it's easy. The orders are normally coming from a pre-wholesale company. And shipped for several companies at the same time. And we have here a wholesaler list, that means the company delivers every 10 days, the same day, to us, to avoid that we have overstocking good, or too many goods, and so, there is a regular ordering process. So normally it's a 14-day cycle that they deliver, and we avoid to have this express demand between. So that avoids costs, and too much traffic on the way. On the other hand, we are distributing normally, with smaller freighters directly to the customers, and there we have the demand of the good distribution practice, that means control, temperature control

and products in a van, and these vans have now limited weights, because we have all these cooling and heating equipment on board which will use the loading weight. And therefore, we need more tours, we run more often than before on the same route. And that could be avoided if the law allows us to have higher loading, in weight, then we can avoid environmental damage. And on the other hand, what I'm planning is to have an electronic fleet, so no more diesel. But at the moment the weight of the battery is at one ton, and that's the normal loading of the truck, like this. So, we have to get there in a higher overall weight, so the tare weight of the battery has to be taken out. And there we are at the moment with the Pharmalog (Association of Pharma wholesale), the all services are together in an organization that's Pharmalog, we try via there with the state to bring up this overall weight of the car so that we can use electronic cars. S, it could be a chance, for a better time. What we have normally, the companies they avoid, they want the packaging has to get cheaper and cheaper, so they avoid to get good cartons, and in the production, here we often have problems in a scratch or damage to the cartons, and we can't sell it anymore. Because it's so light weight carton at the moment, that we have really the problem. Because they make the maximum on optimization of this cartons, and packaging, and at the end, the handling of these cartons, is quite difficult and dangerous, because no client, no patient will buy a box which has a little scratch. But the product is still ok, but it's medicine and they say I pay for it and so it should be 100%. So, there I think we have to avoid that packaging is reduced to the max, and no more destroyed goods, which are normally healthy and well. Only because there is a scratch in the box.

(L): And do you discuss these issues with the manufacturers?

(A): Yes. But I don't feel they always listen. It's always, marketing listens to us, but production has a certain goal to reach, it's a financial goal, and a capacity goal, and of course, there is always between marketing they say: of course, we should avoid this, because patients should have the best material, and on the other hand, it has to be the most economic packaging.

(L): You mentioned that you're one the biggest distributors in Switzerland, so I imagine there are others.

(A): Yes, we are the biggest, and there are three others.

(L): Do you have any collaboration agreements with any of them?

(A): No

(L): Is there a reason?

(A): Because we do our business and they do their business so there is no collaboration between us.

(L): So, the 4 of you, you distribute completely different products?

(A): No, the same products, but the client at the end he decides with who he may work. So, either we are the main distributor for them, or it's another company, or it is another company, another wholesaler. So, you can roughly say in Switzerland, we have the full wholesalers, we are the full wholesalers, we have all products, we have 100,000 articles, and we have nearly 50,000 on stock. The other 50% of market share is taken by 4 other wholesalers. And then you have the short liners, they have only a certain article line, only fast-moving products and other special products, and I would say from them there are around 20- 25 distributors. But mainly they're distributing to doctors. Because they have a smaller assortment than a pharmacy, and so they work perhaps with 10,000 articles.

It's really special, and in Switzerland, we have areas in Switzerland, doctors have the right to have their own pharmacy, so there is not the 4-eye principle, the doctor prescribes and gives you the medication, and you buy it at the doctor's office. And we have certain areas we have the normal prescriptions. So the doctor prescribes, you go to the pharmacy with the normal prescription, and you buy it, and the pharmacist on top is the one who is checking the prescription and decides if it's a good prescription or not. And that's really an old story because in the mountains we had no pharmacies, or in the country sides, and the doctor had the medication in place, and that's the traditional story. So, one third of doctors in Switzerland distribute medications. And two thirds have only prescription rights. So, if you live in a town, normally you get a prescription. If you live on the country side, you may get your medication directly at the doctor's office.

(L): Do you think initiatives such as The Responsible Business initiative would affect any of your operations, or any of the pharmaceutical companies' operations?

(A): I would say in the pharmaceutical industry normally we have so high demands and perhaps ethical, it's not always ethical but it's called ethical, needs and demands, that I would say that it would not change. Because for example, in the pre-wholesale business, all pharmaceutical industries demand this already from a pre-wholesaler, 3 PLs have to sign that they are ethical, that they don't have children work and and.. And we demand the same here

from our suppliers. So, if they can't prove that they don't have this social responsibility and ethical behavior, we can't buy from them. So, I think it will not change in our industry.

(L): What's your intake on single sourcing in the pharmaceutical industry?

(A): You can say, normally product families are the problem. For example, you have antibiotics. It's very difficult to produce it, you have a lot of demand for this production, and you can only run one product on a production line, so it's very expensive and at the end, antibiotics doesn't cost anything at the moment. So, it's not interesting for the companies. So, what are they doing? They sell or they buy all in the same companies, so for example, Pfizer will produce in one pharmaceutical production site a single antibiotic, and Novartis will buy from this source. So, everybody is buying from the same source. And if they have a problem, especially antibiotics, and also cancer drugs have difficulties about pollution or infection of this production site, they're fading out. And we saw it in the last years, from vaccines, a lot of vaccines are not available at the moment, even basic vaccines, as tetanus, it's basic, you need it, it's not available at the moment in Switzerland for old people. So, if you want to go on holiday and you demand from your doctor tetanus vaccination, he will say sorry, I don't have it. So, there we have problems, because a production site of a vaccination is two years. If you destroy a lot, you are out for two years. And it's also a low margin business and investments in vaccination is low, so there are many companies producing it. So, I would say, if you high price medication, normally the interest is there to have 2-3 sources and you guarantee the production. But for old drugs in low margins and high demands in production, we have always the risk to have this drug no more available in the future.

(L): So, do you think there could be more than one source sometimes, but there is less interest?

(A): Not interest, it's not existing, so the investment is not done. So, for the vaccinations for example, the companies are building now new facilities and production facilities but it takes 5-10 years. And the investment is quite demanding and you can say it's not very interesting on an economic scale. But, from the demand as a pharmaceutical company normally it's a moralistic need and you have to do it. So, otherwise you get in problems as a company. And therefore, some companies in the past they sold their vaccination business, Novartis for example, they sold it completely, because they wanted to get rid of this risk, to be in the press. And now there are 5 or 6 companies having the whole vaccination of the world. That's scary.

That's scarier of the rest of your questions here, so there is really a risk, and now the companies in this field, of course they start to build up new facilities. But the third world, starts now also to vaccinate their people. In the old times, it was only the developed countries. And now these goods are passing to the third world. The WHO has helping programs, and taking away vaccinations from the industrial countries, and in the industrial countries we are missing these drugs. So, there is a shift, and an interesting shift in the future, either we pay for these drugs on a certain level, and guarantee that there is investment behind it, or we will lose vaccinations and safety. And when you die out of tetanus, that shouldn't happen, that should really not happen. Or pertussis (whooping cough) for children, if they have this cough, this hard cough, they die from that, but it's not necessary. Not in an industrial country, we have to avoid this, and that's a demand, that's a need. So I would say, for innovative drugs, new drugs, the risk is very very low. But for cancer drugs, old cancer drugs not the new ones, they are far away from getting rid of, so the old ones, the basics, they cost just nothing. It's always, I would say, it depends on the cost, and on the margin. If there is a very low margin, and very low cost for the product, and it's old, and it's not protected anymore, and the generics are not interested to jump in this fill, you will lose this product, and then we have not the supply of it. There is also risk of having increased medication cost in the future because then you have to take only the new ones. Could be a risk. But there, I would say, for industrial countries the risk is to lose these goods, what I told you before, not for the rest. For the rest, I would say we are quite safe. And especially when there are generics, 6-7 generic companies, they have sourcings, 3-4 sourcings, and the original company has 2-3 sourcings, then we are out of danger. There is enough production not have these goods, these medications.

(L): Thank you very much for your time. Would you like to add anything?

(A): There is a company that distributes to the news shops, and yes they are also taking medications with them, so they are distributing for the wholesale to the doctors and pharmacies on their tour, because they have the early tour with the media, they have to end up at 6:00 o'clock and then they have capacity to transport medications till lunch time. So, they have their cars developed now at GDP conform, and temperature controlled, so you know this link between media could be very interesting, because you have everywhere a new shop. You have more new shops than doctor's practices and pharmacies. And we built up a

collaboration with another similar company, to have this small distribution for a specific customers. Because the normal customers, in our case the pharmacy, they have a daily tour, two daily tours, and they are like a bus stop. 7 o'clock, they will get their medication, and the next, at 7:15, 7:20 so it's a very punctual and classic tour. But if you have a small customer who orders twice a week, and only once two or three products per time, you don't open an official tour, you send it by parcel. And this parcel service we have outsourced to a partner, so we can distribute it directly from him, to the customer, and we control it in a complete way.

(L): How do you control it?

(A): It's GDP conformed, we have all temperature on the travel, and we have the loading transport, and deloading recipe, and we can follow at GPS the car when he is driving to this place, and he has a certain area, where he is allowed to drive with the medication, if he passes the line, we get a notification. Yeah, if you have for example, the very expensive products on board, hepatitis C products which cost CHF 15,000 a box, you're quite interested to see where they're leaving, where they're going. But, there is no burglary at the moment, it's Switzerland. But you never know, so certain systems are working and the people know that.

(L): Thank you again for your time, and for sharing your experience and knowledge. I shall send over a copy of this interview transcript, once ready, for verification purposes.

(A): Thank you and good luck in your thesis.

9.2.6. Interview No. 6- Siegfried AG

Interview with Mr. Christian Neubaur, Global Head IT, Business Excellence & Procurement Senior Vice President, Siegfried, Zofingen, 27th of September, 16:00 pm

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

Neubaur (N): Maybe let's start with Siegfried as a company, first of all, if we look through the history of our company, then we have grown quite dramatically within the last four years. Which I personally can always see from an inside perspective, joining Siegfried in 2013, and in that time, we built or acquired 6 new plans. Amongst them one in China, which we just built up from scratch. One at the west coast of the US, which we acquired, a stand-alone plant, for sterile filling. Afterwards, we acquired 3 sites for pharmaceutical production of APIs from BSF, and one sterile filling in Hameln, which was a stand-alone company which we acquired. So, that combined with three existing sites, massive change for global footprint, production footprint, first of all, and also from an organizational perspective. 850 people were working for Siegfried in 2013, now, it's 2,400, so it's rapid within that time period. And therefore, all our organizational set up, our processes, our way on how to organize the business, has changed in the meantime. Or, it still is changing. So, that is first of all one part of it. If it comes to our turnover, we make 750 million, from which roughly speaking 70% is coming from synthesis of APIs, and the rest is either or in dosage forms, meaning tablets, or sterile fillings, be it ampoules or vials, also both of them are within our product portfolio. So, there is somehow two different parts of the business; we call one drug substance, which means synthesis of the API, the other part drug product, which is sterile filling or oral dosage form. If it now comes to my role, when I started here I used to be responsible for Supply Chain and IT, in the meantime I am responsible for IT, Business Excellence, and Procurement. Business Excellence is optimization of all of our processes within the company. That's LEAN, Six Sigma approach mainly from an organizational view point, covered by Black Medick agreement projects. So, therefore, I do have a history in Supply Chain, as a whole, but also, in the meanwhile or my focus right now is procurement. That's one part of it. If it now comes to, especially corporate social responsibility, I initiated a campaign first of all to address this topic within the whole organization, in Siegfried, honestly speaking so far not really successful. Just because we got a clear statement from our executive committee that we will not invest in

enhancing in our capabilities in this respect. So, it's a topic for the company, we are asked by many of our customers, but so far, we do not address it professionally, within our company. So, no resources addressed to that topic, or no external support, to build up something which would make us a little bit more credible in that respect. So, that's one part of the starting point. Secondly, if I now look into the market, and see what is going on there, we see that normal customers are asking questions and want to assure by doing so, wither sending us questionnaires or even audits on sites, and then asking the same questions again, want to make sure that the whole SC, they overlook, which means normally they buy from Siegfried, our business partners are the big pharma companies like Roche, or like Novartis, whatever, were wide, and they want to make sure that the whole SC, not only our part but also our suppliers does finally fulfill certain standards. Be it economic responsibility, but I think that is mostly covered by maybe looking at the company's P&L statement, our income statement. That is, I think, where there is a lot of transparency in the market. And Siegfried is a renowned company in the market for 150 years almost, and therefore, quite trustful as a partner from a financial perspective, from a growth perspective. So that is I think, we can cross that bridge and say yeah, that's fine, we are reliable partners in this respect. If it now comes to somehow economic standards or more to the whole responsibility area, be it more environmental or social related, the environmental part is part of what we at least present in our comments on the income statements, on the financial reporting, and is also part of certain audits which are well known instruments within our industry, to finally establish relationships between companies and to make sure that certain standards are followed. If it comes to social responsibility, CSR, only a few questions normally are asked, but attention is grown if our customers, first of all, and secondly, there are more professional instruments in the market available than in the past, which somehow assesses how well a company follows certain standards. So, if it comes to Siegfried, on our own reviewing, our own production activities, revenue creation activities, then I think we can fairly well state, we are on the one hand side mostly having our plans in the industry that do not have a high risk of strong violation of CSR standards, with one exception being our site in China in Nantong. So, that is fairly clear, we have very strong guidelines in place, even to assure that in Nantong, we follow these standards, so I don't have any doubt that Siegfried, on its own, has no issue, and has a high standard. We have also been rated by EcoVadis is which I think is established standard and

we got the gold standard there, so we are quiet fine. More and more, our customers are not only asking for CSR certificates or standards that Siegfried will follow, but rather also say what are your suppliers, how do they follow certain standards. And that becomes more tricky. Just because if I look into the distribution of how are suppliers' global distribution perspective looks like, we have a certain amount of our suppliers in China and in India which are those countries which are from a high level of perspective I would at least see as more critical than Western Europe or the US based companies. And now, this becomes a really crucial part of our assessing activities, on the one hand side, we have started a close look at that, we are really making audit, be it on-site or be it questionnaire based, but again that is something where you hardly will find out if the other counterpart doesn't share information with you. And will anybody answer with yes, I do have children working for me, yes, I do violate, no, they will not. So, from my perspective, it is somehow becoming more and more important topic, is it easy to handle? Is it easy to assess? No, not at all. There are certain standards, which is for example, from an industry perspective, of pharmaceutical and chemical industries, maybe EcoVadis, but again it's only a self-assessment. And they're sending you a questionnaire you can answer, how you have somehow upload certain documents they will check afterwards, so it's all paper-based. Does it really give a clear indication of what is going on? I don't know.

(L): You mentioned that you suggested to the management a certain CSR program, but it was decided by the management that it is not the time..

(N): The problem would have requested certain investments and certain employees to be hired to foster the goals or the objectives of this initiative, and it was decided not to take that investment, for the time being.

(L): I think I would like to jump to my last question because of how we started the conversation. When it comes to the Responsible Business Initiative, as an example of institutional pressures, do you think if approved, would that necessitate certain changes in your SC?

(N): No, why I answer that clearly is just because today we have in place, for example, our legal manual, which has to be followed by each and every leader within Siegfried, and that we have the same statements in there. And so, would we have to change anything? I don't think so. Because if we would have any sign that any of our suppliers would violate, we would

not choose him as a supplier, so that is fairly clear. If there is the slightest sign there, we would not engage with that supplier. But, do we know? I don't think. So, from a legal perspective, it wouldn't change anything. But, I think what still has to be improved is really the way how we assess your suppliers, how you really make sure they really are not violating. So, you could get a certificate, what does it really mean? Is it meaningful, yes or no. and therefore, I think that is the crucial point about it. Nevertheless, compared to other industries, I was prior to joining Siegfried, I was working in the consulting business for 16 years, and therefore, saw a lot of different companies, in different branches, and I would dare to say that the pharmaceutical companies, by having that many audits, visits to your suppliers, visits from your customers, both directions here, is a highly audited, and therefore an industry with more transparency about what is really going on other sides. Have we ever seen any sign for children working on one of our suppliers? No, we didn't. Otherwise, we would not make them a preferred supplier. They wouldn't pass our audits, and I think if I compare it, for example, with the automotive industry, where I have worked in, we have more of these customer audits and visits than any other industry than I have seen before. So therefore, yes, there is a certain standard established, but can we really be sure that besides that we might be visiting on any production plant outside all standards are kept? Not sure, and that is there where I personally would really feel the need for improvement of transparency. So, for us from a legal perspective there is no way to engage with a supplier, that we know he has some issues. Be it environmental or be it CSR related.

(L): If you compare supply chains between one industry and the other, what do you think is very different about a pharmaceutical supply chain?

(N): The biggest difference comes from profitability. I think the pharmaceutical industry still compared with other industries is a highly profitable branch or segment. And this means if you see what.. There is a wide range, and we are a CMO (Contract Manufacturing Organization), not a big pharma. Big pharmas is even more profitable than a CMOs normally are. But, if it comes to really judging pharmaceutical industries versus the automotive or any other, I think the level of profitability is higher on average. Meaning that from a SC perspective, to secure supply is more important than to bring down cost. If automotive is targeting next round of negotiation with a supplier, I think normally they are focused on bringing down the cost. For sure that is also a goal in the pharmaceutical industries but

besides that, we would never dare to somehow risk that supply is not secured. Because if you cannot produce products showing 25- 30- 40- 70% margin, it is ridiculous to do so. And that makes somehow different the setup of the SC, therefore, secure supply, in terms of on the one hand side we want to make sure that for example, we don't face a certain risk that one of our suppliers doesn't get official certificate to be allowed to produce in China, which is right now in our industry, or becoming an issue, that certain quotes are only given to certain suppliers for certain fine chemicals, and things like that, there we not only look on to who is the cheapest one, but we also fairly clear rate the risk of any supplier risk. And I think that makes a difference between different industries that I have seen.

(L): Do you have any single sources?

(N): Yes, we do have. That is, we are a CMO meaning, within the CMO business, 70% of our turnover is on a so-called exclusive customer synthesis or customer basis, meaning that we only have one customer for a product, that we are really, first we have the contract, then we start to manufacture or fill or whatever, and by doing so we always have to look at the dossiers of our customers and maybe I already stated that the supply for a certain ingredient of our production process, raw material has to come from XYZ. And that means that yes, we do have that, not allowing for any other source. Which also means that the customer somehow takes over the risk. To have chosen the right supplier, and also, to take over that finally a certain price point has been fixed. Sometimes even our customers manage our suppliers, it can happen.

(L): What sustainability measures is Siegfried taking, in general?

(N): I think first of all, much effort of what we do is described in our SOPs (standard operating procedures) I think every pharmaceutical company does have that. And I think the SOPs many of them have also parts in it where we are dealing with issues of CSR, so that is one part of the answer. Second part is that we try to somehow really make sure that these guidelines are followed by making audits to our customers so these are the main two that come to my mind, and last but not least we use EcoVadis to assess our different sites but also have a look at how our suppliers are rated at EcoVadis.

(L): What do you think are the main operational/ strategic challenges does your supply chain encounter?

(N): Operational challenges I would say the VUCA world has become more and more a reality, so 'Volatility, Uncertainty, Complexity and Ambiguity' have grown over time. And by doing so we have to adapt our SC accordingly, meaning that we do have to adapt to changes, coming in from our customers, be it time-wise, be it quantity-wise, and therefore, flexibility has become one of the most demanding success factors for SC. To become more agile, to become more responsive means that you finally will a higher likelihood to convince customers to place orders with you. Besides having a certain quality standard, for sure. Besides having a certain competitiveness with respect to pricing.

(L): I met another small sized company recently, and talking to their SC director, he mentioned one of his operational challenges was that as the company grows, he has to shift the mindset of the staff that they are really growing, did you face something like this in your acquisitions?

(N): I think if it comes to integrating new sites, first of all it always is somehow important how well the different culture are already aligned prior to the acquisition. And so far we only had 3 acquisitions finally, which were quite fitting to our own culture, so that's one part of it. The second part of the answer, I think the main challenge is to organize SC differently, if you have only one department, or one plant to manage, you can have a face to face meeting, no problem, and the way you run that one site is by definition your standard, if you now have 3-4-7-9 sites like Siegfried does at the moment, it's somehow hard if you manage each and every site differently. Meaning that you somehow have to implement certain standards. Be it planning-wise, be it reporting- wise, also in terms of how you organize meetings and alignments between different functions. And that is still a challenge for us, as we are growing fast, and as the people who try to implement that are very limited, because are headquarters are not that big, and shall not become big. Therefore, that is a challenge.

(L): How do you think sustainable supply practices in the pharmaceutical industry can be improved?

(N): Good question but I think the pharmaceutical industry is somehow an industry within higher, I would call it, high level of interaction between the different companies, for example, one of our customers, can also be our supplier at the same time. And that is something, if you look for example in the automotive industry, we will not be the supplier of one of their suppliers, so there is a more clearly structured SC in other industries. Which, on the other hand, means that there is a lot of interaction between companies in the pharmaceutical

industry, and also, a lot of assessments going on. Assessments or audits. And I would expect that it could be fairly interesting I think, that is something that EcoVadis is also trying to establish a certain shared knowledge base. So if it comes to that, it would be a highly appreciated by myself, for example to have a neutral instance, be it one of the companies, or be it organized somehow differently, that shares just the knowledge. If there is any supplier out that doesn't follow certain standards, let's make blacklist. Let's distribute amongst the industry, and that would be a strong enforcement for any supplier to follow certain standards, just because he knows he will be out of business fairly soon.

(L): Why do you think this is not an idea that is not in practice yet?

(N): Someone has to take the lead, someone has to start something like that, and it doesn't require much investment, it is just sharing information that is already there. And I think somehow there are certain companies around who do some audit reports and that could be a starting point for example. But to have such a common database or to share something like that, that would be really appreciated.

(L): Do you have any other collaborations with other pharmaceutical companies in Switzerland in certain areas?

(N): Yeah, if you look on what is going on here, this is the Pharma Park in Zofingen, meaning there are other companies doing either production or some of them are working as certain suppliers for us in terms of services, therefore, you can see outside, there is Arena here there is Celgene here, both of them are doing production on their own. So they have bought certain facilities from Siegfried and are now running these productions on their own. Is there cooperation? Yes, there is. We are supporting them for example for IT services and things like that, or procurement services. That's one example. The other examples are those who are offering industrial services to us, which are sitting in Zofingen, and the same in two other sites. Besides that, if it truly comes to CSR, no, we don't have not established any kind of partnership. No. and distribution of goods, that is something that is normally handled by freight forwarders, we do have selected certain ones, but that's not a real partnership, it's a supplier for services we need.

(L): In the procurement department, what are the selection measures when selecting suppliers?

(N): Price, price and price for sure (laughing). It is like that, last week we had just an auction to secure our power supply her in Zofingen, and for sure we selected the vendor based on price. First of all, power supply in Switzerland, all comparable quality, they supply power, so it's only a pricing issue. That's it. If it then comes to selecting certain suppliers, be it for our production, for example, ingredients or raw materials, first of all we have to find someone out there who meets the standard of specifications. Specifications are fairly well defined normally in different pharmaceutical collections. Are there many suppliers available? No. In many cases, we have several ones. Sometimes even only one. Then the decision is already made. If there are comparable ones out there its always discussion of how reliable is the supplier, what does his pricing strategy look like, decisions based on that. Supplier history, history of quality, has there been any violations in terms of were there any out of specs deliveries, or something like that. That has a high impact on the supplier rating.

(L): Is there any sustainability measure, in your procurement department?

(N): Yes, the rating has also one question regarding, but I'd say it's a yes or no question, so it's a make or break decision, finally.

(L): I referred to your CSR report, and it mentioned there is a program regarding compliance with legal regulations when it comes to suppliers. But it wasn't much explained. Are you aware of that program?

(N): It's a ticked box, more or less. So, if it comes to, there's always different steps of selecting customers. First of all, we try to find someone out in the market that can fulfill our specifications, as a first step. The second step, we then normally try to find out whether he can follow certain quality standards. And quality standards are product related, but not only product related but also legal, CSR usually comes in there, that goes to that one, normally that is assessed by sending out a questionnaire, in the first step, so that's the second step. And that's what we normally do then. If it is an important supplier, or if it's material is really key and goes into our final product, then we will conduct an onsite visit, and then there are certain questions, or certain procedures are then followed, within this procedure we will ask some questions, but then again, either we are sitting here at the table and trying to find out whether they're following certain rules, certain standards, for sure we ask questions, we might to try to have some gross questions to find out if he is really telling us the truth, but that's it. We have grouped our different products in certain categories, and if they are

belonging to those ones that we really see as critical ones, so it's not about the gloves that we buy for our workers, it's not about maybe the liquids that we need to clean our equipment. But it if it really comes to the key raw materials that will make it to the final product, then it's a highly-rated product category then we will conduct an onsite visit prior to starting any supply. Or within the first year of supply, so if we have some strong hint, that we will not expect any issue, for example, we have a trusting relationship, or it's one of the world known and renown suppliers in the market, then within the first year of our relationship, we will do an onsite audit.

(L): Thank you for your time, I shall send a transcribed copy of this interview once ready for verification purposes.

(N): Thank you.

9.2.7. Interview No. 7- Interpharma

Interview with Dr. Andreas Pfenninger, Director of Management team, Registration, Production, Quality, Environmental Protection, Interpharma- Basel, 28th Sep, 9:30 am

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

Dr. Pfenninger (P): So, Interpharma is not a pharmaceutical company. Sometimes people think we are a pharmaceutical company, especially mail spammers, so they are sending us a lot of mail, but we are not having any production business or research business or anything else. So, Interpharma is a service provider, it's an association, and it's an association of the 24 Swiss companies doing pharmaceutical research in Switzerland, or having a research part. So, it's the (Verband der forschenden pharmazeutischen Firmen der Schweiz). It's started more than 75 years ago, and originally it there were the pharmaceutical companies located in Basel, and with the merger of Ciba-Geigy and Sandoz, merging to the company named Novartis and Serono being sold to Merck in Germany, then the membership also was expanded and today we have 24 pharmaceutical companies, and we cover, or we represent in our association more than 90%, it's around 91 point something % of the array of the prescription medicine market in Switzerland. So, that's what we stand for. And I would say I am not a business expert in that context, but a subject matter expert. So, I'm coming from the pharmaceutical industry, I was working for one of the Basel companies for more than 20 years, and usually, originally doing my PhD. Thesis in research, in pharmacological development, then working in production, several roles, working in the Supply Chain (SC), and at the end of my career, or at the end of my term there, in engineering and major investment projects. So, that's my background. I'm a pharmacist, by training.

(L): When I ask the questions that have to do with SC, perhaps you can shed light on them also from your previous experience.

(P): Of course, that experience did not change dramatically, because the pharmaceutical business is something which is very stable. You need your license to operate. Your license to operate is the approval that you have a certificate for your product, and this includes also how you manufacture it, how you supply it, how you ship it. And those things do not change, minute to minute, it's something that goes, when it changes it changes slowly. So, it's based on stability.

(L): What does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique in the pharmaceutical industry?

(P): Ok, what would be your preferred comparative?

(L): I try not to say my own opinion.

(P): Ok. So, what we can use perhaps as a comparative is the car industry. Where you have different suppliers, and you ask the pharmaceutical company who are then getting products, or raw products, or a part of the product from the different suppliers, and then you assemble that to your product. And the model is then going further in that the companies within themselves they have different fields of expertise, and then the product is at different degrees of finished and sent around and always a new site or a new location is then adding something on top of it. So, when we start where the pharmaceutical molecule begins, it's with the synthesis of the product, when it's organic chemistry then we know about molecules which go through 20-30 steps of synthesis and those 20-30 steps of synthesis are not made in one single location. So, the product, or the pre-product, might be shipped around during that stage of the production process, product or pre-steps or some for instance solvents or other components are bought from somewhere else, and at a certain point in time, we have the active pharmaceutical ingredient we call that the API, the API is then somewhere stored, it's released for the next step of production. In the biotechnical, biotechnological manufacturing it's a little bit different. There, you usually have something which has to do with fermentation, and then you have the purification, and those two stages, and then the product is in it's pure form and then that's buffered somehow and then usually it's frozen, deep frozen, -20, -60 degrees Celsius, and those processes are usually done in one dedicated plant. So, we have a multipurpose environment, where you do one day this one, the next day another one, it's a campaign production versus those biotech plants which usually manufacture one product for a very long period of time. So, we have then the API. The API is then shipped to the next site. This might be in a completely different geographical region, where you do then the production of pharmaceutical form, so when its liquid form then it's going into vials, it's going into pre-filled syringes, those might be in different locations, or it might be in the same location. When we have a product, which goes into a solid form then you can have tablets, you can have capsules, there is also powder which is sterile filled, which is then a very different form, but also, usually, those plants producing the pharmaceutical form, those

plants are as well not dedicated, those are multi- purpose facilities, except for antibiotics where you have this dedication or except for highly toxic medicines, where you have to protect the environment and the workers working there at the same time. Those are usually dedicated. The other are multi-purpose. And then we have the product which is not yet labelled, the product, for instance tablets are in drums, capsules are in drums, pre-filled syringes are in trays, vials or ampoules are in corrugate boxes we call that AWRAK. This then might be shipped or is then usually stored, released for the next stage, so the quality control is once again going over those products, and then it's released for packaging and labelling. And this might be another site as well, and those are in most cases multi-purpose sites as well. So, there are packaging centers, for instance doing, we call that sometimes rest of the world business, means supplying all the small countries, so when you look into Eastern part of Europe and the former Russian states, or Middle East and Africa, where you have lot of small countries, so they can do large batches for larger countries and some small batches where you for instance do hand packing on a table for small countries. Or then you have, for instance the United States, larger packaging plants where you supply the US market, but only the US market. Or in Japan, for example, for the Japanese market. So, we have all sizes, dedicated, multi-purpose and different locations, product is shipped around between, so it's really multi-faceted, it's not unique and you have all kind of aspects and complexities. It's sometimes comparable with the car industry.

(L): It's interesting. Every pharmaceutical company I've spoken to so far has compared it to the automotive industry.

(P): Yeah, that's now really something coming from my background or my history in production. The first manufacturing execution or planning system we had was a co-development with the German car industry. And at a later point in time, when the pharmaceutical industry said, so this one started in 1996 where the margins, the profit margins get a little bit smaller, then the companies started there to focus themselves on research development and sometimes also production, and then they say software development is not our core business, let's get that from somewhere else, and then this famous production planning system was then replaced by a system coming from where everything comes from today, from SOP, and it's a subject today.

(L): What added value do you believe your supply chain department brings to your organization?

(P): To have the right quality and the right amount of product at the right place at the right time. That's their mission, and they try hard to do that, and with all the planning. So, you see, that's not a good example, but it's really true. For me, producing a pharmaceutical product, can also be compared with producing whiskey. Because you sell a product today, where the planning for the product starts 2, 3, 4, 5 years ago. And then, are we sure, how the world will look in 5 years? And they try hard to figure that out, and to do all this planning, to have the things ready, when there is the market demand coming, and on the other side, they had all their interviews with their consultants which said we need LEAN warehouses, do not store, it's dead capital when you have high volume in your warehouses, so it's really to have the point between to have too many, or not being able to ship. So, that's an interesting business.

(L): What sustainability measures are the Swiss pharmaceuticals taking?

(P): So, I think they first of all, they do everything that they fulfill their own rules. You were already with pharmaceutical companies, they have their sustainability programs, they have their internal compliance rules, they have their rules how they should behave in business and first of all they will fulfill their own regulations. Then they have to fulfill the regulations of each and every country where they are working in, and this is giving them the framework where they can act in. But first of all, the sustainability is that they are able to deliver the markets and to fulfill the demand which is coming from the market. And I think the Swiss pharmaceutical companies, the companies which are home-based in Switzerland, they do a great job in that. I was involved in several due diligence activities when it was going in where do we find extra synthesis capacities and all this kind of thing, and they do a great job in that. I think there is other pharmaceutical companies or other business which probably is little bit going towards the margins of what is sustainable business, and it's usually then in the area where not the research- based companies are in those, usually work with patent protected molecules, and it's really, I see the problem that if the molecule runs out of patent, and it's then under the generic competition and when we get the price pressure from our sick funds and from the payers, then it's sometimes difficult to keep those sustainability criteria under control. But, to be honest, it's not in the area of companies we represent, and it's also hardly to be found in the companies which are based somewhere in Europe. It's really something

which can be located to some areas in India and in China. And this we are well aware that this is happening.

(L): In your opinion, do most Swiss pharmaceutical companies have local manufacturing sites or global supply chains?

(P): They have both, in parallel. So, there are huge, no not huge, there are, in their size they are really important for their supply network. There are manufacturing capacities in Basel, for Roche, they have a packaging storage capacity in Kaiseraugst, the pharmaceutical packaging and production manufacturing capacities of Novartis are located in Stein, we know about other companies like MSD which has a biotech plant in Emmental, in Entelbuch, near Lucerne, we know about Lonza in Visp, they do synthesis of API. We know about smaller companies like Spirig or Siegfried, in Egerkingen or in Zofingen, we have CSL, they do blood products in Bern and are now building up a building or are now commissioning a startup of a new facility in Lengnau, that's near Grenchen. We have biotech capacities of companies who go on the field of a former paper mill. They sold the area and will do now all the construction work for a new biotech facility. So, we have manufacturing capacity for API, also for pharmaceutical products, and for packaging, and for storage in Switzerland. And vice versa, those are depending on other capacities which are located in the US, in Japan or in Europe. So, it's really globalized. So, the pharmaceutical production networks are truly globalized. Those are truly globalized.

(L): Are there companies with manufacturing sites in regions like China or India?

(P): Yes, so I think both Roche and Novartis they have manufacturing sites in China. For Roche, I'm sure, for Novartis I think yes as well. India, I do not know. I am now aware of. I'm not sure. For China I'm sure, because at that time, it was in the mid of 90's, 94, 95, 96, when China opened for pharmaceutical companies, and then at that point in time to get into business with China it was mandatory to have a site in China, and that was at that point in time that the city of Shanghai started to explode. So, the pharmaceutical companies at that point in time went towards Shanghai, and I know that Roche had a research and a production area in Shanghai and I think that is still there. For India, I'm not sure. Novartis has a site in Hyderabad, but I'm not sure if they are producing there. I know that they use that as a service center, but I do not know what they have there in business related to manufacturing, or related to SC, or related to QA.

(L): And what operational or strategic challenges do you think pharmaceutical supply chains encounter mainly?

(P): So, we have this kind of business disruption which all businesses are suffering from. So, those earthquakes, volcanoes, so, in 2010, the volcanoes in Iceland were active, so the SC were under great pressure, because a lot of those products have very short shelf life times, when they are not in the final finished stage. And then, airline shipments are a real problem sometimes. We have all those national boundaries which come up again. And are sometimes difficult, so for instance, the new US government with their ideas to put imports under new taxes and we see some sort of nationalism are always coming first, and also in high profit margin business, and pharmaceuticals are one of those high margin businesses. So, those are ideas which we see in Turkey, which we see in Brazil, which we see in other Southern American states, which will come up to us again with Brexit. We see in Russia and former Russian states, usually those are smaller companies, but when you 2,3,4% multiple times then it's a reasonable part of our business. So, it's the political environment, it's the natural environment, so volcano, earthquake and all this kind of stuff. It's the tax environment which changes so the rules which say companies should be checked for the parallelism for their flow of goods and their flow of funds. It started with Google and Apple in Ireland, and Starbucks doing all the taxation through Ireland, it's now coming also to the pharmaceutical business. So, those are many aspects where you have to work against that you can keep your SC running. For suppliers, for distributor and for contractors, it's always the same, it's to have them with good contracts under control, that their service is right in time, right in quality, right in the amount they deliver, and that it is coming according to the contract.

(L): How are sustainability gaps identified when dealing with those challenges?

(P): So, the natural conditions are not easy to cover, because you never know where, how and what and for how long. But usually, the pharmaceutical industry today does no longer to try to focus on one center of excellence, so that you do everything for the whole world in one place. But you have at least two legs. But one might be the one doing the business and the other one might be on stand-by. Now, the point is, in pharmaceutical business, you are not allowed to have two locations, and one is operating and the other one is stand-by. Because you have to register both, you have to do the validation work, you have to do the requalification work, and then if you are able to do that work, that means you need to have

at least two batches in each site every year, that you are able to do that. So, usually today, the pharmaceutical markets, or the suppliers at least, build on two sites, sites where something is done, so for instance, the GMP rules or how it's regulated is not exactly the same how it is in US and in Europe and in Japan, those are the three major markets. So then usually, the companies try to have some business in the US, and some business in Europe, and sometimes they also have business in Japan. And Europe is seen as one homogenous block of work, US of course is the same, including Canada sometimes, sometimes Canada is supplied from Europe. Japan is a little bit difficult, the quality which is sold in US and in Europe is good enough for Japan, but Japan has specific requirements for cosmetic finish. Not cosmetics, but for the how the products look like. So, they are sensitive to some external failures which in Europe and the US are not so important. So, for instance, when in a dot printing of an expiry date or a batch number, one dot is missing, then the Europeans and the US they say this is a '2' or this is an 'E' so for us it's ok, but for Japan that's something different. They look at it differently. Or another thing is when ampoules or vials have some scratches like this one (points at glass) that would not be accepted there. So, this is why the Japanese quality is usually inspected once again, that's visually it's also in perfect conditions. The quality internally in the product it's the same. Sometimes, it's even the same batches. So, where are we? Sustainable SC. Ok, the volcano, or the earthquake. The Earthquake in Kobe was a critical one. I do not longer remember the year. There, near Kobe there was one company, producing siliconized rubber stoppers, for to put on vials. And those were the only ones in the world, at that time, to produce those stoppers, where you could fill a biotechnological product, and there it's critical that the protein does not stick to the stopper or does not stick to the glass. So, those were at that times the only ones, and then, they were asked to buy on their own initiative, to open a second manufacturing site. They did that in Japan, on the other side of the island, so that the whole Japanese land masses is shaken by one earthquake is probably not a realistic scenario. This was used there. For API, it's not so difficult, because usually you produce API in campaign, so you produce usually the API for one year, or in a biotech plant you have the batches coming on regular basis, and then you have this, the API is coming in drums, or it's frozen in stainless steel bins. So, that's something you can handle. For the final finished product manufacturing, there you usually have an alternate site, as I mentioned, so if something happens, then you can switch to the alternate site. Now, when some traffic

problems arise, then it can get difficult because then the just-in-time model will no longer work. So, the volcano had the problem that the exchange of goods between US and Europe, so API produced in US in California, could not be brought in by the airplanes to Europe for filling in syringes and sold on the European market. Vice versa, organic chemically synthesized API from Europe could not be sent over to the United States. There, it's difficult to find an alternative. Usually, the ship is not an alternative, because it requires weeks. And it's not reliable, when you send the deep-frozen products, or when you send temperature sensitive products because the ships are not under control when those are on sea. We have now that the thing that some of the SC is, the exchange of goods is relying on container transport. So, the container is something which is usually used for greater amounts of goods. Now, we have this railway disruption in Germany, so the containers go on a ship. They will come but probably later. And most of the middle and small distribution things are done with trucks or sometimes with trailers. So that the trailer is docked at the warehouse, it's filled and then brought to somewhere else, and there the business is continued. So, industrial action is also something which is difficult for us. Difficult is to supply the Russian or the far eastern areas at times where the Ukrainian crisis came up, so, we have always those disruptions. That's something which happens frequently. But the companies have their transport providers, with contracts on hand, and they work closely together. So, those are the 3PL and 4PL supplier managements which usually work well. For final finished products, it's then sometimes that you have product, but not in the right box. So that you might have product which is packed for the US market, might be the same vial, the same capsules or the same pre-filled syringes in there, and then the product is re-boxed for another market. We have the same in Switzerland. Switzerland is about 0.8% of the pharmaceutical market, and Switzerland has, with the three languages, very particular requirements for the outer packaging for the box and for the leaflet. (So, the Fachinformation and the patienteninformation). And in these cases, then the companies bring to the Swiss market boxes which were usually intended to go in the German market or in the Belgian market, or in the French market. So, the product itself is the same. The boxes then, the German, the French or the Belgian box, and the Swiss patient leaflet will then be dispensed together with the box. This can be done, it needs an authorization from Swiss Medic which is given for a certain period of time, and with that, within Europe we are able to supply the market. It's rarely Swiss packages are going to, we

had that once where Swiss packets were going to the Austrian markets, but usually the German and French market are the bigger markets, and then the companies take some part of a batch from there and ship it to Switzerland. And in Switzerland, we have for several products, we have the principle of, or we have the regulation that companies need to have bridging stocks. So, for antibiotics, for certain vaccines, and for the meds tummy flu, the flu medicines, we have a legal requirement in Switzerland that the companies have to have in their warehouses 3-6 months of stock.

(L): Is that the Helvecura?

(P): That's the Helvecura Stiftung, that's right. And the model here is really unique. It's coming from the philosophy which is still spilling over from the second world war, where Switzerland really was an island. It helped us a lot to bridge short disruptions in supply. So, short in the sense of 3-6 months. But after that, we need to find other opportunities or ways to get the supply. But 6 months is a time where you can react. So, what our patients do not like is if they get it today, but tomorrow it's not there and nobody can say when it's coming back. And for that, we really have a buffer of 3-6 months where we can react. And where companies can find other ways to get supply back to Switzerland.

(L): Before I ask the next question, I wanted to ask from your knowledge, do you think many pharmaceutical companies do single sourcing?

(P): I already started to give you an idea about the sourcing model. So, we have two critical phases in the life-cycle of the product. The first critical phase is at product launch. So, when, which is good for the companies, when the success of a product is there, then usually companies are not capable of supplying the market when the demand is getting very high. Because you have to build up your production capacities. Especially in areas where the granularity of the product is not given. So, for instance, fermentation capacity, you have 1, 2, 3 or 4 10 cubic meters of fermentation capacity or reactors, fermenters. For API is not so difficult, there you can put in more production lines. It's easier. Or for organic APIs. For secondary manufacturing, it's the same. So usually, the companies start with the launch site, and when something in the launch site happens then it gets critical. Because the launch site might not be the supply site. It's a site which is very flexible, but which does not have the capacity to supply the full market, when it's a major in the market. Usually the companies, then have, then they tend to have two sites. One located in either in Asia, in US, and in Europe.

That's the model they have now. When the product gets mature, when the molecules are patented, then we come back to the situation we had in the beginning. Usually the price pressure is coming, then usually the companies are no longer manufacturing the API themselves, it's contracted out. Sometimes, it's licensed out. Sometimes the molecule is sold. And then we have, at the end of the life cycle, we have the really the risk that there is one manufacturing site in the world, the only one which is then doing the synthesis, and then this API is then sold to the different generic companies. And when the companies went on shortage, or are no longer able to supply, then we really have to look into if the company has a problem doing their packaging or their filling, or their solids production, and on the other hand, we have to check if the API supply is disrupted. And if the API supply disrupted, in a situation where the margins are getting tighter, then usually the damage or the effect is going through the SC to the customers. So, we had the risk at the very beginning, where it's in the hand of the innovators to start a business. And we have the single sourcing usually at the end of the life cycle of the molecule, which might be a very long period of time, but there we see the single sourcing again, yes. And of course, the single sourcing is then coming from countries, to be honest, this then might be China, it might be Russia, it might be India, but it also might be the US, it might be other countries, so yes.

(L): Keeping in mind that Switzerland in comparison to the rest of the world has very high sustainability standards, where do you think is there room for improvement?

(P): So, first of all the companies not to run into problems with their reputation, they tend to go with suppliers and contractors which are as reliable as themselves. So, I think it's no longer the time where you get an offer, you sign the offer with the contractor and the business is done. Usually, the due diligence is done, usually the companies do audits, at least on two areas, or usually today at 3. So, first of all a financial audit, so that the company is sustainably based and financed, and this company is complying with the rules of that country. Second, usually an environmental audit is done, so that the internal compliance and sustainability things are covered, and the third which is then more relevant for the SC so that the products and the boxes can be moved around, then the quality audit. So, that those companies comply with the rules of their country but also are compliant with the rules of the country we are coming from, so that the supplier plays with the same rules we have. And I think that then those three together give some sort of assurance that the business goes in the right direction

and the companies I know, or the companies located here, in that area, that geographical are, the companies do that on a constant basis. But the conflict is always when you have something in-sourced, or you have something in your own house, then you have it under control, but you always have the full cost. And then when you contract it out, then you don't see the full cost because those are covered with the contract, but you have some sort of, there needs to be some sort of confidence building that has to go on before, otherwise it will not work. And of course, if the supplier went into problems, you can have the best contracts, you can earn money out of the contract that they get punished with financial points, but the product is not here, and you cannot supply the market, so that's the company has to solve internally. And, we saw, or I saw, when I started there in the 90's, production was within the companies, then this contracting stuff came up. Contractors were mainly former production sites which were spun off, as separate companies which were taken with the management, management which were former employees with the company, which gave them away, this worked well. And then came third party companies in there, which were there because they saw their profit model in that. And probably the pendulum went a little bit too much towards this direction, and then the SC crisis came up with the huge problems we saw in the mid 2000s. 2003, 4, 5. And now I think it's always a mix that the companies tend to have the best of both in their concepts. So that they can switch, they can balance the workload, and that they can recover from problems which may occur in one or the other side. And of course, there, the pharmaceutical industry is similar to, not to the car industry, when we look at all those air bag problems or break failures in the car industry or the recalls they have to do. There, in context of quality, pharmaceutical industry behaves like the airplane maintenance industry. So, if the quality is not ok, the product will never get to the next stage. And, what is the difference then to the airplane industry, in the airplane industry, a deficit or a problem can be re-worked, in the pharmaceutical industry, sometimes it can be re-worked, usually not, and then it is disposed. And that has to be in a proper way itself, and there we have different rules in Europe, than in US, than in other parts of the world.

(L): Where, in your opinion, are the main gaps when implementing a 'sustainable' supply chain?

(P): So, that you find the reliable partners. That you find them. And usually companies do not like to run into a monopoly situation, so that you depend on one single supplier, but you have

always two hands you can work with. So, that's the problem. That's why sometimes, the pharmaceutical products, when you look into the formulations they sell, are not so innovative. Because you really try to be on safe grounds, and to work along lines where you know in which direction the lines go. So, this might be one reason why innovation in this area sometimes have difficulty, to grow and develop. Not when it comes to molecules, but the molecules are then usually synthesized or the biotechnological productions are doing in ways and modules you already know, then it's going into capsules and tablets, those are known since decades, it's filled into pre-filled syringes so those we know since 30- 40 years, so you see the innovation is not, yeah, here they really tend to be on the safe side.

(L): I think it's also a very heavily regulated industry so you have to maintain the balance between innovation and regulations.

(P): Yes, of course. And you see, the followers are always there but who is the first one, that's always the question. That's right. Regulations are sometimes brought as an argument, yes. The point is, the regulations we want to have as a pharmaceutical industry are the regulations which say what to do. But we see now, the regulators, so the government also, telling us how to do. And the what to do for the pharmaceutical industry would be fine, because it would give you the boundaries where you can maneuver inside. And the how to do is then getting difficult, because then really this is going against innovation. But the point is, yes regulations might be an argument, for me it's the first one. It's one of the reliability, that we really tend to stay on safe ground, because you have the patent. And you have development time, and when you have the approval of the product, then you have, minus the development time, then you will try to do the business when the molecule is still under patent. And when you spend too much time here, then you have less time there. And that's why you also have to balance, and the companies always tend to have the most time under patent protection. Because that's the room for maneuver to do their own business on their own, otherwise they run into competition then they are not alone on the market anymore. That's also one point, so, to have the research and development phase in a most possible short period of time, so, then to have the most available time under patent protection.

(L): What do you think is the level of transparency between the Swiss pharmaceutical companies and their suppliers, but not only their tier one suppliers. How realistic is it to think its fully transparent and fully controlled?

(P): What do you understand on fully transparent and fully controlled. Because when we look at quality, when we look at all aspects related to quality, there we have the transparency between two to two partners.

(L): And when it comes to sustainability measures?

(P): There I cannot answer. This one is a question you should ask the companies directly. We, including myself, here at the association, we do not have any insights in contractual details. So, as I said, I know that they do those audits, they check, they do the due diligence, but what is part of those contractual packages, I do not know. And the point is between the different partners in the SC or in the business, there is also the confidentiality agreements, they do sometimes memorandum of understanding when they confidentiality grows, but then all partners have their corporate confidential data packages, and I think full transparency is not something where the companies or also the suppliers try for, otherwise we can go for a merger. Because I think then we are in the business and there are elements that companies think might give them competitive advantage.

(L): I understand your point and I agree with it. But my question is rather about the sustainability audits, so if a company is dealing with a supplier, and that supplier is dealing with other suppliers, I think it may be difficult to control that. Not your first point of contact, but then whoever they are dealing with, and whether or not they are applying sustainability measures.

(P): There are, I am aware of business areas where the suppliers complain, 'Oh, we have so many customers and we get audited every week with the same questions', so there are service providers around which do such audits, and then those audits can be shared, companies can be part of such a platform, so the companies then share the audits among themselves, or those auditors sell their audit results to companies which are not capable or will not, or do not want to do their audits themselves, so this is another sort of business which is going on. We see that in the air, so, to start at the top, for the API manufacturers, there the company has to go on their own, and check that their API is manufactured properly, including audit the financial and the environmental stuff. So, especially in the area of the (Hilfsstoffe) of the exepients, there the exepient industry is not only producing for the pharmaceutical market, they ae also producing for the food market, which has completely different rules. And there, there are platforms around which do then those audits for the expeient manufacturers

and then they are able to provide with the certificate of quality a certificate that they do it in the right way. So, there are platforms around. So, this is some sort of transparency. But even when you look on the internet, you are able to find many things. But, as said, many things is not giving you full transparency. And we always say or it's something we say here in Switzerland, or here in the association, full transparency is contradictory to confidentiality. So, we have to balance somewhere in between, and it has to be in a proper way and in reliable way and in a reproducible way, and I think that are then the important issues here.

(L): Do you think the procurement departments in the pharmaceutical companies have any sustainability measures or weighted average that goes into the final decision?

(P): I think they have, and if the supplier (I should not answer to this question because I cannot for the procurement people), but in my opinion, I think the wrong thing would be when the procurement department is only driven by the price they negotiate. We, those are really anecdotal things. We had that in the past, and the companies learnt from them. So, to give you an example to procurement, usually the procurement department is then used to buy commonalities, it starts with toilet paper and handkerchiefs and all this kind of stuff, but they are also responsible to purchase the high mass supplies you need, for instance ampoules or vial or rubber stoppers or aluminum caps or pre-filled syringes or all this kind of stuff. So, the organization buying the API or the raw product, or the product which is used for synthesis are usually different departments. So, one of those purchasing departments I mentioned first, they thought they made a good deal, and found a new glass supplier which was able to, I do not remember if those were vials or ampoules, to purchase the product from there at a lower price. And at that point in time, the quality control on the raw products and on the packaging material was not that well developed, as it is today. It was probably one learning out of these things. Ok. The specifications were the same, the product looked fine, but the product, the glass body of the ampoule or vial, I do not remember, is heated up to 300 degrees for depyrogenation, paragens are hearts of the bacteria hull, which remain when the bacteria dies, but this component, it's a protein, its able to provoke fever. So, when you inject the product in a patient, your intention is to do something good for the patient, to provide the healing process. Now, the point is, the paragens are still there, and they might provike a fever. It's short, because it's only protein, it's 2-3 hours, but it might be dangerous. So, the glass is blown, the glass is cooled down, the glass is then washed, usually with drinking water. And

this water has bacteria in there, and those bacteria when they die, when they dry out, they form these paragens. The glass is then heated in a heating tunnel to more than 300 degrees for 90- 120 seconds, it's short, and those ampules simply cracked. The ampoules usually go through that process, they come out looking as they go in. They go in to the heating tunnel, there the ampoules cracked. And the ampoule filling machine works at 300 ampoules per minute. So, when you have a higher percentage of cracks, of broken glass, you have to pick those out. The glass does not break like it would when I throw a glass to the floor. At 300 degrees, the glass explodes. So, you have the splinters everywhere. Ok. We were no longer able to produce our batches, because the purchasing department found a glass supplier which was able to provide some Rappen per piece or per 100 kilograms cheaper than the other one. We didn't know in production, we saw that and said: hey, what's up here. And they said: ah, we found a new supplier, how did it work. And then they discussion started. So, you see, coming back to where we started, when the procurement department is driven by the price, it's probably not a good idea. Today, the processes are that all departments involved later in the process, are involved in those purchasing decisions as well. So, for instance, today, a new supplier has to send in a sample, not only one, but to produce an exhibit lot, we have to put, or the companies have to put that on stability, to see that nothing happens, to be on the safe side, today it's probably different than it was in the past. So, this is the purchasing committee and there all the disciplines where a purchase decision might have an impact on, are involved. Quality, production, but also development. Sometimes those test fills are done on development lines because it's only a small batch, so development people are involved, yeah, scale up.

(L): My last question is about the Responsible Business Initiative, but I would like to clarify that I give this as an example only of institutional pressures, so we can also include any other. Would there be changes in pharmaceutical companies, in general, and to supply chain departments, in specific, would it bring, if implemented?

(P): So, we have the text or the issue on the table in our association. We see three main issues. First of all, it would be an element that Swiss legislation will be required to be applied in foreign states. It would be the first time that this happens. It's something we know from the US that they are doing that with (FATCA) and all this kind of stuff in the banking business. But it would be the first time that Swiss law has to be applied outside the boundaries of our

country. The second point is, it's a problem for the Swiss companies or the companies based in Switzerland, because they will never be able to take over the responsibility for their contractors and their suppliers which have their legal bases in foreign countries, so outside the borders of the Swiss state. They can do that with contracts but the ultimate responsibility for everything relies with the company which has their legal base outside of our boundaries, of our country frontiers. And the third one, it would bring a reversal of the burden of proof. So up to now, somebody else has to prove that the company or the accused person or body is guilty, and here we have a piece of legislation which will reverse that, so that the company, or the legal body has to prove that they acted in a right way. And we don't understand why something which came from business behavior from a company which is located in Switzerland, and you probably know their name,

(L): I actually don't.

(P): it's Glencore, so the initiative has their basis on the business behavior how it is done by Glencore, and this was one of the ignition points to come to that text. And we do not understand why other business besides this particular business, it's the mining industry, and the oil business industry, why then for instance the pharmaceutical industry, which is already a really heavily regulated industry, should come under the same terms of that initiative. So, our position here at the association is quite clear for the arguments I just presented. What the companies are doing we are quite sure that the companies are thinking in the same direction, because usually it's the rule that the association's position cannot be different from the company position. I think this will be first of all, we did not make an impact analysis, but first of all, it will have impact on the supply chain business, yes, of course, of course. And companies, we are now coming back to the beginning of our discussion, companies have a truly globalized business, companies have several places where they can manufacture, and when the conditions in Switzerland are not in favor, of the pharmaceutical manufacturing business, then they will slowly go away to countries where the conditions are right, and this is a process which is, as I mentioned, not going (snaps fingers) by pushing the button for the light. It's something which goes through the lifecycle, this means the damage is coming slowly, but this damage would be definitely very sustainable. Because the lifecycle, for instance, of a manufacturing plant, usually is an investment for 30-50 years. So, when the investment decision is done, is taken, not to place the site in Switzerland, then it will not be in Switzerland

for the next 30 to 50 years. So, my generation probably will not suffer. You are young enough to see this spill over the facts of such a thing. You will see that, that is for sure. So, we saw that in other countries as well. Companies are not doing that very loud, those decisions are taken very quiet. But the impacts are sometimes really huge.

(L): Thank you very much, I shall send a transcript once ready for verification purposes.

(P): Thank you.

9.2.8. Interview No. 8- Lonza Group

Interview with Mr. Volker Bargon, Vice President Global Strategic Sourcing, Supply Chain and Logistics, Lonza Group- Basel, 28th of Sep, 13:00

Lüchinger (S): Please provide a brief description of your organization and what role do you play.

Bargon (B): So, I think if I start with Lonza, Lonza has a very broad range of offerings, starting from pooled chemicals up to biopharmaceuticals. So, heritage is very much from the chemical side. Now Lonza is evolving more and more and they call it into the healthcare continuum, which goes more to the pharma side, and I think we could say today, we are half a chemical, half a pharma-related company, and so you will find anything from heavy oil we are purchasing down to cell materials or media for biopharmaceutical runs. So, it's a very broad range. My responsibility is global procurement, in Lonza, which is tackling all the goods, at least organize it from a headquarters perspective, that this company is fulfilling 3 missions, I would say. Or my organization do three missions. One is, to have continuous supply, for the existing business. Then certainly, build a supplier base, which also, can catch our growth initiatives, and then thirdly is to build competitiveness, by sourcing from the right sources, and also out our buying power in the right place into the market, and thus generate competitiveness with the company. So these are the three things we try to tackle, if I would estimate we are most engaged, most is keep the ship running, there us a lot going on in the world, we had a strong hit of Harvey, the hurricane, which almost took half of the chemical industry in the US out of business for a couple of times, we get the train problem north of here (Germany) which gives us a lot of trouble, because we are 98% in our side, in Switzerland, dependent on train transport, so we basically don't do anything on the road. But now we got this main axle really disturbed, until hopefully only next week, and then hopefully, this is coming back. So that keeps us a lot busy, or any side, here and there, which catches fire, and then we need to see how to fight it. So that's a lot, and then I secondly think since we started this almost a year ago, really get a little vocal on strategic sourcing, so how we can leverage our buying power in the respective markets, and then we are investing heavily on this, so we can capture opportunities, yeah, with the power we have in the market, and get a little bit creative in buying the stuff. And if it comes to responsible sourcing, I think this is always something which is playing in the background of everything, since we are a stock listed

company, it's important that we have a broad attendance of the stakeholders, which is on the one hand certainly the investors, but it's the broader public, it's our employees, it's our customers, it's our suppliers in that as well, so that at the end, with our business ethics, and our responsibility within the societies that we keep up with fitting with the expectations. And I think needless to say, even on the chemical side, we are serving very big companies, consumer companies, Procter & Gamble and so on, who are very much watching that we respect their responsible sourcing expectations, and that we build this into our supply chain as well, and so, we have multiple angles where we are under a kind of a supervision, either from our big customers, many of our production sites get regularly audited, by customers, but also agencies, if it comes more to the pharmaceutical health, the foot in the pharmaceutical side, then we also get the health inspections and the FDA certified, we are certainly under that supervision. So that's what the company does, and all that gets reflected in our procurement organization, I think that's what I could say on a more summary basis.

(L): when it comes to the pharma-related side of the business in Lonza, in your opinion, what does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique in the pharmaceutical industry?

(B): it's different. I never thought about this, to be quite honest. Whether it's different or not. I think what is clearly or where we, I think we have got limited freedom, by the supervision of the pharmaceutical authorities, mainly the European EMA and the FDA, and they give us a very strong obligation to really know our SC further down the road. However, I have to say, it's practically, it's a big big challenge, because if you go back to your data, then you know in your ERP systems, you normally get your creditor and debtor data, but nothing behind it. So, they would require that you write from all your suppliers the bill of materials in your database, which is not happening. So, I think people, or companies who pretend to have full transparency through all of their SC, I think I don't know how that data technically really works. Also, this is a huge expectation. So, I think what normally is happening is that companies do a due diligence when they engage with their suppliers, more or less auditing them, but due diligence also involves a check, a screening of a supplier, then checking their reference list, with who do they do business, then this gives you a tendency and direction whether you are tapping into someone who is well versed with that expectation, or whether you go into new sources. And very often, since the suppliers also need to be under the

supervision or the surveillance of the authorities, or even have a track master file for their offerings, then they are in the same boat, almost. Then if you get that kind of a surveillance over them, then you're already in a pre-assembled or a pre-cleaned phase. And then you get the auditing services, but that is also more randomly, or more a sample test of it, but I think also that no company can really claim they have a 100% coverage of their supply base with audits. I can't imagine anybody has the resources for this. So, I think, difference is really that everybody, every player in the SC is more or less under the surveillance of the health authorities. It's heavily regulated.

(L): What added value do you believe your supply chain department brings to your organization?

(B): I think it's really financial benefits. So, we are targeting for very tough saving targets. And we really look into the cost reductions, so if I get a cost base, how can we, through very smart interactions, market interactions, reduce that cost base. So, we have a road map built for this. And, also, engage with consultants to support this. And also, capability building with our people. So that we can match up to these targets. I think this is the most visible part of it. That's what everybody looks into, and says ok, procurement is almost half of the revenues we have, we pass on to suppliers. So, there must be something to gain, you know. That's the classical. And if I look at my functional cost, they out that always in relation to the savings we are having, and then somebody says ok, you need to, at least save five times your own cost, so that the whole equation comes to a close, and that it fits with the profit expectations of the company. So, I think this is a clear brand identifier, but at the end, I would say, it's not the right one on a long term. Because you can do such a program, for a couple of years, but then, I think you will somewhat go into a saturation curve, and I think we need to get more and more into the space of innovation, you know, how to enable growth, how to bring technology into the company. But, again, everybody is talking that nice talk, but I haven't seen happening in practice.

(L): Do you do a lot of single sourcing?

(B): Very often, you know, our model, as a contract manufacturer, we very often get consumers in, at a stage where they have done their pre-development, clinical development before they go into the clinics, and they have already determined their suppliers. So, it could well be that they come in into our assets, with their supply base, and then it depends, on

whether they are single sourced or not. I think we still have quite a lot of spaces where we are single sourcing, and this is very much in products which are in the early stages of development because you just don't want to afford, at that time, to go dual source, because you do not know whether that particular drug is surviving or not. And then, comes the big complications if you want to introduce it later on, so now the thing is flying, and you need to supply the patients, and then the big question comes, ok, now its rolled out to 100 different countries, adding a new supplier will require to deal with the regulatory implications of a 100 of countries. So, very often then you think about different means, so either do a dual sourcing with a supplier, so just get another site, so that you've got a little bit of risk balance, or go on security, a couple of measures you can take, or, if it's really too tight, because you run a too-high business risk, then you must likely go to that dual source. I think we are by reasoning sole sourced in a couple of instances, because there was a kind of a factual base for it, or there was a string business reason to leverage one source against a broader fragmented supply base. But then it has been by choice.

(L): What sustainability measures is your organization taking?

(B): Yeah, well, I can't tell about the whole Lonza. You know, we've got programs for our employees, we do this for the environment. I think we need also to attend all these reach guidelines and whatever have you, so I can't speak for this. If it comes to the supplier base, it's clear we get specifications for what we need to provide from the market, so we hold ourselves accountable to those specifications and the other point which we have is a code of conduct, a supplier code of conduct, which we put in every PO as a reference and make it that way as effective as it gets. But everybody knows if it's in the general terms and conditions, it can be circumvented, but I think we currently don't have the technical capabilities which I have seen with other companies already, that you really get a sign off by the supplier on that code, that they say yes I read it, I understood, and I sign it off. We don't have that capability today in our systems, so we just push it out. There is the link into the web page and people can retrieve it, and how we built that code of conduct was just take 10 industry codes of conduct, assemble one out of them, and do what the rest of the industry does. So, I think it's nothing specific, nothing sticking out, it's just you know, stay with the bunch of the industry. I think this is certainly not a selling position for us, you know. And I'm not sure whether our customers or who of our customers would be willing to pay a higher price because we are

stronger on that side. And since we are in the middle of the SC, we can't discuss with the end customers, or with the brand image which could transport some of it, but even if it does in cosmetics, for example, it could well be where products go, but then we notice little, you know, as a supplier to these companies, that this is really coming to us.

(L): The global suppliers you deal with are mostly in what regions?

(B): Mostly there where we have operations. So, where is a production site, this is where we get also a supplier base around, and then we get global suppliers, but overall I have to say, it gets more global the lower the quantities. So, the more you go on the high end of the pharmaceuticals, the more global the supply base, because the transportation and logistics has just become negligible. If you go to the heavy chemical side of Lonza, then you are very much on a regional SC, even up to the point where we are sitting on the suppliers' site, when it comes to chlorine, because we can then use pipeline. So, there is no way you transport chlorine, this is just too dangerous to transport. So, you have these limitations and so we get more and more local or regional the bulkier the stuff.

(L): and if you're dealing with suppliers in certain regions that have different sustainability measures, especially tier 2 or tier 3 suppliers, do you have any practices in place to ensure that even those suppliers in those regions are checked and audited?

(B): So, if you talk tier 2 or tier 3, this is then the supplier of the supplier?

(L): Yes

(B): Quite honestly, I haven't seen it yet. I haven't seen it because we don't even record who is the next source of it. It is with the pharma supply, yes, we have that, and then in very specific cases we really go there, especially when that source has caused some quality issues or some variation in the product, then this is really of our attention, but if I go to the broad normal suppliers, I think it would be nice, but again, we are lacking tool and visibility and transparency to really get to that point. And I haven't, or I'm even missing the imagination, as long as you don't have the technologies like block chain or whatever, that you can ever do this in an ERP system, where I already today have the challenge that some of my distributors or suppliers don't want to open up the sources they supply us from. We normally, you know, push them to open it up, so that we get that visibility, at least we don't stop at a distributor, so we know what the source of a distributor is, but then they consider this as confidential confirmation, and we then have another conversation, you know, how do we keep it confidential and blah

blah blah. So, I think there is a lot of practical questions unsolved, like at Lonza, we got more than 15,000 suppliers. So how ever do you want to get to the next level?

(L): How do you come up with your most common sourcing strategies, and what challenges do you face in that area?

(B): well, this is a very standardized process at the end. So, you do a demand or spend analysis of what are the demands from the inside, spend analysis is very standard and you get the data out of your systems, more or less, I have to say, if its rightly coded you get them, sometimes you don't. But that's pretty standard. If it comes to demand which means you're looking ahead what are the plans, this already becomes very shaky. But, we live with the data we have, so that's the inside world, and then we try to match it with the outside world. So, then we look at the market offerings, do an analysis of the buying power vs. the supply power, you know of Porter's five forces whatever have you, and then build a strategy how do we want to bring that into our market, and that's what we call at the end strategic sourcing. We start that from a big oversight view and then we nail it down until we get even the individual buying channels defined for each country. And which country or what entity is under that country, which isn't, so that we have that nailed out, and that's what we call strategic sourcing. Do we have collaborations or? Yes, I think there is a kind of a consortia by in Switzerland, where a couple of companies come together, I have heard about it, I haven't really looked into this, because I think it just covers very standard items. And then, we already had very randomly some examples where go out into the market, together with the customer, and try to find an optimal source for the customer. And we do this together. So, we get that also in a couple of instances. But, overall, strategic sourcing is really cutting your spend into the different categories and then manage those categories towards the market. Play the game and the go-to market strategy in the best and most favorable way.

(L): And in those decisions, do you have any sustainability- related challenges?

(B): Yeah there are. There are certainly geographic ones, so if you go to countries like India or China, could be one where you need to do really more diligence and this is really where my people, before we get any source set up, we go to that source, we inspect, look at it, and I get a team sitting in the countries, so I get two people sitting in India, which report directly into Basel, and I get five people sitting in China, also reporting directly into here, which we call a kind of an extended work bench, or sourcing office, which helps us get our feet on the ground,

and be connected on the ground, and understand what's going on. Because for us, Western people, it is sometimes very complicated to understand the culture, and really get behind the issues behind a culture, and behind what you see in the front, what is behind that façade. So, we need local people who have the understanding of both cultures, and who can navigate us. So, that is one. A couple of materials you could debate things like palm oil, which is very much in the press, yes, we are buying also palm oil, we stepped into this initiative of responsible sourcing, I can't remember the name of this initiative on palm oil but there is an association which has given itself a couple of rules, what needs to be fulfilled to buy from a sustainable source, so we are part of it. But at the end, I think, I haven't heard that palm oil is yet a part of substitute for cosmetic products, this is where it mainly goes, into consumer products where it is part of the formulation. So, that's stuff which is constantly in a debate, but again, we try under the circumstances, you can influence, we try to get this from sources which are proven and at least stemmed or rather stemmed by this special association.

(L): How do you think sustainable practices can be improved? In pharma-related operations in Lonza, as well as in your view on the industry in general.

(B): You know I think it really starts at the end customer. Are they willing to pay for it? I think this is where it starts. If the end customer starts to be a little bit price sensitive and responsible on the pricing, I think that will kick into the whole chain, sooner or later, with the certain expectation also on a customer side. I think, at the end, this is what drives it. Because you can't, in the middle of a supply chain, you can't change that rule all of a sudden, if you get back to back. You know, what can you do? And if this is not perceived as being a special value you bring to your customer, then it's very hard to change the practices, or change sources, or even go to much more expensive sources, because they have been specially certified or are from a different geography or whatever have you. So, I think this is one thing, the willingness of customers to pay for a step up here, I think that's the most important. And the other one is really then tools of enablement of how to manage this, effectively and practically. I think this is the other obstacle, because you get very manual, very fast, if you want to deal with these issues. And we are currently working on a kind of a compliance approach where we think about how we can screen regularly our supply base, so really go into those 15,000 suppliers, with a kind of a sequence of filters, you know, there will be a geographic filter, so, for example, go over the supplier base and filter everybody else who gets business in Nigeria.

So, ok, not telling that we are souring from Nigeria, just we have to deal with a company which has to do something in Nigeria, then get the next filter, to that company, up to the point where you do a really full due diligence and say are we sure that this is a company that holds the same standards of anti-bribery and anti-corruption as we do? So, to get this approach set up, but this will be highly manual, and very expensive. And I have done this in another company before, if you then come to the point of full due diligence, then even if it's just a desktop research, this is going to be very rapidly CHF 5,000 per supplier to get a kind of a diligence performed. And I think this is also where you need to, you always go risk-based until you get a manageable number of instances which you can digest in the organization.

(L): Do you have a vendor management team, dedicated for that?

(B): We have that in our strategic team, so people who manage the category manage also the vendors associated with that category.

(L): Can you tell me about the selection measures does your organization's procurement department follow when selecting suppliers?

(B): I wouldn't say we have a universal measure. What we have is, in the early stage of an engagement, if you go to an RFI (request for information), then the code of conduct, or the supplier code of conduct, kicks in, our general terms and conditions then kick in, and we ask the suppliers to confirm that they hold themselves responsible. This is in the information stage, at the beginning. When it then really comes to supplier engagement, then this really goes along the specifications we have. So, I cannot say that there is a universal set, certainly then in the negotiations, or in the final step we will come into the financials, into the money, but this is, then everything else has to be given. And then you come as a final step to the financials. But overall, you get the specifications first, because you cannot trade anything of this against money. So, you start normally with an RFI, then you go for a quotation, then you go for whatever, second, third round, but then this is all digested, this is all done. Then you go really to the specifics, and then finally, then you know your position in the market very well. You know, how can I play in the market, you have seen the competition, and then you can do the financials.

(L): Have you heard about the Responsible Business Initiative?

(B): I have heard about it, and I think here in Switzerland there was a hype about it last year, and I think, now here comes my, you know since I'm still living in Germany, and commuting

to Switzerland, and not really well versed with all the details. But I think it was something like that they want to hold a Swiss company accountable for everything which could goes downstream in the SC. I mean, going to the supplier, and the sub-supplier and so on. Again, I think, a nice intention, but practically, I don't know how this should function, I don't know.

(L): So, I refer to not specifically this particular initiative, but more so to institutional pressures in general, and how they may affect a SC. I refer to it, as a current topic, do you think if it gets approved and implemented, would it affect the SC industry?

(B): I think this is effective, at the end, because it will drive the decision making into the right direction. I think you could see that, now I need to take an example from my home country, when I think it was around 1998, bribes were no longer tax deductible. Think about this, it was 1998, and you could still tax deduct bribery. When this started, and then I think very shortly thereafter, there was a big case in Germany, I think it was Frankfurt Airport, who built in Malaysia, an airport, and it was detected that there was some bribery happening with government officials. And all of a sudden, the law was changed, that this gets sued in Germany, and directors in Germany get sued, in front of a German court, and not in Malaysia. So, that has changed the complete dynamic, and I think since then there is a total different level of, whether you deal or not, and then Siemens case came up, and I think this is now, I hope, it's a non-issue.

(L): And if it actually goes through, do you think it would have an impact on your SC operations?

(B): I don't think so, that I need to be afraid that I get to court. Well, I don't think that this will have a big impact, I don't think so. Because at the end, I think, there is a general movement in society. And every employee who enjoys to live in Switzerland, or enjoys to live in any other part of the western world will not, I might be totally wrong, but will not intentionally impose bad practice on people from other countries. Because they have a certain reality of living, and this is what they also do not neglect when they do business. I think this is what I'm seeing. I see very often the other way around, where I say, ok, so you want to have this extremely high standard of living, and extremely high salaries of Switzerland everywhere in the world? I see this sometimes really the opposite, that people are so concerned that they can't apply the same standard they are used to live, into whoever they do business with, that they are afraid of doing business. And here comes the other side of the

coin, if we are so afraid to do business with different parts of the world, because they're just different, then nothing is going to happen in that world. So, there is two sides of a coin. To give you an example out of my very private life, I lived 4 years in Brazil, yes, it's a shame that you get people who work for a salary of about CHF 200/ month, yes, it's a misery. It really is. But on the other hand, I then took 4-5 people in my house to employ them so that they have at least an income, and they had, so to speak, a condition to work, which I could influence, and I felt responsible to even give them work. So, could I give them a Swiss salary for this? No, no way. But this has two sides of a coin. Or, if you look at countries like Indonesia, if they want to participate in the global markets, what do they have? What can they participate? And I think, there is always a little bit a balancing, but I think there are clear red lines which you shouldn't cross. But, I ask myself, very often, in my very personal example, am I exploiting the people in the country, because I take their service for such a low price, you could see it that way. Or am I socially responsible because even though I don't need them, I employ them so that they get something to eat. How do you want to look at this?

(L): I think big companies have power in a society to place pressure on their partners if engaging in non- ethical social behaviors or labor conditions.

(B): I think it's again two sides of the coin, and I fully agree with you. I think you are building the bridge from a developing country to a western country where you sell your products. You have got a responsibility to bring something in, and I think you can see that. So, I travelled last month to China and I visited the sites of Lonza. If I look at these sites, the working conditions on our sites, is no different than in Switzerland. But, ad here comes the big but, I remember being a customer of Lonza, and I stepped out of Lonza at the time because they were just too expensive in China. So, I went to a pure Chinese supplier at the time. Because there was a product running out of patent, this is going to come under extreme price pressure, this is what society wants, by the way, in pharmaceuticals, so, we needed to evade, somewhere the pressure needed to go. And in this case, it went from a Swiss working environment in China, to a Chinese environment. Because it was pushed from a customer down. And I think this is where you need to make choices. And I was very impressed when I looked at the Lonza sites and actually the conditions. You couldn't tell whether this is in China or in any other place in the world. I think it was a very interesting experience, but I have seen both sides.

(L): Thank you very much for your time, I shall send a transcript of this interview, once ready.

9.2.9. Interview No. 9- Alloga AG

Interview with Mr. Andreas Koch, CEO, Alloga- Burgdorf, 28th of Sep, 9: 30 am.

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

Koch (K): Let's start with Alloga. Alloga is a company which is doing pre-wholesale. The term pre-wholesale is not known, all and everywhere. Because wholesale is clear, you're a trader, you buy and you sell, so what is pre-wholesale? Pre-wholesale is one step before, it's providing logistics services to pharmaceutical companies. Switzerland is a rather small country, compared to the others around. And in Switzerland, we have a special regulation, that if you would like to sell pharmaceutical products in Switzerland, that should be reimbursed later on from the health care system. You have to have a local stock here. Probably the reason is that they don't want to just be a country, or Switzerland doesn't want to be a country with just license or products, and then they will be not made available to the Swiss market, but to others, just to have license and say: look, officially I have a product developed, but it's not for the Swiss market. So, to avoid this, it's a request. So, we have around 250 companies, pharmaceutical companies, that have licensed products in Switzerland. Which means that all of these needs to have local stock, and you can assume some of them are very big, like Sandoz, or Pfizer, and some are very small, they just have one product or two products. And for them, it doesn't make sense to have an own facility, an own warehouse. So, they're looking for an outsourcing solution, but not only the small ones, also the big ones, so like Pfizer and Sandoz. They have no own facility to store their products, they have outsourced that to another company, to us. Let's take one of the biggest, if we talk about maybe Pfizer. Pfizer is probably 8% of our business, so related to what we do now, now you went around the building, you have seen the size, if they would build up their own warehouse, it would be a 10^{th} of this size. So, still, even if it is a big player in the Swiss market, related to the facility they would require to do this, it's rather small. And they have to have a lot of things in place, which means warehouse security, which means a system for transportation, a system to control their stock. So, a lot of basic things, and for just doing their business, it would be rather small. So, from all of these companies, there is remaining around 20% of the market, that is doing their logistics by themselves. I have an example why a company might still keep

that as their own. We have a company, which is called Grünenthal, it's a famous company in Germany, they have a lot of very famous products in their line, and they have a small production in Switzerland. And because they also have production, they decided to keep their own warehouse, close to their production. Because for the production, you also need to have some form of warehouse for the raw materials, and intermediates, so they decided to do this as well. And also, within this 20% that are still doing their own logistics, we have companies that work closely together with others, so they have built also a kind of synergy with others, and if you look at the details, you find out that it's still not their own warehouse, they have somehow a group with others. So, I think within this 20% there are certainly 10% that are purely doing still their own thing. And, our business is now 60 years old. The first supplier, pharmaceutical producer, that outsourced this business in Switzerland was Glaxosmithkline (GSK), this was our first industry partner, we don't call them customers or clients, we call them industry partners. Because there is always confusion at the end, who is the customer. And we decided to say that the customer is a hospital and a pharmacy or a physician, and still not the patient. So, the patient is at the end of the line. And, so this has been kind of a tradition, to outsource this. And then, you have two models: you have one model where GSK is telling their customers, please order directly at Alloga. They will all and everything, they will get the order, they will take care of the shipment, and they will also invoice. And the strange thing is that we do all of that, but we are not owners of the stock. We just do this for GSK, we are an agent. And then, there is another model, we have this for instance with Sandoz, where they still have their own customer service, and they have still an own department for invoicing, so the customer is ordering at Sandoz, at the customer service, the customer service is entering the order in the system, the order is coming to us, we do the shipment, and then we tell Sandoz, we have done the shipment, and then they will invoice, through an interface with our industry partner. And with the big ones, we always have interfaces. Also, for this, we call this auto-to-cash model, what I just explained when we get the orders and we collect the cash at the end, the auto-to-cash model, for the big ones we have interfaces. So, they are always aware of the transactions. And, Switzerland, you could theoretically say that each second pack which is dispensed or distributed to a patient in Switzerland, was previously stored in our warehouse here. So, this is quite an important facility, even if it's difficult to find probably. But maybe this makes also sense, not to put it on the plain. And, the value of the

stock which is stored in this warehouse is close to CHF 1 Billion. This is also one of the reasons why it is not our own stock. Because it would be hard to afford. And now there is also something else coming, which is quite interesting probably for your studies. All these products are usually coming from abroad, from other countries. More, and more from the Eastern countries, as well as could be India, China, depending on the product. So, they're coming from abroad, and when they produce, these big companies, for Switzerland, it's always a very small amount, related to the others. So, which means that, if they produce for Switzerland, they would not produce next week again for Switzerland, so, the batch size for our purposes, is rather big. Which means that when this batch arrives in Switzerland, it has to be stored for a certain time, it will not go out the next day. Which is a big difference to Galexis, you have seen, it's kind of cross stocking. All the time, products are coming in, and on the other side, they are going out. In our warehouse, products are coming in, and then they stay. Because, the turnover of this warehouse is round about 7 times per year. Galexis has 18. Just to compare. So, it's also a kind of security stock for quite a long time, for certain products. And then you have another thing in Switzerland, for antibiotics, for instance, or for vaccines, you have to have a safety stock, which is required by Swiss law.

(L): That's Helvecura.

(K): Yes, exactly. And this Helvecura stock is also stored here. For the industry partners, we make business with. Which are kind of each second of the big ones. So, that's basically what we are doing, and our turnover is based on logistics services. And not on selling these products, which means that we earn money based on our transactions we do for the partner. A good's entry of one pallet has a cost, and we multiply this cost with the transaction we have done. So, if you would have a look at our invoice to our industry partners, it looks like, so many pallets arrived and we have put them in the warehouse. So many controls we have done in good's entry. So many pallets you have on stock. So many shipments we have done. So many transport fees we have created. And also, order intake, obviously, interface, maintenance fees, and also if they have cash collection, so all of that, will give a sum, and that is invoiced, to the industry partner.

(L): and you bulk the transactions?

(K): yes, we have monthly invoices, and we calculate the transactions per month. And then we invoice them, so, it's very, I feel it's very easy to understand for them, and they can also

influence, for instance if they decide to make a lot of small shipments to their customers, it will create a lot of transport cost. Or if they decide to get a lot of different good entries, from a lot of different companies or countries, because the productions are very fragmented within the world, then they will have a lot of transactional costs based on that, so, that's basically our model. And usually, within this warehouse, it's mainly the first step or the first transactional step with the product in Switzerland, so they cross the border, they arrive directly here. The tax control and things like that is already done, but then, we are the first making a physical control of these products. Usually, we have to make either photos, or we send a physical sample of this product to the producer, so, for instance, when we take Pfizer again, there will be pallets of products arriving here, it's a new batch, we have never seen this batch before, we take one sample, we send it to Pfizer, they control if everything is right, based on their production requirements, and they say ok, we can release that. And from that moment on, it can be sold in Switzerland. So, this is a very important administration step, to ensure a certain quality. From my personal background, I originally come from Germany. I started in a forwarding agency, after high school. I worked there for 2 years, then I worked some months in France, basically to learn the language, and then I started studies at Mannheim University, Business Administration. At that time, it was still very classical studies, today, we have all this alignment with bachelor and master and things like that. This didn't exist, at the time. After I finished my studies, I was working for about 10 years as a business consultant, in supply chain management, which was not completely focused on pharmaceutical supply chain, but also chemical. I have a little bit less experience in automotive, for example. So, I was always a little bit more linked or closer linked to chemical industry and pharmaceutical industry. And, in 2009, I decided to leave the consultancy, and started at Galexis, as head of supply chain management, first. In 2011, I started also at Alloga, so you can assume supply chain management should rather be a connection of the SC, not a single step. So, it was decided that within Galenica, that head of SC management should cover more than one company, and not only Galexis. So, I had a double assignment, if you want, at Alloga and Galexis, head of supply chain management. And in 2015, which is 2 years now, I changed and became CEO of Alloga. So, that's my background.

(L): What does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique in the pharmaceutical industry?

(K): There is one thing which is unique that we have not a continuous production, like in automotive, where if you optimize that you have a constant output, and a constant SC, so everything you produce can directly flow into the production of the next step. In the pharmaceutical industry, you have a batch production, a bulk production, and one of the main decisions is how big you have to make the batch, in order not to produce too much, to optimize your stock, to ensure the availability, and this is one of the biggest discussions they have in pharmaceutical industry. Because when you change your production into another product, you have always a lot of setup costs. So, if you produce, for instance, Paracetamol, you try to stay as long as possible with Paracetamol, and not change your production line, because the setup is always big, but the output has to go somewhere, right, and you cannot have a completely unique product which will serve to all the markets. So, you always have to specify for the market, if you optimize that, you can have the same tablet, and you can fill it with different blisters, which are market related, and then, on the package side, you could also differentiate at a very late stage, if you optimize that. But the general problem of the pharmaceutical or challenge of the pharmaceutical SC is, which batch size, which markets, how you optimize that. And usually you say you would like to reduce the stock, but if you have a flu, for instance, what are you doing? All of a sudden, everyone needs the same product. So, you cannot reduce the stock. The seasons of the flu, for instance, it's also very complicated. One time you have a flu in October, and then you have one in December, then it might arrive in February- March, or we have also seasons, without any flu. And then, everyone is sitting on their stock, and crying. So, this is a very tricky thing. On the other side, we have now new ranges of products, which are mainly biologically based products, they are very expensive. We have one example here. We have a product here, that has to be stored at -80 degrees, and it's a very expensive product, and we heard, just recently, that we will have a new product now, on stock, where one pack will cost close to CHF 60,000. So, one single pack, this is the other side, of the game, and for the pharmaceutical industry it's a challenge to discuss, to negotiate with all the health care systems, because you cannot just discuss with one. And then it will be applied to all the countries, so you have to go through a very complex release process, to get the product on the market. And we mainly discuss with logistics people, and they will always their best, to make their product available. But then, on the regulations side, there might be a lot of impact, for instance, for this minus -80 degrees'

product, we have it now stock since 10 months. No sale so far, because they are still in the process to get the license. So, the synchronization of that is very complex. And sometimes, you get it very fast because it is a generic, or its already clear that it's not difficult, and then from the supply side, you're in trouble, because it's still not produced. Or, it's produced but not for the Swiss market, and then there is again big trouble.

(L): It makes me think of another service that I'm curious to know if you provide: do you have any waste disposal services? Does it happen that you have some stock, with short shelf life, and it expires before the license?

(K): yes, this happens a lot. Because when we have these huge batches on stock, and either they are not needed or there is another product coming up, which will replace the existing, and then they have to destroy it. So, this happens quite often, that we have to destroy products. But we don't destroy it ourselves, there is a company which is specialized in that, and you have to, sometimes if it's controlled trucks for instance, you have to have specific transport, and then also, someone from the authorities will follow this truck, to ensure that its really destroyed, at the end. So, this is then a controlled process, obviously to make sure that the products will not bypass somehow.

(L): And for these companies, who is the customer? Are you the customer, or is the pharmaceutical company?

(K): We are the customer, and usually, we will pay them, we will collect these costs, and then we will invoice them to the pharmaceutical company. So, at the bottom line, you will have destruction costs, in the invoice, where they see, ok, that was the amount that has to be destructed. But they give the order, because we are not the owner of the product. So, for example, Sandoz is telling us, you have to destroy this batch.

(L): Is there more than one medical waste disposal company in Switzerland?

(K): Yes, there are several. And usually, the destruction itself is not very complicated, because it is burnt at more than 1,000 degrees, which is the best way of destroying the product. And there are some companies which are specialized in that. So, Cridec, for instance, is one of the companies, that have the possibility to destroy pharmaceutical products.

(L): The reason I ask is, how do you decide which company do you want to go for such services?

(K): Yes, we have a lot of influence in making this decision because the pharmaceutical company will ask us, how should we do that in Switzerland, and we are the ones usually that have to provide the solution. And it's very rare that they will come up to say, we have taken the decision that you should do it with this or that company. It's the same with the transport. They rely on what we propose, usually.

(L): And when you take such decisions, what criteria do you base the decision on?

(K): It's the capability, where they're located to facilitate the transport because it's always an official person of the Canton of Bern, which will follow. And when we will decide to drive to St. Gallen, yeah, it's difficult, not impossible but difficult. And then obviously also cost driven question, so, who is able to provide what at what cost.

(L): And are there any sustainability standards? Keeping in mind the sustainability standard here in Switzerland, is it a part of the matrix?

(K): It's a part of the audit we are doing. So, we are doing a supplier audit then, before we decide to select or to propose the suppliers to our industry partners, and it's because the audit also follows ISO criteria so therefore, we ask all these questions, which we have to answer as well for our companies. Because they ask us the same questions, so about sustainability. But then, at the end, we don't have a specific audit for that, where we check on sustainability, it's more, is the operation within the regulation of Switzerland, which is, compared to others, already quite a high standard. And if they have an ISO certification, and they work according to SOPs and we see they are a professional company, then, you feel good, yes. Because you can imagine if something happens in this area, then all of a sudden, products that have been decided to destroy will be found in the market, then this will be a catastrophe.

(L): What added value do you believe a supply chain department brings into a pharmaceutical company?

(K): I think in the past, it was underestimated. A pharmaceutical company was mainly driven by their innovation. And at the end they said, the way to the patient will be found somehow. If we have a very good product, the rest will come somehow. Since quite some time, this attitude has changed, so pharmaceutical companies are more and more aware that if they don't set up a proper SC, either others will do it, or they will lose a lot of money. In the past, they had a high margin, and it wasn't important if a SC cost was 3 or 4 or 5%, but today, I think

it's also from the administration part and the healthcare sector is pretty much aware of these costs, and is putting a lot of pressures on these companies, so, the effect was SC became all of a sudden, a lot more important than it was in the past. And then, you have another complexity today. Because you have these globally centralized productions, you have for some indications or products you just have 1 or 2 producers remaining in the whole world. And if it's one production site which is serving different pharmaceutical companies, it's bringing a lot of complexity, into the supply chain. All of a sudden, you have to deal with countries that weren't on your radar before. And we had also some traditional companies in Switzerland, they had their production in Basel, and they had customers around, so this is quite an easy SC. It's more the bottleneck or the complexity is how to set up your production. But the distribution wasn't a big deal. Today, it's a lot of more complex. Today, they source in the whole world, they have to bring the product somehow to Switzerland and then you have to deal with a lot of competition and you have to deal with an own complexity within the SC. Because Switzerland is again special with this model of self-dispensing doctors. And when you compare this to Germany, where a company like us has a couple of direct customers, and then they will take care of spreading out the product to the market, in Switzerland, we have a lot more customers because we have all these self-dispensing doctors. So, for a company like this, thousands, in such a small company, thousands of customers you have to deal with. And this makes it again very complex. And then they come and say: the distribution cost, so high, what can we do if we compare to Germany? And we say, you cannot just compare the costs, you have to compare the systems, as well. We have a very completely different system. You don't speak German, yesterday night in the news, it was quite an interesting discussion. They compared the Swiss healthcare system with the others, and they said from the quality aspect, we are number 2 in Europe. Norway is number 1, Switzerland is number 2. But from the cost compared to the value, we are just number 17 or 19, behind France, Germany, they are also very close, so France and Germany they have maybe 14 and 15, and Switzerland is 17, somehow. But there is a lot of others that are more efficient in that way. They have an easier SC, where you say we have the pharmacies, and if you need a product you go to the pharmacy, and to replenish the pharmacy, we have a wholesaler, and that's it, basically. So, this might be a very easy model. And in Switzerland, hospitals can make business, a physician can make business, you have the models where the industry is directly delivering and then

you have the wholesale as well. It's complex. And then you have all these languages to deal with. This is a complexity. And all of that makes it a necessity to have a proper supply chain.

(L): Do you think companies can compete on a SC level?

(K): No. We have a lot of congresses which are related to SC and pharma and things like that. And, I attend them, since I started in the consultancy company. And, on each of these conferences it's the same game, we should but we still didn't. We might but we are not allowed to. So, a lot of things that are quite clear are still behind. And, you feel it when someone is changing from another industry, to pharmaceutical industry. They are always very fast very frustrated. Because all this flexibility they would like to transfer to pharma is getting more or less lost. You have all these compliance issues. But I think it's not about that. If you really would like to change something, you might change it. But the surroundings are very.. It's a difficult environment. Because it's pretty much focused on pharma science more than other things like logistics. And if they try to create synergies they would very fast say no, but we have no experience, it's a very traditional market, it's probably that. And when we have meetings for innovation, for example, so we have to setup a SC at -80 degrees, from production to the final destination, which is at that time the hospital. And it's a challenging item, it's interesting, but we face that from our industry partner, from compliance part, we have 10 people sitting around: Oh, but we have to be careful because of that, Oh we have to make sure that, Oh we have to.. So, from the moment we decided to do something, to the moment it's really running, it takes a lot of time, and a lot of energy. And they are still putting a lot of difficulties in it. And this is, for a SC manager previously working for Procter & Gamble or something, is also from the automotive industry, if they look at that, they would say Oh my God! They are far behind. And a lot of models which are already very common, in other industries, are mainly even not known in our industry. So, we are very slow movers, within SC innovation in the pharmaceutical industry, but I think everyone is aware of that. But that gives still a lot of potential. They didn't exploit that because the amount of cost is more in development of this product, than in SC. So, if you really would work on cost efficiency, you should rather look at your development pipeline, than at the end, even if there is still a lot of potential in it. But others have, on their product itself, if you produce tires, for instance, you have a very small margin and because of that you have to cost control all the other expenses, very closely, otherwise your margin is just gone. If you have a big margin, you still have

possibilities to .. and we see that now, because the requirements in pharmaceutical distribution have changed, recently, now, costs raised, and now the industry is reacting. They change their way of ordering, from the customer side already, because they say: Oh, ok, if I order 10 times a week, it's now even more expensive than it was in the past, so I reduce to 5 times probably. And the industry as well, they see, ok, if we serve a small customer, a small physician, and we sell them something for CHF 300, and at the same time we pay CHF 35 for transportation, so we tell them, not to order for CHF 300, but we tell them next time to order for CHF 3,000, or he has to look for another way of getting the product. So, and this reaction is pretty much linked to the cost. And the cost was driven by regulation, and all of a sudden, they change, and try to improve, to reduce, which is good at the end, because you cannot avoid to follow the regulation, so you have to do something, but on the other side, you reduce your transactions, and then you can reduce your costs again. Did you know, by the way, that a pharmacy in Germany, let's say in Munich, is delivered 5-8 times a day. Ask yourself if this is sustainable, this is nonsense, sorry, but this is completely weird. They drive with normal cars, to make these deliveries, because they didn't even get a whole van. Because if you have to deal 5- 8 time, it's more or less each pack, and we have just been visited by an Austrian company and they said: But, if we look at your fleet, this is all small vans. So, delivery vehicles. And we said yes, sure, this kind of vehicle (points at vehicle), and they said, how do you get this full? And we said, we just have 2 deliveries for a pharmacy, per day, instead of 5-8. And that's why its full. And this is another step of improvement they have to go one or the other day. Imagine all the traffic you make if you have such a delivery frequency. I have worked in a pharmacy for some days, just to check how it works, which had also multiple deliveries, per day, and when the driver arrived with the boxes, they had still the boxes from the previous tours, standing around, because they hadn't had the time to allocate them. And then I ask myself, why do they need so many deliveries. It doesn't make sense, because they don't even have the time to work on that. But they order permanently, if the patients arrive, and by the products, it's going to the system, and then they see ok, we have to re-order that, and they re-order it, and it's getting delivered directly, but they don't even have the time to pit it all on the shelves. So, they still have potential.

(L): My next question was going to be about the sustainability measures Alloga is taking, and what you mentioned now is a very good example. Are there any other sustainability measures?

(K): Yes, there are general sustainability measures. For instance, gas consumption for heating, energy consumption for keeping in the warehouse, at Galexis we have the transport, we don't have, at Alloga, we don't have our own fleet. We have a partner, a transport company which is doing that for us. But still, this is a measurement that you will find in the sustainability report of Galenica, and maybe you can have a look at that. And we have an agreement with the canton as well to lower our expenses for the energy. That's why for instance we decided to put measures in place like replacing the lighting in the warehouse with LED, or using all heat which is produced from aggregates to heat the building. Or we have for instance our temperature control, the cooling system, is based on ground water and now we will have, next year probably, it was first planned to finish it that year but probably it's getting in January- February, solar panels on the roof. So, all these measurements, reinforce the insulation, have been put in a 10-year plan, in order to lower our consumption.

(L): You just mentioned this is an agreement with the canton. Is this just in Bern?

(K): No, I think this is based on a national initiative. At this time, the canton is even giving money for even reinforcing the insulation, so we get this. But on the other hand, it is also required by some of our industry partners. So, if they make their audits, they ask for things like that. So, theoretically you could also answer no, we do nothing. I don't know whether they would say, ok, in this case, we will change the provider. I don't think that.. The question is what are they doing with this information. But I think anyway we are in a circle of being forced to put measures. If we would say we don't do any agreement on national level or with the canton, we just have to pay more taxes in the future. But it's not only that, I feel that there will be in future, probably in the next 5 latest 10 years also an increase of energy cost. And either you think about now, what you can improve, then it's already too late. So, I think anyhow you have to do something. If you are doing nothing, you just wait until one day, you will be dead. Actually, now I'm just in contact with our management, from our business unit, because you have seen Galexis its own fleet. And we were discussing whether we should now start using electric vehicles.

(L): Yes, Mr. Amstutz spoke to me about it.

(K): Yes, exactly, and he is now trying to influence the politicians that they open up a regulation, which is from our perspective old fashioned now, to make it possible that we can use this kind of vehicles. Because we just see a lot of advantages. Imagine you would drive to Zurich with an electric vehicle: No emission, not only gas emission but also the noise is reduced. So, this would be a perfect model, but it's not possible. I mean, that's ridiculous. And now we try also to influence, a little bit, to make a change.

(L): You've mentioned you deal with overseas companies. Producers of medicine.

(K): our main contact is always the, yeah we don't have a main contact, because a pharmaceutical company works like that. They have their global organization, and then they have their continental organizations, so European organizations, and within the European organizations, they have country organizations. So, either we work together with the country organization, but more and more we work together with the European organization, because the country organization is sometimes reduced to just have some marketing people left, a general manager, a local general manager, and some people in the field, that are consultants to the physicians for the product. And all of the rest is controlled by the European SC organization. So, it's not always the same, either, we work together with the European SC organization, or what they call the DACH organization. De is for Germany, A is for Austria and CH is for Switzerland. They try to cover within the European organization, the German-speaking ones. That's why. Or, if they have a very strong local organization, we deal with this organization.

(L): So, you don't really have much contact with organizations that do not have either country representatives or European representatives.

(K): No, because the country representation is also a requirement. This is also an interesting aspect, it's not only that you need to have stock in the country, you also need to have a responsible person, in the country. And this person needs to be a known person, not an organization. And to have a name, and this person is personally responsible for the products. And you can outsource this, as well, so they are persons that are doing that, but then, they are the authorization holders of the product. So, it's again an intermediate, and they are then responsible. So, if there is something wrong with the quality of the product, Swiss medic, which is the organization which is controlling all of that, is going back to the authorization holder. And behind this authorization holder, there is a responsible person. And at the end,

this person will be made personally responsible. So, you cannot just sell the products, and say ok, we don't care anymore. That's a huge responsibility chain behind.

(L): If you're dealing with company through a representative then, in the distribution role that you have, and a sustainability-related incident happens in the facilities of their company, somewhere in the world, do you take a stand?

(K): I think from this more or less, from the production, and also from companies like Pfizer, if they have an incident somewhere, we are normally too far away. But if the incident would happen here, in Switzerland, then obviously, it would be a big deal. But there is still something going on in the world, with all of this, but I think we are too far away to take a stand or influence something. Sometimes, we feel it, that, for instance, a product is out of stock, and customers or customer service is asking, do you have any news why this product is out of stock, and we go back and we say because the stock level is controlled by the pharmaceutical industry, not by us. So, we ask them, if there is something wrong with this product. Because we have already demands from customers, and they would say, yes, we have an issue with in global production, this product is no longer available for the next 6 months. Things like that, yes. And the reasons behind that might be.. One time, the production burnt completely, then all of a sudden, an important antibiotic wasn't available anymore in the market. Sometimes, it's rare, but it could happen, that it's stolen on the way to the destination. It's destroyed because the temperature during the transport broke down, somewhere. So, it's in a container on a ship, and then you see the temperature isn't any more in the range, and then the quality inspectors refuse to release these batches, and then it's gone, it's destroyed. So, things like that. But I think we have not a very close identification with let's say global pharma, or what happens in the world. We concentrate pretty much on what is happening from the moment the products cross the border. And that they're distributed here.

(L): What operations/ strategic challenges does your supply chain encounter?

(K): There was something coming in my mind, but I think we touched on the production, we touched the changing requirements, the regulations, the batch sizes, I think that's mainly it.

(L): How are those challenges faced?

(K): at this time, it's more the challenge of the pharmaceutical industry, I think we are the backbone at the end. What we can do is optimizing our network, that at the moment that the product arrives, that the distribution is secured later on. Because if we make an error later

on, then all that has been done before has been destroyed, at the end by us, so we try to avoid, at least that. And we try to provide enough flexibility, so still, that's one of the most questions they have as well. How many flexibility do you have in terms of place, for instance, when we, after Easter, they produce usually a lot of stock, and then, before summer holidays, they distribute the stock to all the facilities, like we are one, and usually during summer time, there are not a lot of sales, in pharmaceutical industry. So, you have a very very high stock, during summer time, and then, after summer time, like now, when Autumn is starting, the distribution starts really to speed up. So, first you have to have the capability in buffering all these stocks, and then you have to have the capability in distributing all that. Because now we have the vaccine period, and within very few weeks, you have to distribute a lot of things. And, I think that's the main focus we try to develop ourselves is according to these needs, to be this flexible backbone. I think that's certainly something that you have seen at Galexis as well. The weakest day and the heaviest day in the year, it's more than doubled then, it's even tripled. So, we have to buffer this.

(L): In my last four questions, if you'd like to give an opinion, more so from your consultancy background and your experience in the industry, maybe you can provide me some insight.

(K): Sure.

(L): How do you think sustainable supply practices in the pharmaceutical industry can be improved?

(K): I think that the values within the pharmaceutical industry are rather high in general. So, I don't think it's just printed on paper, that they have a responsibility for the environment. And I think, if I compare it, but it's more my own opinion, if I compare it to other industries, they are taking this subject more seriously than probably others. If you have producers for steel or for aluminum and you look at the sites in China or in India or textile industry also, you will find conditions which are certainly not sustainable. It's just a modern form of slavery, and one or the other day, you have to stop with that. Maybe in 5 years, maybe in 10 years, maybe in 50 years, I don't know. But, as more as, we get transparency on all of that, the more difficult it would be to remain with these structures. And I think the pharmaceutical industry has seen that. That this is not the way how they can work, because they have another mission. So, I think the values and the missions are already different. And if I look at the famous companies, they are mainly in Zug area, if you go to these local offices and then you see that they are

either good place to be for work, number 1, number 2, number 3, so that's all pharmaceutical industries. Why is that the case? Because they still work according to a high standard. When they make audits, they always ask, what are you doing for sustainability? What is your program? And I think that it's also an industry that still can afford to invest in programs. So, at the end, I feel that they are doing a lot of things, and probably there is not so much to improve, because at this time, they are probably in the group of the first movers, rather than automotive or others. And for automotive, you can probably learn how to setup a LEAN SC, but sustainability, from what I understand, to be able to survive, also in 10 and 20 years, I think they are a little bit far already. But you see, if you focus to SC just, I think the way how they have structured the market now, to say ok, we will have one global production and then everything is fine, I think this is probably a one-way road. I think they will change it back, to get another point of sustainability, which is the stability of serving the market. I think it's a little bit too far, where we are now, that we all rely on one. I think this would change probably.

(L): When I visit pharmaceutical companies, I usually ask them about the selection measures their procurement departments follow. But the more I speak with them, the more I note that single sourcing is a followed strategy. Again, from your perspective as involved in the industry, do you think it is a subject worth looking more into? Do you think there is room for improvement there?

(K): It's like a wave. I think in automotive it was the same. 20 years ago, it was the most important thing, you have to single source, you have to outsource, you have to stream line, you have to put all your stocks on the road, until we had a lot of cases in the big automotive factories, where they had to stop the production, because it didn't work. The supplier was not able to deliver, they ran out of their small stock, because they didn't have any stock anymore, and they have learnt. They have said ok, the idea as such is good, but we shouldn't apply to all and everywhere, we have to find a way in the middle, a little bit. But now pharmaceutical is behind, they're in the same wave, so I think they didn't really learn from automotive, they will make now the same mistakes, and then, we hope that the wave will go down again to again more normal model, where we say ok, we take the idea, we realize the idea, where it makes sense, but we also have to think about backups.

(L): So maybe there would be a room for improvement there, then.

(K): It's a strange industry. When there are initiatives coming, from one of the biggest, I know, from that moment on, when he's calling me, and says look, we would like to make this now, that it takes maybe 2-3 months, the others will all follow. With the *same*, with *exactly* the same. We had this now, with emergency and crisis management, which is also kind of sustainability. Before, they didn't ask any of these questions, and then all of a sudden, they all asked the same questions. Where I see, ok, one brought it in, and the other are just copying. And it's coming again, and again, and again. And we feel this in a lot of areas, also for the quality audits, when our quality manager comes and says: Oh, now they start in this area, and we know that within the next months, all the others will ask the same questions. And they will come to the same findings. So, there is some inventors, and then there are a lot of people that are copying.

(L): My last question is about The Responsible Business Initiative.

(K): Yeah, this is for us a little bit less important, because we always have a primary contract with a local company. So, even for the ones that don't have a real representative in Switzerland, but like I explained, they have to have it, so they are looking for someone doing this for them, and then enclose our contract with this company, and not with the company behind. Which makes at the end, that all of our contracts are more or less Swiss-based, and not with a company abroad.

(L): I give this just an example, and not to go into details of that initiative in particular, I refer to institutional pressure, and try to see how much of an influence it might create. Do you think if such initiatives take place, in such a heavily regulated business, it might affect the supply chains of pharmaceutical companies?

(K): I think for pharmaceutical probably less, I think more for the other industries, where we have food coming from Russia, and mining, or all the other textile probably. I think for them, it will be more difficult to follow and also to control. For the traditional pharmaceutical companies, they have these requirements already. Because they have to take over a huge risk, if their products don't work, it will be a catastrophe. We had such cases, and it was always a catastrophe. So, I think we have other examples, like this Chinese company, at the end, everyone was relying on the other, until the last was not reliable. But, I think it might influence a little bit less than other industries.

489 **(L):** Thank you very much for your time and the shared knowledge. Is there anything else you
490 would like to add?
491 **(K):** Thank you, it was interesting to discuss these topics.
492 **(L):** I shall send a transcript once ready.
493 **(K):** That would be very good, thank you.

9.2.10. Interview No. 10- Glatt AG

Interview with Mr. Philippe Tschopp, Head of Business Development, Glatt Pharmaceutical Services- Skype Call, 2nd of October, at 14:00 pm

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

Tschopp (T): I explain you a little bit what I do, and then we take it from there. So, I have nowadays 2-3 different roles at Glatt Pharmaceutical Services. My first role is in the business development of our CDMO (Contract Development & Management Organization). So, there I promote out outsourcing services to developed pharmaceutical products. This from scratch over scale up from clinical trials, to commercial bulk manufacturing. Then, the second point is I am responsible also for the business development of our newly created logistics center, where we do pharmaceutical logistics, supply chain activities, similar to what (Christopher Amstutz is doing in fact, in Switzerland). So, that's with pre-wholesale, but also supply chain activities in clinical trials, distribution and logistics and warehousing of course. And the third part is, and this goes also again into supply chain, I'm taking care of pharmaceutical exepients, in a third company, which is all under the same roof, and there I come more into the game how do exepients get into a pharmaceutical company and what happens there. So, I have different angles, in the past, I used to do also distribution and promotion in the former CIS countries, and Sub- Saharan Africa, so, I have some background in, let's say, supply chain activities. Very little, but more holistic, perhaps.

(L): Can you also tell me a bit about the company, about Glatt? What source of pharmaceutical services does it offer?

(T): Glatt, as a company, is mainly in equipment business. So, we mainly manufacture equipment for pharmaceutical production, like fluid bed dryers and stuff like this, but one division out of it, is contract development, so what we do is, we do any type of solid dose developments, pallets, tablets, granules, whatsoever, right from scratch, or takeover existing formulations, optimize them, scale them up and go to commercial bulk manufacturing. So, that's the major service, so, it's a real hardware transformation of API and exepients, into a drug product.

(L): And can you also provide me with a brief description of your educational and professional background?

(T): So, my education is I'm an economist, I worked long years in accounting. Then, in discount brokerage, so stock exchange, and then in the year 2000, I walked over to the pharmaceutical industry, starting with distribution and development of pharmaceutical exepients, supply all over the world, and in parallel, with distribution and promotion of finished drugs, for this CIS and North African countries.

(L): So, what, in your opinion, does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique in the pharmaceutical industry?

(T): Lack of automation, lack of information transfer and very still old structures. So, we are far away from just-in-time deliveries, we are far away from reducing of security stocks. Everything is special. When we go for manufacturing, that's the case if we go for the end part of the supply chain, distribution into the pharmacies from the wholesalers, there it looks a little bit better, I would say.

(L): Do you think there is any added value do you believe a supply chain department brings into a pharmaceutical company?

(T): Absolutely, because you have different constraints. If you look from the end point, from the patient being at the pharmacy, having need of a product, there is somebody that has to get the complete overview of the complete supply chain, including risk management of raw materials. Just an example. Iboprufen was a big, or is still a big issue, to get the product, it's an OTC, so non-critical, everybody says. But in the end, we have stock-outs in the market, because people did not take care about security stocks, or about delivery agreements, and alike. Nor a distributor, nor a developer, or a salesperson has this capacity or capability to overview this complete process. That's for me the role of the supply chain manager. That's the end-to-end view. It's a very holistic approach, but he has to control this, and he has to ensure smooth transfer from the initial raw materials, packaging materials, whatever, over production, through storage, distribution, till the final point, which is, in the end, the patient.

(L): What, in your opinion, are the sustainability measures that pharmaceutical companies are generally taking?

(T): They try. Mainly, from the supply chain, so goods coming in, I start there with the raw materials, they try to do some evaluation of their suppliers, make quality checks, ask for sustainability plans, what happens if their site burns down, if they have an additional site, but this goes strongly against the regulatory affairs or regulatory topics, because you would have

to register two sites of API, for instance, or exepients, so, this is rarely done. So, we have a big big topic there. Then of course, there are huge contracts of social sustainability, whatever workforce implemented, HSE controls, I would say, the international companies they have about booklets for their suppliers of 200- 500 pages, which cover all of this. At the same time, I am not sure if they do the same for themselves. So, because of all the regulatories, how can you manage two sites producing the same products, in case that something happens, so we have a huge dilemma between what we should do in the industry, to ensure sustainable supply to the market, also under the right ethics, and what is in the end possible according to regulations. So, that's my personal view. On the, let's say, that's raw material supply and production, it's for me the same issue. Then, in the distribution part, I think there we are quite well, because the distribution channel how it comes to the patient or to the pharmacy, that's an easy way, that's logistics. Usually companies have multiple access to the market so that they can assure that they have warehouse or stocks or distribution channels, so there I don't see really the big big issue.

(L): You mentioned that Glatt are also manufacturers of pharmaceutical equipment. And I imagine you sell this equipment to pharmaceutical companies all over the world.

(T): Absolutely.

(L): Are sustainability measures something pharmaceutical companies ask about when considering your company as a supplier?

(T): What they would look at is out history, our position in the market. They would check financials, whatever they get. But, it's also the strong belief in a brand. So, young players have more problems than older ones, that's the logic behind the human being. But, I don't see kind of inspection and sustainability plans for equipment suppliers if tomorrow you can deliver another machine or not. They would look at delivery times, but they mostly know unless you have a unique technology, there is mostly one or two other suppliers there.

(L): That's interesting, talking to a supplier and hearing their perspective.

(T): It's a lot of reputation, it's a lot of long-term relationships of course. They do, especially when it is for development and manufacturing services, they come and audit, and they want to have plans and stuff. I was rather talking for the equipment part, there I think it's less, it's more about quality, price, availability. When we talk about sub-contracting of manufacturing or development activities, like clinical trials, then they are very very careful in the selection.

So, they make performance audits, they have the KPIs to check, did you perform in time, in the right quality, etc. So, there they are very, they're more strict. There is also, to be said, that more and more international companies outsource a lot of their supply chain activities, so, what they do, they use more and more contractors to manufacture their products, so therefore, it's getting a more complex task, and they are getting ready for it. But, I would not say that they have it a 100% under control. It's difficult especially with the big contracting players, because based on what they show what they have, they might have it, but they might not be capable to use it. So, I think it's very difficult to really understand what are the big core competencies of an external partner, and to manage this risk as well.

(L): Just a clarification; if you are providing equipment to a pharmaceutical company as a supplier, you also have your own supplier.

(T): Yes.

(L): Do the companies then ask to check your suppliers?

(T): So, let's talk about the services. Services is clear, everything which is exepients, we have to check and make sure that we have sustainable sources, usually meaning big companies with additional manufacturing sites, and stable supplies, etc. API is usually coming from our customers, so we do not influence it. For the equipment side, hmm. Good question. Less of importance, because it's mainly stainless steel and a lot is under our control, so, I cannot answer it there. There might be, for sure, on a quality level that we can ensure the delivery that we have according to ISO guidelines, because this is not GDP, GMP or whatever. It's more ISO guidleines, so that we ensure the thing there. But there it is more on a contractual basis, because it is a one-shot thing, usually.

(L): When it comes to Swiss pharmaceutical companies, from your experience, do the majority have local manufacturing sites, or global supply chains?

(T): Global supply chains, with local supply chains. So, it's getting smaller and smaller. That's what happens!

(L): And in those global supply chains, where do you think the main regions the operations are?

(T): It depends really on the company. Most of it is, in a lot cases the supply chain sits in Europe.

(L): And the partners, where they purchase the materials from?

(T): The US, India, China, with the trend back, if we talk about the API, with the trend back to Europe again. So, supply chain issues, the driver was to go to low cost countries, for all the services, even CRO, whatsoever, analytics, and stuff like this. The smaller companies tend to come more back to countries like Italy, or more Eastern Europe countries, with lower cost drivers, but having much better skills, and same cultural levels. I think it strongly depends on the economics of the game, to be frank. I think if you would ask them if they would prefer, at same conditions to work with a European or an American company, I think nobody would doubt it, no? So, the driver, and everybody knows, that in China, or in India, in India we have for example, environmental problems created by pharmaceutical or API production facilities, which is for me not sustainable at all. China has to turn around the whole environmental aspect, as well, child work, everything. So, in the end, the driver is cost versus quality. As long as the quality is ok, as long as the supply is secured, in the right cost and quality, and on an acceptable level, what is concerned with the local production, I think the industry would not switch. And for me that is not sustainable, because there was a time, and that's why these markets hyped so much, that people went for cheapest product, it has its price in the end, it has the price. For me, you have to balance out, it's always a make or buy decision, and the decisions cannot only be made on the money, in the game. It has to be made on a long-term basis, where the risk profile, and of course also thinking about where do I spend my money, approach.

(L): What do you think are some of the main operational/ strategic challenges pharmaceutical supply chains encounter?

(T): There I have to go perhaps back to the development of a pharmaceutical product. Because in an early phase, you start with the product development, pretty easy, it's still in the development department, and I think the biggest biggest challenge is really to have early access and exchange and still pulling down Chinese walls, from development to real commercialization. Because, there is, let's just say there is, the developer, he doesn't care really at his stage if a raw material is available in the tons they are needed, in the right quality, at the right price. So, he offers solutions. But I think the challenges start there. That the people that developed the product don't have to bring them on the market. And vice versa, the guys that want to bring it on the market, do not have to develop them. And that's for me where the biggest challenge is created, because once successful, nothing changes. And everybody

says we change when we are successful. So, an adaption of this supply chain or those sources, is no longer possible. This is creating a lot of topic. And the other thing is, this is both operations and strategic, industry is not talking with suppliers. Typical thing, I deliver raw material to a company that is doing a development of a product, I don't even know in what type of products usually, I talk about the usual cases, there are other cases when they have an issue and then they start to investigate, but, sometimes you don't even know where the product goes. You don't know the stages of the development. At the usual stages of development there is, let's say 5KG order, 10KG order, 1-2 years later, 200KGs order. Silence, silence, silence, and then big bam. Until then, I might be bankrupt if I am a small company, or I have sold all my capacities to others, and then I'm very surprised that there is a huge product launch ahead of us. So, biggest challenge, to make it short, is still communication. Along the whole value chain.

(L): So, the two big challenges you've mentioned are the segregation of roles between developers and the producers and the unpredictability of the business because of communication issues. How do you think these challenges can be faced?

(T): In the way that we have more integrated roles, for complete projects, and this is for me typical supply chain which has to go over all the difference phases. It is solved in some companies that already in early development, people from market access or marketing or production, are in the meetings with potential solution providers, and check. And tell, look, it's nice that you have this and this technology, but we don't have this in large scale. Ask the question directly, do you have outsourcing partners that have these scales? Or would we have to make a CAPEX investment, this is production related of course. Challenging at a very early stage the quality of raw materials, and the sustainability of this source, before going to it. In some cases, it's not possible because it's a very small production, whatever, but I think to get people into the game that overlook the complete topic. And in some companies, I have seen it myself, in the other companies, it is still the Chinese walls between the departments. So, development is talking with scale up, scale up is not talking with production, production is not talking with marketing, but marketing is directly talking with product development to do what they need on the market, or what they believe they need on the market. So, its all related there. Communication is an issue.

(L): Is your company a single source of any product or service?

(T): Yes, we have some specific technologies that we only manufacture the equipment to it.
(L): Do these technologies' customers then ask you then any sustainability related questions, keeping in mind that they know they can either get this product from you, or they will not.
(T): Yes, they would have long meetings with us. And then they realize we are a family owned business in the third generation, on a healthy basis. And at the end, it's the work that we continue to do this. And if it's a specific contract, then of course you have then obligations. You try to fix it on a contractual basis, that you say ok, but if we go for this and this solution, ensure, like when you buy a hoover, that exchange parts are available for the next 20 years.
(L): How do you think sustainable supply practices in the pharmaceutical industry can be improved?
(T): In general? That's a tricky question. For sure, there is a big topic on data management, what they try now to do with serialization and stuff like this, on the end part. To ensure that the right product is at the right quality with the patient. That's a huge challenge there, but again it's not complete lack, but big lack of automization. Which then leads of course, if you imagine nowadays an amazon shop, you have a demand, you go on the amazon shop, and you see there are 10 pieces available, of what I need, and the resupply takes 20 days. This is not the case in pharmaceutical industry. We try to make of course supply contracts, and or long term contracts, but there is no transparency, what is really in the pipeline for me. Therefore, we have huge security stocks, with the problem of running shelf lives of the product, just to balance out this non-fitting supply chain issues. And there I believe, and that some of my big big topics, coming from a supplier side, is it is possible in other industries, we talk about the pharma industry, industry of a high quality, we are at a lower level, much lower level than microchip industry, we say we have strong issues in supply chain, precision that we have really goods on the market available for the patients, I think there are more products stock outs than in many other industries, when we don't talk about life saving drugs, but about consumer goods and stuff like this. So, again, the industry can learn from supply chain management of faster turning under pressure industries, such as food, such as automotive, and the like. But there is still not enough pressure on costs, it seems.
(L): Where, in your opinion, are the main gaps when implementing a 'sustainable' supply chain?

(T): So, I think we had it in a little bit before concerning the sourcing of material, there it's both environmental and social. On the patient side, we drive into a situation that I believe that a lot of drugs in the future, will only be available for a specific part of our population. And there, I don't see the social sustainability versus the patient. And these are the biggest two gaps we have there. So, ensure that where things are produced, and it goes back to the pharma story, they have the least profit out of it, but transfer cost and profits more where its produced so that they can do it in a good way, and do it also the next 50 years in the right way. And then, on the other hand, ensure that the patients that need these drugs get to them at an affordable cost.

(L): We have touched on this earlier, but if you would like to add anything.. What do you think are selection measures does your organization's procurement department follow when selecting suppliers?

(T): As I said, they try to make a quality assessment, they try to establish questionnaires, they're obliged to make their audits, that's what they can do. And again, of course, long-term contracts and relationships.

(L): How do you think Swiss pharmaceutical companies evaluate the Responsible Business Initiative and what changes to their organizations, in general, and to your supply chain department, in specific, would it bring, if implemented?

(T): I think it depends on the setup, as I am not familiar with it. If, there can be still constructs built to prevent the company from any harm. Let's say I have a manufacturer in Bangladesh, that is using child labor, and is polluting the environment. I have a distributor in between that is confirming me that everything is ok, and I have a second source auditor that say everything is ok, I have all my documents done, if there is no risk that I am being followed, or sued, I think nobody would care. This is now just off the top of my head. But, if there is such rules and regulations, and it goes through the supply chain, that you as a manufacturer or user of a raw material have to ensure that the local manufacturer is fine, then either there will be the further establishment of more and more audited auditors, that are, let's say, not bribable or however you want to say, and give a clearer picture, because they would then be held responsible by the pharmaceutical company, if something happens, then it changes. But the current way it must be very wrong, if in special markets, in special, let's say also not only from the supply side but also from the sales side. People try to hide behind constructions where

one is telling the other, I'm fine. And if the target of this initiative is to break with this, then there will be a string shift. Because then we will have a legal impact, potentially we are back to the money again, because people except for some exceptions, people in the business, they are driven by legal concerns and money concerns, so only this would really bring a change, I think. But then with institutional pressures, there would be some change, of course. If they can bring it through, with the pressure. Therefore, I believe that some people are not very happy.

(L): Thank you very much, I shall send a transcript of this interview once ready, for verification purposes.

(T): That would be great, thanks.

9.2.11. Interview No. 11- Science Industries

Interview with Ms. Linda Kren, Scientific Assistant and Responsible Care Program Manager, Science Industries

(Email as received from Ms. Kren)

Lüchinger (L): Please provide a brief description of your organization and what role do you play in it.

Kren (K): I work for Scienceindustries, which is the business association of the chemical, pharma and biotech industry of Switzerland. As a scientific assistant I am responsible for environmental topics related to industrial production (waste, air protection, CO2, prevention of major accidents, contaminated sites, etc.) and for the Responsible Care program.

(L): Please provide a brief description of the Responsible Care program.

(K): The RC program was initiated in the middle of the '80 by the former Canadian Chemical Producers Association and then adopted worldwide by ICCA (International Council of Chemical Associations) at the beginning of the '90. scienceinudstries decided in 1991 to implement the program for the whole membership (which includes chemical distributors in addition to the sectors mentioned above). Every member company is asked to sign the RC principles of scienceindustries. In 2016 we updated these to have a better alignment with the RC Global Charter and consequently restarted the signatory process through the whole membership. Up to now signatures of 68% of the associated companies have been collected. Implementation is based on self-commitment and periodic auto evaluation. We collect yearly the RC key performance indicators. During the next year we will focus on the implementation of the new global metric to assess process safety performance. A first workshop on this topic took place in September of this year. Sharing best practices is a key element of the activities of the program.

(L): Please describe whether the RC program has any implications, or interactions, with Swiss pharmaceutical companies, and if so, what is the scope of this interaction.

(K): Best practice sharing on production topics (e.g. process, occupational & health safety, CO2-reduction and energy efficiency) is an activity that reaches across all member's sectors including of course pharma. We are planning a round table with the Swiss Federal Institute of Aquatic Science and Technology (Eawag) to discuss the status of scientific research and communicate the needs of our companies, mainly in the fields of Eco toxicity and water

treatment plant technology. Representatives of all member's sectors are highly interested in this exchange.

(L): What does a pharmaceutical supply chain, in your opinion, look like? What are the processes you believe to be unique to the industry?

(K): In my opinion, the supply chain of the pharmaceutical business does not extremely differ in its complexity to other industries. It can be stated that the management of effluents is more challenging, since the emitted APIs, intermediates products of decomposition must undergo a risk assessment (determining PNEC and PEC), due to the lack to limit values for these substances.

9.2.12. Interview No. 12- Pricewaterhouse Coopers

Interview with Mr. Wolfram Koester, Director, Supply Chain and Operations, Pharma Sector, PriceWaterhouse Coopers, Director, Skype Call, 6th of October, 14:00

Lüchinger (L): Please provide a brief description your role at PWC.

Koester (K): Sure, so I am director PWC in the Swiss pharma and life science practice, and I am heading the supply chain and operations team for Switzerland. My background is now 17 years of supply chain consulting, mostly in life sciences. And, well, my educational background, I studied economics, in Freiburg, Cologne, and Sydney.

(L): Can you start by telling me what does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique in the pharmaceutical industry?

(K): Well, one of the requirements when looking at pharma supply chains is the very high level of compliance that is required. So, we are looking at goods that usually carry a shelf-life, there is a lot of regulations associated to pharma products, pharma production and distribution. And, of course, unlike in some other industries, there is also, depending on which kind of pharmaceutical product we are looking at, also some requirements with respect to, for example, cold chain. And, track and trace, so traceability of products back to the batches, and where they were produced, is also something that is essential. Also, legal requirements.

(L): What added value do you believe supply chain departments brings to a pharmaceutical company?

(K): Which value, I mean, without the adequate supply chain organizational setup, it would be fairly difficult to assure the supply to match the demands. So, this actually starts from supply chain planning perspective. Getting a view on what will be the requirements. Having the inventory, quality, setup in the right way, to also monitor what I already mentioned, shelf-life and expiry related topics. And, then, in the end, it's assuring that lead times, when replenishing affiliates, ultimately the customers, like pharmacies, distributors, and so on, and the market is shifting a little bit, and in some cases, might even go to end patients, that this can be fulfilled with the right distribution models.

(L): I ask this question is because there are theories mentioning that one added value of supply chains can be obtaining a competitive advantage through a Supply Chain. In your opinion, can that be applicable in the pharmaceutical industry?

(K): I mean, it's mainly a cost aspect that needs to be considered, and that's definitely where there is some kind of competition. And this can also position a pharma company on top of the competition. Like I mentioned before, if lead times, associated costs, and so on can be kept at an adequate level. However, I mean, as of now, the life science industry is also rapidly changing, with respect to more patient centric solutions, you know, I am touching on the digital capabilities become more and more key, to jump on top of the competition. That's where u do feel that, especially for supply chain but also tech-ups a whole, this, becomes more and more a competitive advantage. That you position yourself in the correct way.

(L): What sustainability measures within the SC that pharmaceutical companies are taking?

(K): I mean, sustainability, it's usually very much focused on the quality of the goods, and compliance to regulations. So, it's probably less lead time considerations, or something like this. It's more very much at the product at such. And, in pharma, this is where the SC departments need to make sure, together with the tech-ups quality functions, and traceability that they don't have too many off-sets in quality, and if they do identify them, they're able to trace them back immediately. And, in the worst case, even initiate a recall.

(L): From my research so far, I understand most of the Swiss pharma companies have manufacturing sites in the US, or Japan or in Europe. But also, some in China or India, such as antibiotics in Hyderabad or similar areas. Are the sustainability challenges that supply chains face in such areas the same as those faced in the Western world?

(K): Well I mean, this is very much associated to different regulations, that you have in such countries. For example, from a distributor perspective, you have some limitations and in some cases restrictions with respect to market access without having set up local partnerships. And that is especially the case in China, but also for India. And if you are looking at Indonesia, that's also something where you are not, you cannot simply operate with just export licenses, you need to have someone already positioned within that country.

(L): What are some operational/ strategic challenges that you believe pharmaceutical supply chain encounter?

(K): The supply chains in Switzerland, I mean, something that shift a little bit the model, is potential shifts in tax considerations. I mean, as you are most probably aware many of the Swiss pharma companies, and also non- Swiss headquartered pharma companies, have initiated some kind of principle agent model, to ensure that tax burdens are kept to a

minimum, in a way, this might even mean from a physical flow of goods, some negative aspects relating to the pure supply chain function. So, when we are looking at tax optimized value chains, from a supply chain perspective, utilizing free-trade zones, and so on, usually result in some optimal setups. It usually results in significant increase in lead times, and this also then of course needs to be reflected in inventory policies across the distribution network. So, you are carrying excess costs, however, they are compensated by significant reduced tax burdens.

(L): And are there any sustainability-related gaps when dealing with those challenges?

(K): From a Swiss perspective, no I am not really sure, what exactly. Can you give an example what sustainability issues you could see from a Swiss perspective?

(L): As in when Swiss pharma companies dealing with overseas suppliers, different legislations and practices, whereby some practices may be considered acceptable in a certain country but not in Switzerland.

(K): in my opinion this is not related to Switzerland only. It's something most Western countries would have to deal with, and of course, there are certain challenges associated to this, but I don't see Switzerland in a special role.

(L): I agree, I only ask this as an example, because the study is focusing on Swiss pharmaceutical companies. Moving on the next question, how do you think sustainable supply practices in the pharmaceutical industry can be improved?

(K): I would see that this is mainly relating to the regulators, you know, that if a pharma company can work along the regulation authorities, to properly define the regulatory specifics, then this would definitely help, especially when we are looking at the new trend of personalized healthcare, where most regulators are not in the position yet to give a comfortable level of certainty to the pharma companies.

(L): When it comes to sourcing, what in your opinion are the selection measures that Swiss pharma companies' procurement departments follow when selecting suppliers?

(K): It's price and reliability.

(L): Are there any sustainability measures that they require from suppliers?

(K): That would be part of the reliability, because reliability would cover several dimensions. I mean, we are talking about the agreed time for delivery, we are talking about the quantity,

and we are talking about the quality. And, a lot of the sustainability would relate then to the quality that is associated to the products.

(L): And do you think that the companies apply these selection measures to their first-tier suppliers, and their second-tier suppliers?

(K): I think that when it comes to second-tier suppliers, indeed many pharma companies probably have a limited view. However, when it comes to traceability, at least in theory, one should be able to also track completely along the chain. So, depends a little bit also on which kinds of products we refer to, if we are looking at CMOs that provide not only the API, but maybe already bulk products, and the pharma company is more or less just focusing on packaging and distribution, then, in such cases, of course, second tier suppliers for example, one that has been providing the API, is far more important than as if we are talking about just a supplier of packaging material.

(L): Do you think there is a lot of single sourcing practices taking place in the pharma industry, and if so, in which areas of sourcing is this strategy followed?

(K): Well, I mean, in many pharma companies there is a lot of single sourcing relationships, but this, very often, also relates to the life cycle of the product, you know, if we are talking about, I mean, if it's still in license, and patents have not expired, then, this by itself already limits the number of potential suppliers. But if we are talking about generics' companies, then of course, you could also potentially drive dual or multi-sourcing relationships. It does carry some more complexity, of course, and this goes back again to traceability issues, because the end product as such that you are selling, it would, at least for the consumer, it should look exactly the same. I mean, you are having the same API, same dosage form and so on, and you just need to make sure that traceability can still be guaranteed, that you see that there were some batches related to one supplier where it might have identified some issues.

(L): I refer to the Responsible Business Initiative as an example of a current institutional pressure. In your opinion, how do Swiss pharma companies evaluate Responsible Business Initiative and would it bring changes to their organizations, in general, and to supply chain department, in specific, if implemented?

(K): I don't think so, no. Because I mean, the switch is just relating to the supplier selection process, and the supplier metrics, so you're kind of expanding the supplier-related metrics that you measure suppliers against. And, I mean, I believe that suppliers will strive to

correspond to any new regulations, and as this would be measured also by the received of those services, I do not really see that should have a major impact on supply chains, as such. I mean, the only thing that could happen as we are looking at more metrics, and they are kind of binding also, the supplier qualification process, you might experience some more changes in suppliers, but I believe this could only be in the more shorter term, the mid to long term this should not really be relevant.

(L): This was all, thank you very much. Would you require a transcript copy?

(K): That would be nice, and actually, from your thesis that you're currently doing, it would be nice also to see how you came to conclusions with the interviews that you incorporated.

(L): Sure, I will be able to share that only after January only.

(K): That's fine.

(L): Thank you very much.

9.2.13. Interview No. 13- Roche

Interview with Dr. HVS, Procurement & Compliance, Roche, Skype Call, 5th of October, 14:00 pm.

Lüchinger (L): Please provide a brief description of your organization and what role do you play.

(H): Roche is a leader in the Dow Jones Sustainability Index, and we have now about CHF 50 Billion, in sales. Our company has sustainability at out DNS and we intend to have sustainability included in all business decisions, and everything we do. Therefore, we expect the same thing also from our suppliers. My role is in procurement is sustainability and compliance, and in this role, I need to ensure compliance, with law, and with our internal regulations and policies, and also ensure that our suppliers understand what we need in terms of sustainability and compliance. So, these two things go hand in hand. We see compliance as the basis, as the foundation, and sustainability, the economic, environmental and social aspects, come, of course, on top of this. And we believe that compliance and sustainability bring a business case, so this is basically why I am in this role that I am in, to really create a stronger business case for this, in collaboration with suppliers.

(L): What does a pharmaceutical supply chain typically look like? What are the processes you believe to be unique in the pharmaceutical industry?

(H): One aspect of the pharmaceutical supply chain is that it is highly regulated, with regards to authorities, but also with regards to quality. Because its human life, that's what medicines and diagnostics are needed for, to protect human life. That means we must not waiver on quality. So, we need to deal, in contrast to other industries, with specific CGMP (Current Good Manufacturing Process), GMP (Good Manufacturing Process), GCP (Good Clinical Practice) regulations. We have a lot of individual laws in individual countries. We have specific stakeholder groups, that expect the pharmaceutical industry to do specific things. And also, we have gone through quite some changes over time, where pharmaceuticals are manufactured. Generics have in the past been manufactured also in the west. And due to cost reasons, a lot is now sourced to Asia, for example, India. And we sometimes see, like in the antibiotics business, the sourcing happens today mainly from India. So, pharmaceutical companies, that are string in antibiotics, they have almost no other choice, but sourcing from India. And that brings specific problems with it.

(L): Can you provide me with some examples of problems in areas as such?

(H): With India, regardless which antibiotic you take, you will find that the vast majority of them is manufactured today by a number of companies in the Hyderabad area. And they need to follow strict GMP compliance requirements, and they have also other strict requirements, like, they must not produce any liquid outlets, and still it happens that you can almost detect every single antibiotic in the river water downstream, from the plants. There is, of course, the reason also that people and the population do not have sufficient education on how to safely and properly use antibiotics, and if they overdose, if they dispose of antibiotics, then they may end up in the water closets and go down the drain, and that way arrive in the rivers. That creates a new problem, and the problem is that you will have then the creation of multi-resistant bacteria that are resistant to all antibiotics. We are creating a problem here that the industry has currently no simple solution to.

(L): Has there been any attempts to minimize these problems?

(H): Education programs for the people there, or saying we don't deal with suppliers and facilities that do not adhere to standards. Yes, both these topics have already happened. You see, our company, almost not exposed at all, to India sourcing. In the specific cases where we do it, we really look very carefully, and we work with our suppliers. We educate them, we support them as we can. We also have tough targets with them, that we work on, together. We have also seen suppliers that were unwilling to meet those tough targets, or could not really put enough commitment behind that. We are not shy of supporting, also financially, in order to have the right standards, to ensure that our suppliers really walk the talk on the high environmental and social and economic aspects of sustainability. But walking the talk is not so easy. So, this is what I can speak for Roche. I can also speak by seeing what other companies are doing. And we are collaborating with the PSCI (The Pharmaceutical Supply Chain Initiative). In the meantime, there is now I think 24 companies, mainly pharmaceutical companies, but also some suppliers to the pharma industry that all commit to high standards on safety, health, environment, social and ethics. And these companies have agreed on common principles of sustainable supply chain, which is written down in the PSCI principles, and the related implementation guidance. Under this collaboration, we are also looking specifically into antibiotics, and we have a dialogue ongoing with stakeholders in this area. So that we make a pledge to educate also the suppliers. For example, the antibiotics in the

Hyderabad area, and this dialogue has happened through a conference, where PSCI invited the CEOs of leading suppliers in India, earlier in 2017. And you can find that information on the PSCI website, if you google PSCI, you will find the website, and on the news stream, you will find also information about this conference. We're in the dialogue with these suppliers and also representatives from NGOs and other bodies. There is a clear commitment, visible, from all sides that there is a responsibility to clean up, and that actually everybody will need to do their share to clean up, so that we solve the issues around antimicrobial resistance. We have even investors involved there. Nordea is a Swedish bank, and they have an investor, a head for department for sustainable investment, his name is Sasja Beslik. He wrote a letter to the CEOs of many of the pharma companies. He also attended a PSCI meeting last year in Dusseldorf, and we had the discussion with him and colleagues of his, how PSCI can play a stronger role, in helping to solve the problems around antimicrobial resistance in India. We are collaborating closely with Nordea here, because Nordea as a sustainable investor, they went, Sasja Beslik himself went to India and looked with his own eyes how bad the situation was, and they had an article on their Nordea website, which we also read and of course responded to. This is a great way of engaging together, on collaboration, and since then a PSCI member from Pfizer has been to Sweden, in order to also report to the Swedish Crown, on what our commitment on improving situation is, for example in India.

(L): What added value do you believe your supply chain department brings to your organization?

(H): Our suppliers play a key role in our supply chain. There is hardly any company that can do everything in-house, so we depend on our suppliers, and their suppliers, in order to produce these life-saving medicines and diagnostics. It means, often suppliers are better positioned, or have better knowledge or also better cost structure, to produce certain intermediates that are needed for the pharmaceutical manufacturer. Or sometimes they even know better, how to produce the bio active, the drug substance. So, these things we take into account, a pharmaceutical supply chain therefore needs to ensure that all the suppliers involved in this supply chain, have high standards, and these are not just with regard to quality, but also with regard to sustainability.

(L): How many manufacturing sites does Roche have?

(H): That's a good question, I don't know the number, by heart, because it has been changing recently. We have, also sold some, we are in the process of finding companies that are interested for some others. It depends if you just count the drug product or drug substance sites or if you also add formulation sites. So, it's certainly a number that is bigger than 10 and smaller than 100. I don't know the specific number.

(L): And where are they, region-wise, mostly located in?

(H): We have them in all regions. We have, of course, many, here in the West, in Europe and the US. We have some in Japan. But we increasingly also have locations in China, for example, a pharmaceutical manufacturing site in Shanghai, a diagnostics plant in Suzho, near Shanghai is currently under construction. So, we need to be where the markets are, and where we have good infrastructure.

(L): And when dealing with suppliers in regions where your manufacturing sites are, and let's take China as an example, how do you ensure those suppliers commit to sustainability measures in their own operations?

(H): First of all, when we pick a new supplier, we need to do our fair share of due diligence, and of course, the suppliers will also do their fair share of due diligence with us. But for our side, it's important that the supplier commits to the principles of sustainability that we have outlined in our Roche supplier code of conduct. And also, that they adhere to the contractual requirements that we have, where we specify many other topics. We usually go also on site, and see with our own eyes, conduct supplier assurance visits. These include, for example, that we work under the PSCI protocol, and send an HSE and a social auditor on that site, and these are approved, specifically hand-picked auditors that have the necessary qualification under PSCI. They follow the PSCI protocol and conduct an onsite visit, to the supplier. They conduct also interviews with employees, they take a tour around the site, they work with the HSE mangers on site, and the site management. They also look at the peripheries, like fire department, like security, and other things. At the end, they write a report, this report is then shared with us, and also with the supplier. And we then work with the supplier on any findings from such an audit, such an assurance visit. And we will need to see the supplier improve on any findings that they have. Sometimes the suppliers also have great ideas and opportunities, so we not only work on risk-reduction but also, we seize opportunities that we identify during these visits. So that is a key element of ensuring that the supplier has the right standards.

Beyond the onsite visit, we have the ongoing risk-assessment that we do either on our side, or together with the supplier. With very critical suppliers, we ask for a business continuity plan, that we can jointly develop, and even run practice trails if needed. And we also have then ongoing due diligence, from other angles. Like contractual compliance, like reconciliation that we do from time to time in order to see if what has been negotiated under contract is also delivered. And, of course, our quality colleagues have to go back to the sites, in regular intervals, in order to ensure GMP compliance, and the same we do with our sustainability assurance visits. That we go back earlier to such suppliers where there were more findings, and because we just have this responsibility to ensure that our suppliers have good standards, too.

(L): Do you feel those practices are sufficient to ensure your suppliers follow the requires sustainability measures?

(H): In audit, it's usually a spot check, and therefore somebody wants to cheat. And they know the auditor is coming, maybe they will be able to hide certain things from the eyes of the auditors. And so, this is just a one-time quick view. We will, however, also look at what others say about this supplier. We have, of course, multiple people from our company collaborate with a supplier, so, we form our picture not just from this one spot moment, but also from visits from others. So, sometimes we learn that a supplier is not playing openly, and there is something that they hide. And that comes out, over time usually. Sometimes, the authorities pick it up, the supplier gets a fine. Sometimes, its picked up by NGO's, and it hits the media. There are various ways, how these things come out. It's very hard for somebody today to hide things on the long run.

(L): Do you think there is room for improvement when it comes to sustainable supply practices in the pharmaceutical industry?

(H): Everybody can contribute to walking the talk, at any time. And, we have, also in-house, say with new comers, people that we need to educate from scratch. We need to inform them why sustainability matters. But we have also others, who come with even better knowledge on sustainability than we have today. And so, we have this whole bandwidth of people that are less educated, or less willing, and people that want to take a leading role there. The same applies to our suppliers. We have some suppliers that are just fantastic. They have also their highly regards and decorated for their sustainability doings, and then we have others, where

we understand that they are focusing too much on cost, they are not investing enough in sustainability. These suppliers we may not be doing business with, if the management does not change. And so, it is really always, there is always work to do. You don't have everybody on the same page. We have people in our organization who focus mainly on cost, in the finance department, for example. For them it's much easier to calculate savings, than to calculate the benefits from sustainability. And, so, we need to work internally and externally, and continue to educate people, and do that together with our suppliers. We often have the situation that 100 people are doing the right thing, and there is one person that is doing the wrong thing, and it may have significant consequences. So, we are always shy of priding ourselves of doing a good job, because it can change tomorrow.

(L): Do you follow the same procedures mentioned earlier (such as due diligence and audits) also with second tier suppliers?

(H): We wish we could have exactly the same rigor with assurance visits at tier 2 suppliers. But we do not have usually a contractual relationship with these tier 2 suppliers. Put tier 1 suppliers may actually choose not to inform us who they're tier 2 supplier are, and refrain from having that incurred in the contract. So, this is a discussion point. Where we get transparency and support from our suppliers, it's much easier, to work with tier 2 suppliers on the same thing. We are actually implementing such a right to know more, by the PSCI principles, because there is also an element in there, in the principles, that says our suppliers are asked to work with their own suppliers on implementing the principles. And, this way we see even tier 2 suppliers becoming PSCI members already today. We have still a long way to go until we have full transparency with tier 2 suppliers, and we can sometimes only win that through a full support from tier 1 suppliers, and also, through some third parties that help us get more transparency into the supply chain. There is, as I said, often no legal right to know who are your tier 2 suppliers, so this is more a social obligation, but it is very tough if you just apply law, to know exactly who your tier 2 and tier 3 suppliers are. But we bring transparency through analyzing our supply chains, this way.

(L): In my other interviews, one of the transparency related topics that came up was also the difficulties that come up with demand and stock management due to the lack of transparency. Do you think there is a sustainability-related issue there?

(H): Yes, I clearly believe that there are various reasons why you may not know what the right stock level is. It may also depend on how quickly, for example, a competitor of yours, gets the right to market their generic version of a drug that gets off-patent. We are experiencing that as we speak, and we had such cases also, in the past. It makes it very difficult to predict, if you need to supply the market for a full year longer, or if the generics come in already now. And usually it has a dramatic effect, prices get usually slashed very quickly. Also, you don't know how much more you can sell, so these things have a significant impact on how much stock you should keep. We have always the absolute priority to secure supply to patient. So, we cannot simply say ok, we will rely on the prediction of a demand, because it can change overnight, and if it is bigger than expected, the consequences may be that if the demand is bigger then patients may die. Because we cannot supply on time. We must not let down patients that are in need of a life-saving drug. So, that is really a challenge, and it can happen that, because we may not have enough visibility sometimes, and also for the reason of uncertainty that we are sitting all of a sudden on some stock, because generics came in faster, because there was maybe also some other factors playing a role, like a competitor coming up with a new drug or something like that, or, because authorities all of a sudden ban a product in a certain market, and we can no longer sell it there. So, its multiple reasons, and makes it very tough to maintain always the right level of stock. And then we have on top of that, regulatory requirements, that relate to a shelf-life, relate to specific authorizations, or registrations that may expire, or that we cannot extend quickly enough. So, this is really a tough area.

(L): What other operations/ strategic challenges does your supply chain encounter?

(H): This is, and remains, a big issue. Of course, the stock topic is an important one. The second one is if we cannot fill an internal plant anymore, because one of the products breaks away, either because there is generic competition or something else, it's really hard then to maintain a cost competitive position for the other products that you keep. Because, the fixed costs need to be absorbed by less products, and so, this can become a down spiraling effect. So, keeping a proper balance in a production site of what your produce and what the demands are, is very difficult. We try to aim for always having a certain amount of free capacity so that we can also respond to sudden upswings, that can happen because we need to supply longer, or there is an earlier demand than expected, especially for new drugs, but, we need to really

be flexible here, also, work with our contract manufacturers and suppliers, who need to display the same flexibility. And for them, it's often the same situation. That some have the problem too much demand, they cannot expand quickly enough. Some others, there is too many going out and all of a sudden, the site is no longer competitive and then you need to close it down.

(L): How do you think such challenges can be faced?

(H): It's very important that good communication happens, across all sites, and so, a supply chain leader, technical product lead, has a key role to play and needs to be in close touch with marketing colleagues, so that you have a proper sales and operational planning process. And that also takes into account the authorities, that also takes into account new incoming competitors, that takes into account situations on demand. It is multiple facet topic, communication is key.

(L): What selection measures does your organization's procurement department follow when selecting suppliers?

(H): What is important is that we look at the overall situation. The quality, the availability and flexibility, and of course, the sustainability aspects. So, how good are the SHE (Safety, Health and Environmental) standards, how good are social and ethics, the experience that we have with the supplier, how well is the relationship with their management and their willingness to collaborate.

(L): What are the situations in which you single-source?

(H): Single sourcing is often unavoidable, in case you have a new drug where you have only maybe one supplier who can quickly enough produce a drug component, especially if it is bespoke, very special components, then it may be very tough for a second one to have it ready at the same time. From a quality compliance point of view, it is usually also necessary that you validate every supplier, and when you run more than one supplier in a plant, then you need to have a proper change over one lot, from supplier X to a lot from supplier Y, and, that means extra complexity. And so, usually on a quality compliance side, people historically liked it better if they just had to deal with material from one supplier. Because then there is a much-reduced likelihood that you mix up certain things and then have later a recall from the market. So, basically, single source situations are very common, and there are always regulatory authorities that will not allow second source. In some countries, they simply ask

you to just nominate one source, and they will not tolerate a second one. So, we have these hurdles.

(L): My last question is about the Responsible Business Initiative, have you heard about it?

(H): Yes, of course. In my view, this responsible business initiative is one that we have been trying at Roche already, to do our share, upfront. To declare openly, to be transparent, how we are supplied, where our supply comes from, how our business practices work. So, we feel that we are doing our share. So, it is questionable if you still need a legislation for that, where somebody from anywhere in the world, can come and sue you here, in Switzerland. Maybe just for the purpose of having a personal gain. And, they just find somebody in the legal system who then has this trial go forward and maybe we have to pay a penalty for something. In my view, it is sufficient if we maintain controls also without such a system. So, this is just my personal view. Our company view, you will probably also find more about that. At the end, it will be the decision of the public. And this is something where there is certainly a likelihood that the responsible business initiative becomes a law in Switzerland, one day. I don't know if this would be a better world thereafter, or not.

(L): I would like to clarify that I refer to the initiative as an example of institutional pressures, but I don't specifically elaborate on it. If such an initiative then comes into law, do you think it would bring any changes into Roche, or its supply chain departments?

(H): Well, we have been proactive in many things, but you can no longer rest assured that being proactive is sufficient. Anybody can potentially come and sue us, or anything, and it may have very high fines resulting in there. So, you need to really calculate the risks and opportunities resulting from this initiative to become a law, and the consequences. Some companies they may decide that their headquarters should no longer be in Switzerland, and they will pull out. So, I could see how that, in our supply chain, that could have an impact on us, because some plants that are located here, they will go elsewhere. So, I am not speaking about Roche, but I am speaking about what other companies are considering, as a consequence. So, every company themselves have to decide what they do, but it's certainly questionable if the responsible business initiative would have an economic advantage for Switzerland or for the companies based in Switzerland.

(L): Is there anything else you'd like to add?

(H): I should say that the one or the other is more my personal opinion, it's not a Roche statement, so if I speak here, I speak first in my role as compliance officer for procurement, I would be glad if the statements I made, we need to ask you that this is not published, in the way that 'Roche says', and therefore I would be glad if the answers are anonymized, and that we basically also should say, we don't know all the answers. We have a lot of uncertainties in this world, a lot of volatility in this world, and what may be right in today's circumstances, may change tomorrow, if the conditions change, so we need to be also always mindful of the overall frame, and the changing environment.

(L): Your request for anonymity and your request to mention the statements given here are personal and not an official statement of Roche, will be of course granted. Thank you very much for your time and cooperation.