6. Methodology for the Written Expert Survey

The study was carried out in the form of an expert survey using a questionnaire. The objective of the survey was to obtain answers to the research questions defined in this paper, namely issues that have a strong bearing on the key areas for organisations in connection with supply chain management. Since the steel industry exhibits rather conservative traits, it was not possible to easily categorise this project at its outset. The first step was to design a questionnaire consisting of 34 highly detailed questions. A trial run using three test subjects yielded the following outcome. To begin, both the time commitment and complexity of the survey were too great, and none of the companies approached were prepared to comply accordingly. In order not to forego the practical component of this paper, the survey was revised. This proved to be a challenge, since the research questions still required answering. The revised survey comprised an additional 17 questions, and some compromises were necessary relating to the degree of detail for the individual supply chain commodity groups. A new version using the same test subjects revealed that was feasible to derive answers.

Direct contact persons for this survey included managers, heads of logistics, heads of supply chain management as well as heads of purchasing and procurement. This approach was taken to ensure the effective responsible parties for supply chain management could be addressed and thus also guarantee a high quality of the answers. The

next step was to translate the questionnaire into English and Chinese in order to facilitate a comparison between China, USA and Europe. Various ways for conducting the survey were enacted, of which one involved an Internet-based survey tool. This tool was appropriate for companies in which there was no direct relationship with the interviewer. A second method for carrying out the survey was via e-mail. In this method, companies that were addressed had a connection to the interviewer by virtue of the interviewer's environment. Lastly, individual companies were directly interviewed. On average, the surveyed steel companies were allowed a six-week time frame in which to answer the survey questions. At the halfway point for the answer time frame, a friendly reminder e-mail was sent in order to encourage a higher response rate. In isolated justified cases, the deadline was extended. In total, 36 questionnaires were issued to 36 companies.

6.1. Results of the Expert Survey

Of the 36 questionnaires issued, 15 were returned by the deadline, which corresponds to a very good response rate of 41.67%. However, this value could only be attained by virtue of both the interviewer's existing network and environment. Of the 16 companies approached via the survey tool, there was a response rate of 0%. However, the total of all responses does not come close to a quantitative evaluation. Obtained results were input into Excel, in order to generate the analyses in an appropriate form. In the following

sections for Chapter 6, the relevant analysis results will be outlined by means of descriptive statistics and underscored with statements.

6.1.1. Survey Results for Steel Works in Europe/USA/China

The general component of the survey set out to assess whether the employee count had any bearing on the sales in tonnes and whether country-specific differences were evident.

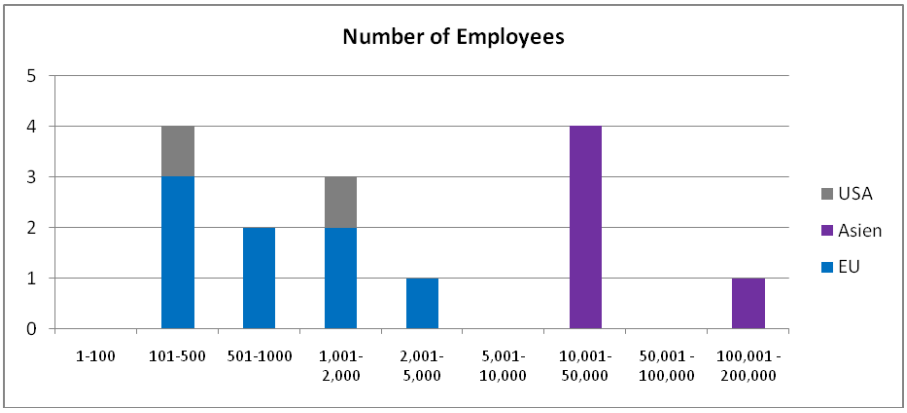

Figure20:Number of employees within the surveyed steel industry companies by country[151]

Steel companies with the most employees who participated in the survey were from China, which is not surprising, since many of the largest steel companies in the world have headquarters in China.

[151] Source: Own illustration

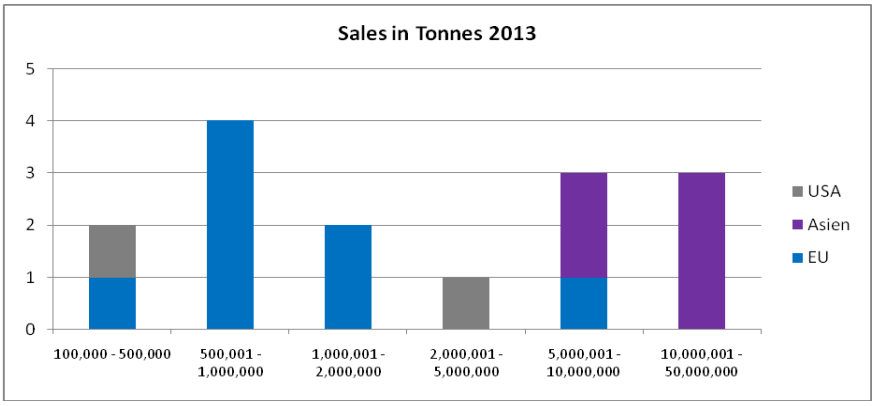

Figure21:Sales in tonnes for surveyedsteel companiesaccording to country[152]

Chinese steel companies are also ahead by leaps and bounds for sales figures in tonnes. However, it is worth noting that the span, in contrast to the number of employees, is smaller by far.

Who is already using supply chain management, where is it envisaged, for whom does it remain a non-issue? These questions form the basis for the following graphic.

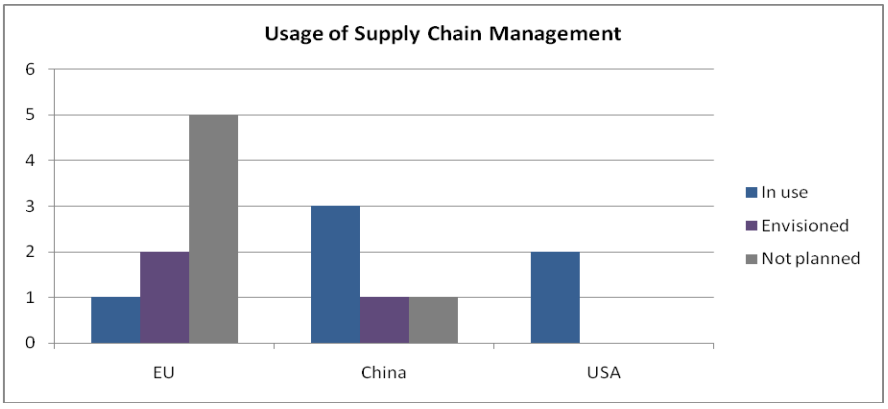

Figure22:Usage of supplychainmanagement by country[153]

[152] Source: Own illustration
[153] Source: Own illustration

Results concerning the question of supply chain management usage were astonishing. All survey participants from companies in the USA are already using supply chain management. This comes as no surprise, since the supply chain management approach was originally developed in the USA. Far more remarkable are the responses from Chinese steel producers. 60% are already using supply chain management and 20% are considering its implementation. Thus 80% are concerned with the issue of supply chain management. Contrastingly, Europe has a lot of slack to pick up. Only 12.5% are using supply chain management and 25% are considering its implementation. The remaining 62.5% are not concerned with the topic and do not anticipate doing so in the near future.

Companies that are already actively practising supply chain management were also surveyed regarding the type of their supply chain for respective commodity groups. In this instance country-specific differences could also be noted.

Which Supply Chain types are in use at your plant?				
EU/China/USA	Iron Scrap	Alloys	Electrodes	Refractory material
No answer				
Lean Supply Chain	1 / 1 / 0			
Flexible Supply Chain	0 / 1 / 0	1 / 0 / 0		
Consolidated Supply Chain	0 / 0 / 1	0 / 0 / 1	1 / 0 / 1	1 / 0 / 1
Fast Supply Chain	0 / 1 / 0	0 / 1 / 0	0 / 1 / 0	0 / 1 / 0
Derivations from the ReferenceModel				
Own types	0 / 0 / 1	0 / 0 / 1	0 / 0 / 1	0 / 0 / 1
Others				
None				
Don't know				

Table8:Usage ofsupplychaintypesaccording to commoditygroups by country[154]

While European steel companies are connected to every commodity group specifically associated with the apparently suitable supply chain type, for Chinese companies this is only the case in the iron scrap commodity group. The other commodity groups were allocated to only one and the same supply chain type. For the American steel works, there was no difference established between commodity groups. They are also the only companies who are using their own supply chain types.

Statements regarding profitability and competition can also be inferred on the basis of the cited supply chain types. The companies surveyed provided the following realised potentials.

[154] Source: Own illustration

What competitive and profitability advantages could you achieve?

EU / China / USA	1-10%	11-20%	21-30%	>30 %
Increase in RoA	0 / 0 / 1			
Increase in EBIT	0 / 1 / 1	1 / 0 / 0		
Reduction of transport costs	0 / 0 / 1			

EU / China / USA	1-10%	11-20%	21-30%	31-40%	>40 %
Reduction in overall lead time	1 / 0 / 0		0 / 0 / 1		
Reduction in customer complaints	1 / 0 / 0				

EU / China / USA	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	>60 %
Improved delivery capacity	1 / 0 / 0		0 / 0 / 1				
Reduction of storage costs	1 / 0 / 0	0 / 1 / 1					
Others	1 / 0 / 1						

EU / China / USA	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	>80 %
Reduction of quality costs	0 / 0 / 1								

EU / China / USA	1-6%	7-12%	13-18%	>18 %
Reduction of material costs	1 / 0 / 1			

Table9:Achievable competitive and profitability advantages by countries[155]

[155] Source: Own illustration

When taking all cited and improved potentials for success into account, it is evident that the American steel companies scored better in the key figures than their European counterparts. This came to light particularly in the area of process improvement. The response rate by the Chinese steel companies is too low to make a significant statement. Whenever an answer was provided, it is comparable to the European level.

Concerning the question of whether risks are also taken into consideration for implementing supply chain management, the response was unanimous: all participants answered this question in the affirmative. It will be interesting to see whether the same risks can be expected to carry the same weight among the various countries.

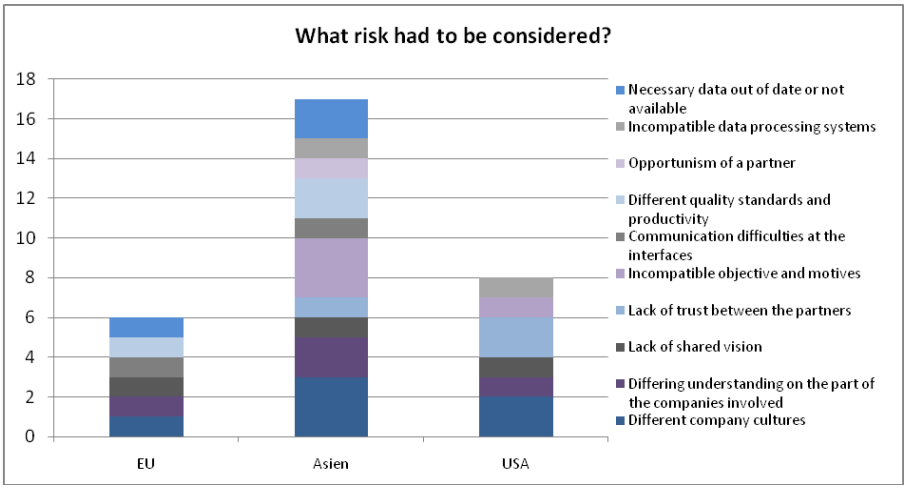

Figure23:Risks to be taken into consideration[156]

[156] Source: Own illustration

Chinese steel companies had by far more risks to conquer than the Europeans and Americans. There were also significant differences in the weighting of individual opportunities. Incompatible objectives and motives was one of the main risks for Chinese steel companies, whereas this risk did not come into play for European steel companies. The opportunism of a partner appeared exclusively within the Chinese companies, while the Americans had to contend predominantly with disparate corporate cultures as well as lack of trust between partners. Another important question concerned the competition criteria currently dominating the steel industry.

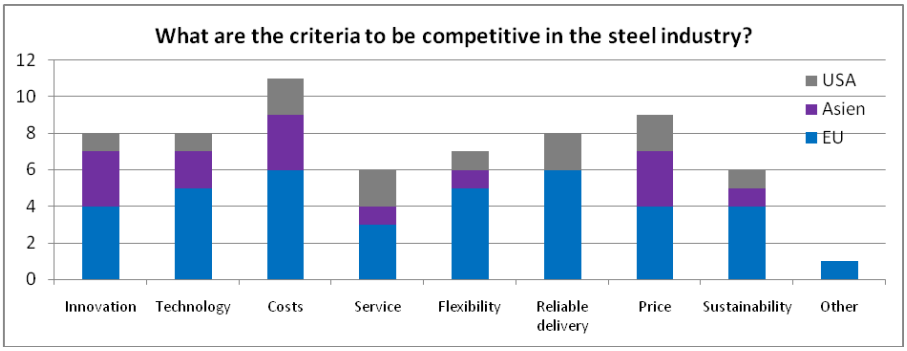

Figure 24:Current competition criteria in the steel industry accordingto country[157]

For the assessment of competition criteria, striking differences in their weighting are evident. While the Europeans rank costs and delivery reliability in first place, the latter criterion has no significance for Chinese steel producers. By contrast, innovation is very important for the Chinese, whereas for other nations it played a

[157] Source: Own illustration

rather minor role. All countries gave the criterion item of sustainability a very negligible weighting.

6.1.2. Survey Results for Steelworks Worldwide

Tallying the number of all the employees as well as tonnage yielded a total of 271,958 employees accompanied by a tonnage of 100,140,300. Measured against world production in 2013, this constitutes a share of 6.4%. However, if one regards the actively relevant markets for this paper (Europe, China, USA), the share increases to 9.5%.[158]

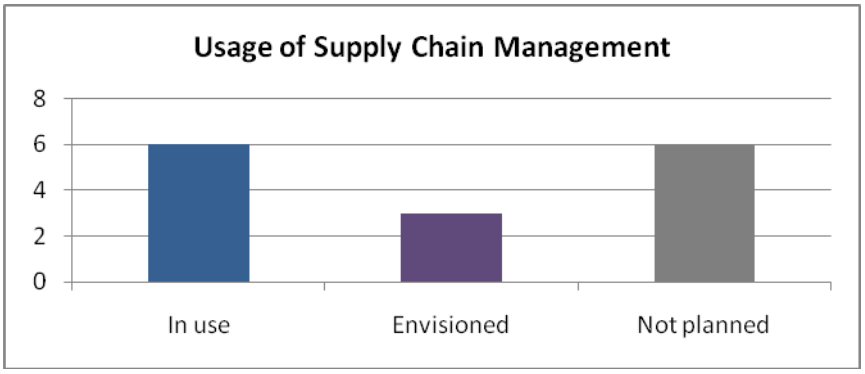

Figure25:Usage ofsupplychainmanagementworldwide[159]

40% of the companies who participated in the survey are already using supply chain management. Another 20% are considering its implementation in the foreseeable future. 40%, the same figure for companies who are already using supply chain management, do not intend to exercise this approach within the next few years. This is a

[158]Cf. Wirtschaftsvereinigung Stahl, 2014, p. 81
[159]Source: Own illustration

relatively high number, when one considers the associated opportunities for increasing profitability and competitive capacity. These options are specified in the following illustration.

What competitive and profitability advantages were you able to achieve?

	1-10%	11-20%	21-30%	>30 %
Increase in RoA	1			
Increase in EBIT	2	1		
Reduction of transport costs	1			

	1-10%	11-20%	21-30%	31-40%	>40 %
Reduction in overall lead time	1		1		
Reduction in customer complaints	1				

	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	>60 %
Improved delivery capacity	1		1				
Reduction of storage costs	1	2					
Other	2						

	1-6%	7-12%	13-18%	>18 %
Reduction of material costs	2			

Table10:Total of achieved competition and profitability advantages[160]

[160]Source: Own illustration

When considering the scores of answers obtained with respect to improvement potentials for the various key factors of competitive capacity, profitability, processes and risks, an improvement of only between 1-10% could be achieved. Several values, increasing EBIT, for instance, could only be raised by 11-20%. Implementation of supply chain types thus demonstrates a bold significance.

Which supply chain types are in use at your plant?				
	Iron Scrap	**Alloys**	**Electrodes**	**Refractory material**
No answer				
Lean Supply Chain	2			
Flexible Supply Chain	1	1		
Consolidated Supply Chain	1	1	2	2
Fast Supply Chain	1	1	1	1
Derivation from the Reference Model				
Own types	1	1	1	
Others				
None				
Don't know				

Table11:Total usage of supplychaintypesaccording to commodity groups[161]

The majority of companies most frequently cited the iron scrap supply chain. As a rule, this also comprises the most purchasing volume, followed by alloys, refractory material and electrodes. Another aspect is that supply chains for both refractory materials and electrodes end at the steel production stage, since they are consumed by the melting process.

[161] Source: Own illustration

Risks involved for implementing supply chain management revealed a tell-tale sequence of factors, which are cited in the following illustration.

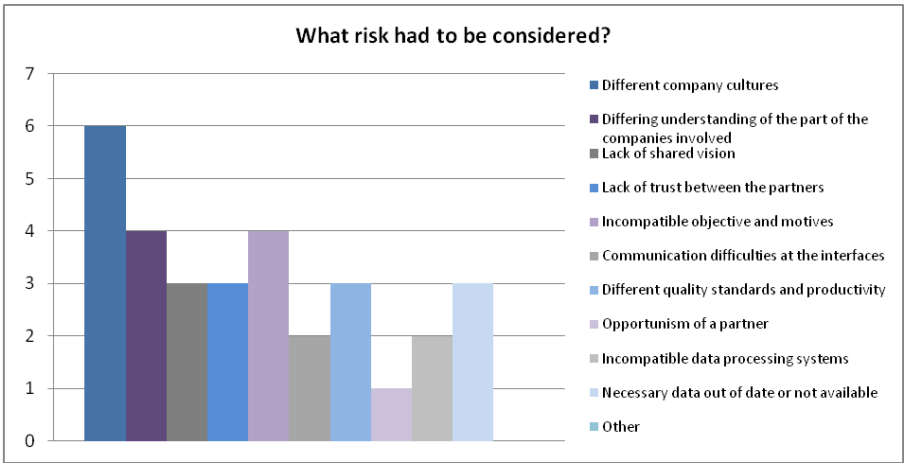

Figure26:Risks to consider[162]

A disparate corporate culture was by far the most cited item for risks to take into consideration. Differing comprehension of the participating companies took second place followed by incompatible objectives and motives of the participating companies. Incompatible data processing systems was noted near the bottom of the risk criteria. This is apparently a risk that can be ably managed.

The current assessment of competition criteria for the steel industry indicates a varied image, in which there are several top figures and a very strong middle ranking.

[162]Source: Own illustration

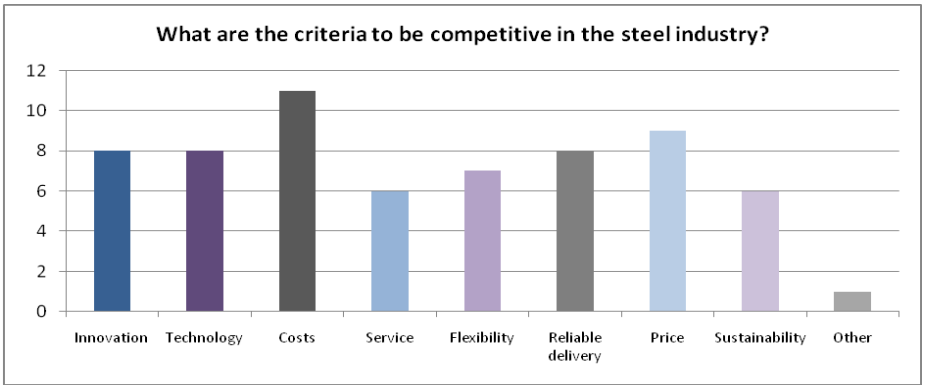

Figure27:Total current competition criteria in the steel industry[163]

Costs are top-rated among the competition criteria. Cost reduction is the highest priority for many of the companies, and far surpasses the well-known strategy of "fill the mill". This particular approach is no longer feasible in order to keep up with the increasingly stiff competition. What is quite surprising is that customer service has a rather minor significance, yet customer focus is the most important factor in supply chain management.

Concerning the question of whether an indicator system is in place, 11 companies surveyed answered in the affirmative. Only three of the companies answered with "No" (1 abstention). The types of indicator systems in place are presented in the following illustration.

[163]Source: Own illustration

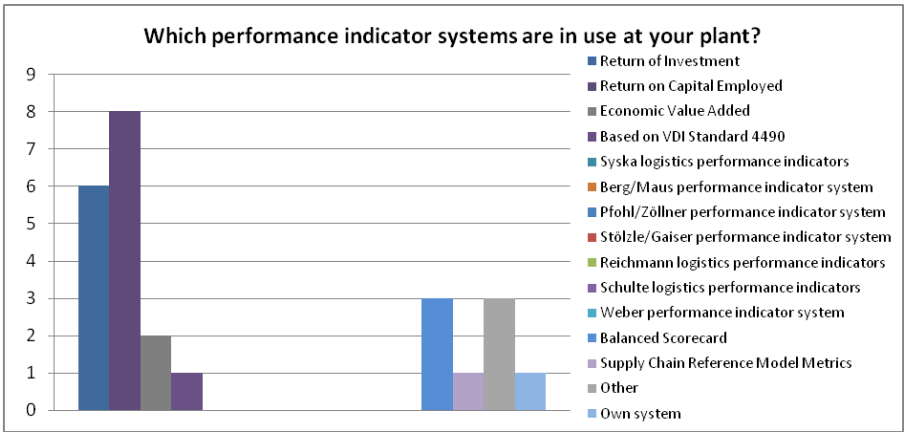

Figure28:Total performance indicator systems used[164]

Conventional indicator systems, such as return on capital employed (ROCE) and return on investment (ROI), are the most widely used. Modern approaches that are aligned with supply chain management, namely economic value added, balanced scorecard or supply chain reference model metrics, are only seldom used, but they still clearly exhibit potential.

For the final question addressed in this chapter, that of key indicators, networking capital takes centre stage. The question pertained to key indicators, which are continually measured.

[164]Source: Own illustration

Which performance indicators are continuously measured?

	1-10	11-20	21-30	31-40	41-50	>50
Days Inventory Held	3	3	2	1	1	2

	1-30	31-60	61-90	91-120	121-150	>150
Days Sales Outstanding	2	4	5	1		
Days Payable Outstanding	3	5	3	1		

	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	>80
Cash to Cash Cycle	1	1	2	2	1		1		1

Table12:Total of performance indicatorsfornetworkingcapital[165]

The answers could not have been more diverse. However, this was to be expected since a variety of payment conditions prevail only within Europe. In the southern countries, these tend to be longer than in their northern counterparts (see the corresponding table in the Appendix).[166]

6.2. Summary

In summary, it can be established that many differences exist among the markets investigated. Americans are the leaders in terms of implementing supply chain management. The Chinese follow closely thereafter, while Europeans lag somewhat behind. There are no significant differences in achieved objectives via the introduction of

[165]Source: Own illustration
[166] Cf. Table in Appendix, p. 156

supply chain management with respect to competitive capacity and profitability. The level of success among the individual key indicators can only be viewed as rather modest. Yet there is great potential when considering the total of all key indicators. Whereas Chinese steel companies perceived that implementing supply chain management would pose a high number of risks, the Americans and Europeans held this perception to a lesser extent. For the Europeans, it remains a minor issue. Within all three markets, costs are currently the most significant competitive factor. Yet it must not be assumed that liquidity alone is a guarantee for a company's continuous survival. To this end, investments that represent a company's mid- to long-term security ought to be handled very prudently. Last but not least, there was great potential demonstrated in the implementation of existing indicator systems. Supply chain management can only lead to success if all areas are targeted accordingly, which also includes a suitable performance measurement system.