ANALYSIS OF REPRESENTED PURCHASING SKILLS IN ACADEMIC LITERATURE AND IN CURRENT DUTCH EDUCATION PROVISION AT UNIVERSITIES

Business Administration: Purchasing and Supply Management

Master Thesis

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Enschede, April 18th, 2017

UNIVERSITY OF TWENTE.

Master of Science in Business Administration

April 18th, 2017

University of Twente

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Acknowledgements

After an intense period of months, today is the day: this note of thanks is the finishing touch on my master thesis. I would like to reflect on the people that supported me throughout this period.

First I would like to thank the PERFECT group for letting me be part of the project team. I would like to express my gratitude to my first supervisor Holger Schiele for introducing me there and for his continuous support during my study, for his comments, remarks and immense knowledge. His guidance helped me during the research and writing of this thesis. Besides, I would like to thank my second supervisor, Niels Pulles for his insightful comments and encouragement.

Thank you!

Marlou Stinenbosch
Enschede, April 2017

Management Summary

This research is part of project 'Purchasing Education and Research for European Competence Transfer' (PERFECT) that aims to develop a pan-European harmonized purchasing and supply management (P/SM) curriculum for universities. This research aims at analysing the Dutch purchasing education at universities by comparing P/SM skills from academic literature with the skills as taught at Dutch universities.

In this study, a P/SM skill model was developed based on dimensions of the maturity model by Schiele (2007). The P/SM skill model was first used to map P/SM skills as nominated by academic literature. In total, 798 skill nominations were mapped. Furthermore, the P/SM skill model was used to map the Dutch university education. In total, 6 courses were mapped on bachelor level and 16 on master level. Furthermore, these courses were analysed by a documentary analysis, with a focus on learning objectives, teaching and education methods.

The findings show a focus of academic literature on soft skills, where *personality* is identified as most important for a P/SM professional to have in the field. Additionally, a purchaser must have good *communication skills,* experienced with *training staff* and having a high *team ability*. Along comes skills that are related to *process organisation*, like *evaluating offers* and *negotiations.* Remarkable is that literature seems to avoid appointing skills related to *planning and strategy* as important, which are categorized in the first operational steps of a purchasing lifecycle. Skills related to *human resources and leadership* are concerned least important by universities, showing important differences between Dutch universities and academic literature.

This research identifies hardly any differences in skills at the different levels at universities. Observations showed similarities in the learning objectives at bachelor and master level, both focusing on deepen the student's knowledge about theories and concepts in purchasing management and its consequences. It is shown that the courses have an agreement of 92 percent about the skills they teach. Moreover, it is striking to see that there is almost no focus on soft skill development, while this is identified by academic literature as most important skill for a P/SM professional. Where universities focus most on teaching skills related to *planning and strategy* and least on *human resources and development,* academic literature identifies this first dimension as least important and the latter as most important.

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List of Abbreviations

PERFECT:	Purchasing Education and Research for European Competence Transfer
P/SM:	Purchasing and Supply Management
SCM:	Supply Chain Management
HRM:	Human Resource Management
VET:	Vocational Education and Training
EQF:	European Qualifications Framework
ECTS:	European Credit Transfer System
EHEA:	European Higher Education Area
HBO:	Hoger Beroeps Onderwijs (University of Applied Science)

1 Introduction: State of the art of purchasing and supply management education

1.1 The goal of this thesis: Dutch purchasing education analysis

This research aims to map the skills represented in the Dutch purchasing education landscape by conducting a broad and structured examination at Dutch universities and compare this with skills retrieved from academic purchasing literature. This research will analyse the differences and similarities of skills as taught at Dutch universities and according to academic purchasing literature. The results of this research will contribute to the establishment of a pan-European purchasing and supply management (P/SM) curriculum.

Project PERFECT – mapping the Dutch education P/SM landscape

This research is part of project PERFECT (Purchasing Education and Research for European Competence Transfer) who aims to develop an empirically validated European curriculum for both a bachelor and a master's program in P/SM. To achieve these objectives, a consortium with five universities is formed: Dortmund University of Technology (D), Hochschule Mainz (D), Lappeenranta University of Technology (Foerstl, Hartmann, Wynstra, & Moser), University of Twente (Spina, Caniato, Luzzini, & Ronchi), and Staffordshire University (GB)[1].

The project is structured according to a model that includes five data sources to help producing three main outputs and is displayed in figure 1.1. This research contributes to the project by first developing a maturity matrix or skill model in the 'Output 2' phase. This matrix or model was used to map courses taught at Dutch universities resulting in a Dutch education landscape, being 'Data source 5'. A combination of the Dutch education landscape and the maturity matrix or skills model was used for the analysis of the Dutch education gap, which is 'Output 3'. This latter output will establish skills that are or are not represented in the current education provision.

[1] See the Project sheet in Appendix 1, p. 1

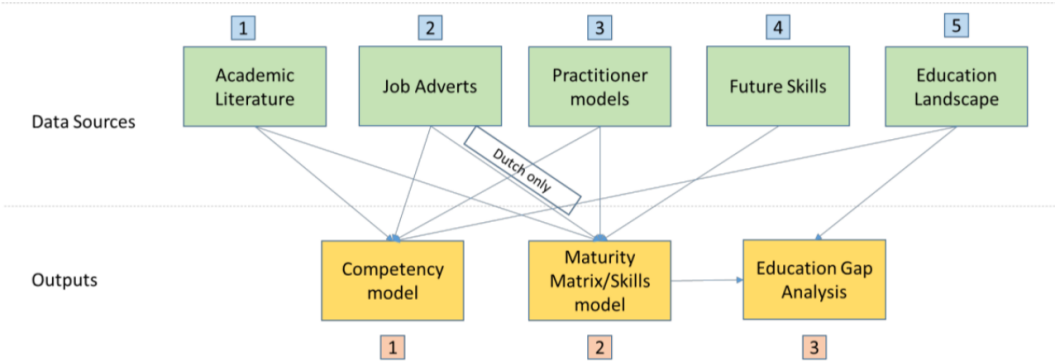


Figure 1.1 Structure of project PERFECT[2]

Defining P/SM

With reference to the scope definition of Van Weele (2010), this study refers to P/SM (Purchasing and Supply Management) as "*P/SM comprises the management of external inputs – materials, services, capabilities and knowledge – that are required for building, running and maintaining the focal firm's processes, while simultaneously managing the external and internal stakeholder network with an extended upstream supply network understanding*"[3]. A distinction is made between P/SM and the broader concept of Supply Chain Management (SCM), which is referred to as "*part of the operations management discipline that examines three or more organizations involved in the upstream and downstream flows of products, services, finances and/or information from a source to a customer*"[4]. This study focuses on the full upstream network, referred to as "*activities of moving material inwards from suppliers*"[5], beyond tier one (shown in figure 1.2). A supplier that sends materials directly to the organization is a first-tier supplier; a supplier that sends materials to the first supplier is a second supplier; and so on to the initial supplier[6]. The organization bundles and splits the materials and sends it outwards to it's so called "*requisitioners*"[7], also known as downstream activities[8].

[2] See Perfect (2016), p. 13
[3] See Henke, Bals, and Kelly (2016), p. 14
[4] See Van Weele and Raaij (2014), p. 57
[5] See Monczka, Handfield, Giunipero, Patterson, and Waters (2010), p. 6
[6] See Monczka et al. (2010), p. 6
[7] See Henke et al. (2016), p. 14
[8] See Monczka et al. (2010), p. 6

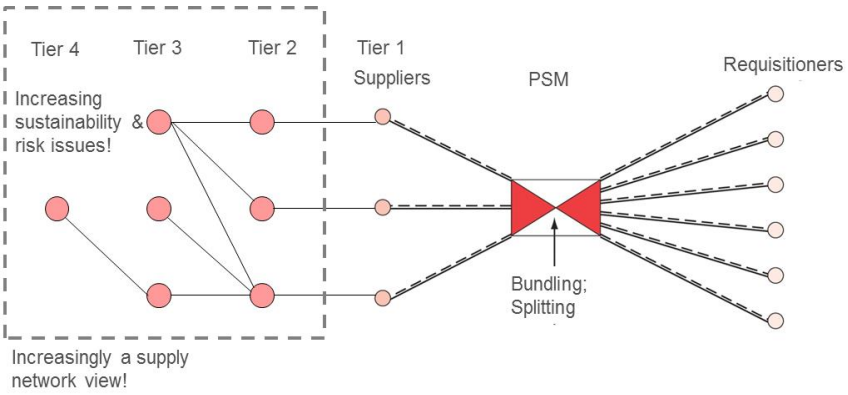


Figure 1.2 Activities in the supply chain around purchasing and supply management[9]

P/SM in relation to SCM

Supply chains come in a huge variety of configurations and its process requires specific tools and techniques[10]. Consequently, logistics, operations, marketing, sales and customer have gained its autonomy as stand-alone, though interconnected academic disciplines[11]. At the same time, P/SM increasingly gained its autonomy over the years in one the one hand academic journals that address P/SM issues and on the other hand P/SM roles gained a vital role in organizations[12]. In the end, this paper looks at P/SM as a stand-alone discipline subsumed in the broader field of SCM, which is in line with the so called *unionist* perspective of Larson and Halldórsson (2002), and diagrammed in figure 1.3.

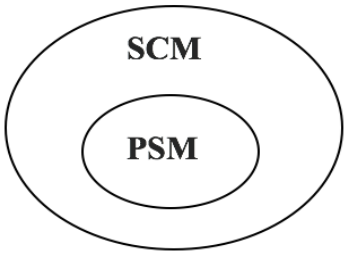


Figure 1.3 Unionist perspective on P/SM versus SCM[13]

[9] See Henke et al. (2016), p. 14
[10] See Monczka et al. (2010), p. 7
[11] See Spina et al. (2013), p. 9
[12] See Carr and Pearson (2002), p. 1032; Prajogo and Olhager (2012), p. 117; Spina et al. (2013), p. 1202
[13] Adapted from Larson and Halldórsson (2002), p. 37

P/SM higher education curriculum

Despite the importance of P/SM, there is no standardized P/SM higher education curriculum yet. In the field of Business Administration, other disciplines have these curricula, such as finance or marketing. This phenomenon is not only seen at national and European level, but also at international level (e.g. North America)[14]. Companies have no other choice than hiring university graduates with other specializations and often spending years training them to reach a skill level that graduates in other disciplines already possess. Students face the challenge of finding appropriate university courses that match to their course portfolio during international exchanges. Teaching the basic modules first and then building further for P/SM is hindered by the varying course contents and depth in programmes.

To seize this opportunity, the Erasmus+ project PERFECT aims to develop an empirically validated European curriculum for both a bachelor and a master's program in P/SM. This research is part of project PERFECT and helps to establish an international studying program at participating universities for higher education in P/SM.

Research questions

This research aims to answer the following main questions:

1. What P/SM skills are identified by academic literature as necessary for P/SM professionals to perform their work in their environment?
2. What are the differences and similarities in represented skills between Dutch bachelor and master purchasing courses at Dutch universities?
3. What are the differences and similarities in represented skills between Dutch university courses and identified skills by academic literature?

Chapter structure

This chapter will continue introducing P/SM and its increased recognition, its role in the value chain, different purchasing roles and concludes with explaining the need for a standardized purchasing curriculum. Chapter 2 will broaden these subjects and chapter 3 will describe the methodology of this research. Chapter 4 will describe the data analysis between the universities and academic literature and lastly, chapter 5 will present the discussion, conclusion, applicability of the P/SM model, limitations and recommendations for further research.

[14] See Birou, Lutz, and Zsidisin (2016), p. 71-85

1.2 Increased recognition of P/SM

The recognition of the positive influence a purchaser in corporate strategy can have is relatively new. The oil crisis in 1973-1974 drew attention to the importance of the purchasing function, which was viewed by top management as administrative rather than strategic. The emerging pressure of competition required careful management of purchasing to protect the cost structure in companies[15]. Within this context, the purchasing function aimed more at cost reduction, affecting a firm's profit and its competitiveness in the industry[16].

In the 70s, the status of a purchasing function within a company was determined by its image to personnel outside purchasing[17]. Support throughout the firm determined that the purchasing function may stay in place because it was perceived as necessary[18]. Unfortunately, most non-purchasing personnel had a simplistic view of purchasing during the end of the 1970s, and viewed it as mainly tactical that could result in downgrading or eliminating the purchasing function[19].

The 1980s was a period of recognizing the impact of purchasing on a firm's competitive advantage. It resulted in a shifting attitude of the purchasing's role in corporate strategy[20]. Despite the increasing recognition in the 1980s, the actual shift towards integration took place in the early 1990s[21]. The rising number of articles in the 1990s mirror this change and was the start of a general increase in interest towards purchasing organisation[22].

Since then, the purchasing function has changed considerably, both in terms of quantity and quality[23]. Moreover, it is nowadays recognized as an important management function on its own, being a strategic core management function[24]. Research have suggested that the role of purchasing has changed more in the past 15 years than the previous 150[25]. In a research of Spina et al. (2013) 1055 articles on P/SM published during 2002-2010 in 20 different journals

[15] See Fung (1999), p. 362
[16] See Kummer, Grün, and Jammernegg (2009), p. 362
[17] See Cavinato (1987), p. 10
[18] See Cavinato (1987), p. 10
[19] See Cavinato (1987), p. 10
[20] See Pearson and Gritzmacher (1990), p. 98
[21] See Pearson and Gritzmacher (1990), p. 98
[22] See Schneider and Wallenburg (2013), p. 146
[23] See Van Weele and Raaij (2014), p. 67
[24] See Andersen and Rask (2003), p. 93; Monczka et al. (2010), p. 17
[25] See Monczka et al. (2010), p. 14

were analysed in order to assess the current state of the art and trends of P/SM[26]. This research is taken as point of departure since they included many articles in different journals in their analysis and the scope of their analysis matches the P/SM definition used in this research.

The study of Spina et al. (2013) concludes that P/SM, that was considered as an incomplete established discipline for a long time, has grown dramatically in the last decade and has matured as a stand-alone academic discipline, both in research and in practice[27]. The main causes mentioned for these changes were outsourcing, globalization and e-business[28]. Moreover, the authors argue that P/SM gained increased attention among business schools, where purchasing is taught, thanks to the appearance of handbooks and textbooks, in open enrolment programs and corporate training courses – thus corroborating the stand-alone academic discipline of P/SM in the field of management[29].

The scientific production in the field of P/SM papers from 2002 to 2010 shows an absolute growth in the number of papers published, see figure 1.4[30]. An overview shows that the P/SM papers in the selected journals (e.g. P/SM related journals, marketing and operations management journals, general management and economic journals) increased with 163 percent[31]. The part of the total number of papers published in the selected journals on P/SM more than doubled (from 4,7 to 9,6 percent)[32].

Figure 1.4 shows the trends of research types conducted by scholars, including exploratory, theory building and theory testing. In 2002, most published papers were devoted to exploratory types, followed by theory building and theory testing types. During the following decade, theory building and testing papers raised quickly with respectively 450 percent (from 16 to 72) and 453 percent (from 15 to 68). Exploratory papers increased slightly, with 10 percent (from 37 to 39). It can be clearly seen that theory building overcame the others and became the most dominant type of research during the last decade.

[26] See for another research of 212 articles from 1962 to 2013: Schneider and Wallenburg (2013)
[27] See Spina et al. (2013), p. 1202
[28] See Spina et al. (2013), p. 1202
[29] See Spina et al. (2013), p. 1202
[30] See Spina et al. (2013), p. 1206
[31] See Spina et al. (2013), p. 1206
[32] See Spina et al. (2013), p. 1207

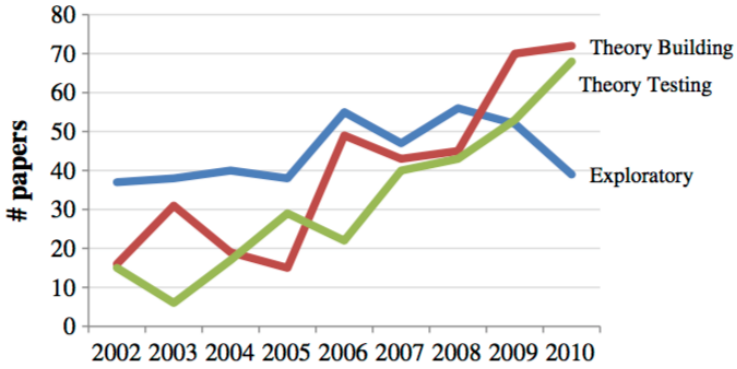


Figure 1.4 Absolute trend of research type (# of papers)[33]

1.3 Purchasing role in value chain

In practice and in research, many terms and concepts are used in the field of purchasing. The purchasing function described by Van Weele and Raaij (2014), does not include the responsibility for materials requirements planning, materials scheduling, inventory management, incoming inspections and quality control, where this research refers to the term purchasing based on Van Weele (2010) that includes these responsibilities. However, the illustration of Van Weele (2014), shows schematically the main activities within the purchasing function, as seen in figure 1.5.

According to Van Weele (2014), a purchase manager should cover a sequential pattern of six specific activities and follows the route from internal customer to supplier. The first three stages have a tactical character that takes place on strategic levels. These actions must be performed carefully to ensure that the quality will meet the requirements in the next three stages on operational level. Therefore, the first three stages are more focused on long-term than the upcoming three.

[33] Adapted from Spina et al. (2013), p. 1207

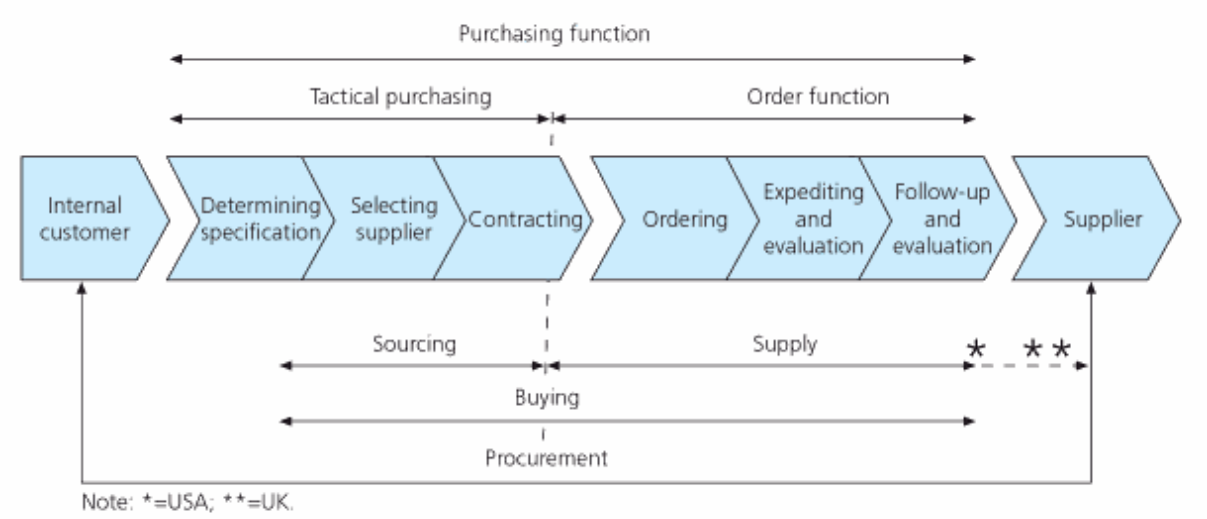


Figure 1.5 Purchasing process model and related concepts[34]

A better performance by the purchasing function can increase the overall firm performance and give a significant competitive advantage[35]. However, the level of fulfilment of this responsibility depends on its development level or maturity of purchasing[36]. Therefore, Schiele (2007) created a purchasing profile to describe the link between purchasing maturity and performance, covering five dimensions of purchasing. Table 1.1 displays these dimensions.

Table 1.1 Five-dimensional profile of purchasing maturity[37]

Number	*Dimension*
1	Procurement planning
2	Structural organisation of purchasing function
3	Process organisation and purchasing's embeddedness in the firm
4	Human resource systems and leadership models in procurement
5	Purchasing controlling structures

This maturity model was tested at 14 firms and showed a highly significant relationship between the maturity of a purchaser and cost-reduction results[38]. Its efficiency will be analysed

[34] See Van Weele (2014), p. 8
[35] See Amelia S Carr and Pearson (2002), p. 1048; Monczka et al. (2010), p. 12
[36] See Schiele (2007), p. 276
[37] See Schiele (2007), p. 276
[38] See Schiele (2007), p. 283

in chapter 2.3, wherein multiple practitioner skills models are identified and analysed for possible use as a basis for the P/SM skill model that will be developed in this research.

1.4 Purchasing roles

Nowadays, the purchaser is not only a negotiator and a saver anymore, since it has a broad commercial relational function as well[39]. Trends in the environment of the purchaser forced a transformation into a more strategic purchasing function[40]. The literature is replete with evidence that the role of purchasing is evolved over the past years to a position that is has important added value to a firm's competitive position[41].

The Dutch purchasing association NEVI identified different professional profiles for purchasers that can be used as a base in among others educational programs, workshops, trainings and exams[42]. In 2011, NEVI identified seven purchasing roles that built upon NEVI's ten-year-old research where they identified four function profiles: assistant-purchaser, purchaser, senior-purchaser and purchase manager[43].

The four established profiles were very outdated, for example the profile of a purchaser working in an innovation driven company highly differs from a purchaser working in a company that have a highly valued operational excellence[44]. Furthermore, the purchasing function changed in a way that a purchaser should perform more as a coach or more inspirational[45].

Instead of establishing new function profiles, seven different purchasing roles were identified that could be present within a company to a greater or lesser extent. The seven roles in purchasing are used in the educational NEVI programs and trainings so (future) purchasers can use this to give their career more direction. Each role is described more in depth, including responsibilities, characteristics, professional attitude and skills:

1. The *Purchaser* is responsible for the whole primary process, from supplier selection to aftercare. The purchaser is the first contact person for internal customers and suppliers.

[39] See Hulsebos (2011), p. 33
[40] See Giunipero, Handfield, and Eltantawy (2006), p. 823
[41] See Carr and Smeltzer (2000), p. 40; Carr, Keong Leong, and Sheu (2000), p. 1440; Giunipero et al. (2006), p. 823
[42] See Hulsebos (2011), p. 43
[43] See Hulsebos (2011), p. 32
[44] See Hulsebos (2011), p. 32
[45] See Hulsebos (2011), p. 32

2. The *Analyst* provides information and analyses data from the market, suppliers, prices and product developments. The results of the analysis should be translated to concrete actions and purchase strategies.
3. The *Relation manager* is the spider in the web between internal customers, suppliers and possible other stakeholders. He or she is a partner on business level and brings the interests of all parties together.
4. The *Advisor* thinks along with the customer and gives advice on operational, tactical and strategical level, both within and outside the organization.
5. The *Performance manager* targets on results as most important task. He or she monitors, controls and checks the supplier contracts and the quality of the delivered products or services.
6. The *Director* manages different interests. He or she ensures that the quality, customer satisfaction and reliability goals are met and that the purchasing process fits other processes.
7. The *Supervisor* is the leader of the team. He or she transfers the companies' vision, provides inspiration and builds a team where employees can utilize their capabilities[46].

1.5 Need for standardized purchasing curriculum

The reason that the PERFECT project exists is that the purchasing function in firms is getting more important, but in contrast with other disciplines in Business Administration (e.g. finance and marketing), it has no standardized higher education curriculum. Purchasers are recognized as key business drivers within firms, because they contribute to both the firm's bottom line as its top line[47]. Companies cannot escape from recognizing the huge potential purchasing has today[48].

Few research is done on investigating "*how to develop superior skills, capabilities, and experience of P/SM professionals*"[49]. Empirical research needs to follow the growing interest in foundational theories[50]. Several research in SCM education exist, but research in P/SM

[46] See Hulsebos (2011), p. 33
[47] See Van Weele (2010), p. 3; Van Weele (2014), p. 3
[48] See Van Weele (2010), p. 3
[49] Van Weele and Raaij (2014), p. 63
[50] Van Weele and Raaij (2014), p. 63

education in the Netherlands among universities and universities of applied sciences does not exist. Existing research in SCM focus on executive education and show that despite the increasing maturity in SCM there is a skills and knowledge gap and that education is still required[51]. There is research devoted to purchasing education, namely the research of Ellram and Easton (1999). Their research chronicles the development and execution of a purchasing class over internet[52]. A course syllabus outline was shown, but the course contents on purchasing were not given[53]. They recommended do's and don'ts in developing and executing an internet course to improve the purchasing class[54].

Research conducted by Birou et al. (2016) showed the current state of the art of graduate and undergraduate P/SM courses at universities in the USA[55]. The research presented among others the course contents, including course topics and assessment techniques, as well as the covered skills[56]. This research builds on theirs, since no research has been done on the purchasing education in the Netherlands so far.

2 Theoretical framework on knowledge and skills: influence of the Bologna process

This chapter starts with an elaboration of role of the Bologna process in the concept of knowledge and skills, followed by an underpinning of the terms *knowledge* and *skills*. Next, the P/SM skills derived from academic purchasing literature will be discussed and an international set of practitioner P/SM skills models is identified. Finally, the maturity model by Schiele (2007) is introduced, its dimensions are described and the model is validated with an elaboration of the link between purchasing maturity and firm performances.

[51] See Bernon and Mena (2013), p. 445
[52] See Ellram and Easton (1999), p. 11
[53] See Ellram and Easton (1999), p. 13
[54] See Ellram and Easton (1999), p. 16
[55] See Birou et al. (2016), p. 71-85
[56] See Birou et al. (2016), p. 71-85

2.1 European underpinning of the concept of knowledge and skills

The role of the Bologna process in the concept of knowledge and skills

Across European countries, knowledge and skills are an important theme in Vocational Education and Training (VET)[57]. Policy debates on employability, lifelong learning and competence-based approaches and what would be the best fit. Despite the creation of a European Qualifications Framework (EQF), that is a framework aiming at creating confidence and trust in qualifications across countries and sectors by principles and guidelines for credit transfer, countries differ in their understanding and meanings outwardly similar terms[58]. The reason is that knowledge and skills all relate to learning outcomes or outputs, independent of the route of acquisition, rather than on learning inputs[59].

To achieve a 'European higher education' with a greater compatibility and comparability of the systems of higher education, the Bologna process was created[60]. The Bologna process is a series of agreements between European countries to recognise higher education qualification in the academic field within Europe[61]. The core of the agreements was based on a system based on two main cycles in education: undergraduate and graduate. Currently, 48 countries implement reforms on higher education based on these two cycles[62].

Before the Bologna phase, almost all academic studies in the Netherlands had the same duration of four years and consisted of two phases: the 'propaedeutic phase' and the 'doctoral phase'. This two phase structure has been adapted to a bachelor-master structure because of the Bologna process, which was signed by the Dutch government in 1999[63].

The main goal of the implementation of the bachelor-master structure in the Netherlands, that started in June 2002, was to have a better acknowledgement of the Dutch educational system in other (European) countries and more flexibility and freedom of choice for students[64]. Legal changes were enacted in 2002[65]. The Bologna process had a large impact on higher

[57] See Winterton, Delamare-Le Deist, and Stringfellow (2006), p. 5; Brockmann, Clarke, and Winch (2008), p. 547; Bohlinger (2008), p. 96
[58] See Winterton et al. (2006), p. 5
[59] See Winterton et al. (2006), p. 5
[60] See DAAD (1999), p. 1-3
[61] See DAAD (1999), p. 1-3
[62] See DAAD (1999), p. 1-3
[63] See European Higher Education Area (2017)
[64] See DAAD (1999), p. 1-3
[65] See Nederlandse Overheid (2002), p. 1

education, because of the changing degree combined with a greater variety of programs. The reform was also an impulse to increase flexibility and freedom of choice for students[66].

To develop European higher education even further, the European Credit Transfer System (ECTS) was developed by the 'Copenhagen Process' in 2002[67]. The ECTS system is used in the Dutch higher education to award students. Every ECTS represents the amount of work-load. Across the Netherlands, one ECTS equals 28 study hours[68].

Furthermore, within the EQF a common reference level for qualification is expressed in terms of knowledge and skills to be acquired and mastered at a given level within higher education[69]. This framework makes it possible to compare different learning outcomes in different levels in any higher education program, also to measure vertical career and study progression[70].

The concept of skills and knowledge in higher education

Higher education is using learning objectives to provide a detailed description of what the student will be able to do when a course ends. The learning objectives include different knowledge and skills a learner should master to be able to succeed a course.

Knowledge is viewed as the result of an interaction between the capacity to learn (intelligence) and the opportunity to learn (situation) and is more socially-constructed than intelligence[71]. Knowledge also includes gaining theory, concepts and tacit knowledge by experience of performing certain tasks. Often, a distinction is made between general knowledge, like basic life knowledge, and knowledge that is only encountered in a specific context, like a sector or group of occupations[72]. Knowledge can be divided in declarative and procedural knowledge, or 'knowing-what' and 'knowing-how'[73]. Declarative knowledge is explicit factual knowledge about facts or some truth and is followed by procedural knowledge,

[66] See Westerheijden et al. (2008), p. 74
[67] See Winterton et al. (2006), p. 16
[68] See Weingarten (2016)
[69] See Winterton et al. (2006), p. 16
[70] See Winterton et al. (2006), p. 16
[71] See Winterton et al. (2006), p. 25
[72] See Winterton et al. (2006), p. 25
[73] See Winterton et al. (2006), p. 26

that is to apply the explicit knowledge to complex real-world knowledge and refers to skills[74]. Most procedural knowledge is *tacit*, since it cannot be articulated[75].

A *skill* is the ability to do something well, to perform a certain task[76]. A skill can be trained and experience is involved in developing a skill: it extends normal human capacities[77]. Skills can be divided in explicit 'know-what' skills and tacit 'know-how' skills[78]. In addition, a distinction can be made between 'hard skills' and 'soft skills'. A hard skill refers to a skill that is mainly vocational and are used primarily in manual work and a soft skill is generic and mostly applied in non-manual work[79]. A combination of both is required to successfully operate the construction chain, although soft skills are more likely to be the determinant of efficient partnering arrangements[80].

This research uses the term 'skill' to cover all requirements that is necessary for a person to perform a job in an efficient and effective manner.

2.2 P/SM skills from academic literature

Analysis of P/SM skills set from academic purchasing literature

Over the last years, there has been a growing interest in identifying an ideal skill set of purchasing professionals. The attention followed the growth in of the purchasing function, knowing that human performances and knowledge have become increasingly important within and influencing the purchasing function[81]. The technological changes and competitiveness have resulted in that individuals cannot be placed in the purchasing function without human resources paying attention to the specific skills they possess, human resources should be more sophisticated when identifying and recruiting new personnel in purchasing positions[82].

The PERFECT project jointly reflected the current P/SM skills in different sources as academic literature, job advertisements, practitioner models and future requirements. Key academic sources were found via a systematic and rigorous approach[83]. The process was done

[74] See Botha, Kourie, and Snyman (2014), p. 24
[75] See Botha et al. (2014), p. 24
[76] See Smith (2002), p. 208
[77] See Smith (2002), p. 208
[78] See Smith (2002), p. 209
[79] See Briscoe, Dainty, and Millett (2001), p. 245
[80] See Briscoe et al. (2001), p. 245
[81] See Carr and Smeltzer (2000), p. 40; Giunipero et al. (2006); p. 823
[82] See Carr and Smeltzer (2000), p. 40; Giunipero and Pearcy (2000), p. 4; Giunipero et al. (2006); p. 823
[83] See Perfect (2016), p. 16

via a search in "Scopus" and "Google Scholar" using the following search terms: "Purchasing", "Purchasing + Professional", "Procurement", "Buyer AND Competence", "Competencies", "Skill", "Education"[84]. "*These search terms were selected because these have been used as keywords or in abstract in well-known and cited articles on the subject of purchasing skills and to obtain the most complete results possible (e.g. Knight et al. 2014; Carr and Smeltzer, 2000)"*[85]. In total, 29 key academic papers were found and listed in appendix 2. All skills that were identified are shown in appendix 3. Each skill that was mentioned in one of the articles was listed, even if this occurred once, and the highest number of notations was 16. A ranking of the skills with at least ten or more nominations, is shown in table 2.1.

The ranking shows that *negotiation* and *analytical skills* were the most important in the wide range of all considered sources, followed by *problem solving, leadership* and *change and risk management skills*. Other highly important skills were *decision making, cost analysis, project management, interpersonal communication skills, supplier relationship management* and *conflict management*.

Table 2.1 Ranking of P/SM skills according to the frequency of nomination[86]

Skill	*Frequency (n)*
Negotiation skills	28
Analytical skills	24
Problem solving	22
Leadership	20
Change management	19
Risk management	19
Decision making	18
Cost analysis	17
Project management	17
Interpersonal communication skills	16
Supplier relationship management	16

[84] See Perfect (2016), p. 16
[85] See Perfect (2016), p. 16
[86] See Cavinato (1987); Keough (1993); Kolchin and Giunipero (1993); Dowd and Liedtka (1994); Killen and Kamauff (1995); Murphy (1995); Carter and Narasimhan (1996); Cruz and Murphy (1996); Pagell, Das, Curkovic, and Easton (1996); Anderson and Katz (1998); McKeefry (1998); Carr and Smeltzer (2000); Giunipero (2000); Giunipero and Pearcy (2000); Faes, Knight, and Matthyssens (2001); Muller (2001); Burt, Dobler, and Starling (2003); Cousins and Spekman (2003); Trent and Monczka (2003); Giunipero and Handfield (2004); Giunipero, Denslow, and Eltantawy (2005); Mulder, Wesselink, and Bruijstens (2005); Giunipero et al. (2006); Baily, Farmer, Crocker, Jessop, and Jones (2008); Tassabehji and Moorhouse (2008); Eltantawy, Giunipero, and Fox (2009); Kern, Moser, Sundaresan, and Hartmann (2011); Knight, Tu, and Preston (2014); Zawawi et al. (2014)

Conflict management	15
Teamwork	15
Strategic thinking	14
Creativity	13
SCM	13
Technical knowledge	13
Quality management	13
Contract management	12
Customer focus	12
Blueprint reading	11
Finance knowledge	11
Product knowledge	11
Time management	11
Written communication	11
Effective communication	10
Organisational skills	10

2.3 Practitioner models of P/SM skills

International set of practitioner skills model

To complement the academic literature, the PERFECT project jointly reflected practitioner skills models and themes. A representative and international set of models was identified. A "Google" search was done using the following terms: "Procurement" and "Purchasing" in addition to the following terms "Capabilities", "Competencies", "Skills", and "Human Capital"[87]. In total, 19 relevant models were identified that focused on coherent and systematic models rather than discussions of such skills. The different models were taken from multiple countries to get an international perspective and are listed in table 2.2.

The mapping of the different practitioner models showed that there were multiple models by different organizations across different geographical locations. The list shows the broad, but not exhaustive, coverage of different organizations from different types of sectors, from public to private, including in-house, P/SM associations and governmental examples.

[87] See Perfect (2016), p. 24

Table 2.2 Practitioner models of P/SM skills[88]

#	*Organisation*	*Location*
1	APICS (American Production and Inventory Control Society)	United States of America
2	AT Kearney	Global
3	Australasian Procurement & Construction Council	Denmark
4	British Columbia	United States of America
5	CEB	Global
6	Chartered Institute of Purchasing & Supply (CIPS)	United Kingdom
7	Danish Purchasing & Logistics Forum	Denmark
8	Department of Defence's (DOD) Acquisition, Technology, and Logistics (AT&L)	United States of America
9	Future Purchasing Consultancy	Global
10	Hays	Global
11	International Federation of Purchasing & Supply Management (IFPSM)	Global
12	Institute for Supply Management (Witte, Van der Wende, & Huisman)	United States of America
13	Morgan McKinley	Global
14	National Association of Educational Professionals (NAEP)	United States of America
15	NEVI	The Netherlands
16	PMMS	Global
17	Scottish Government	United Kingdom
18	UK Government	United Kingdom
19	UK Ministry of Justice	United Kingdom

NEVI: a Dutch association for purchasing management

Of these 19 organizations, NEVI is the only one located in the Netherlands. NEVI is a Dutch association for purchasing management and founded in 1956[89]. It has grown to become one of the world's leading Purchasing Management Organizations. NEVI has over 6.000 members, working in the private and public field, and is the principal authority for matters concerning Purchasing in the Netherlands[90]. NEVI offers in total seven educational programs and over seventy trainings in different themes in-company and throughout the Netherlands[91].

[88] Adapted from Perfect (2016), p. 24-25
[89] See NEVI (2016)
[90] See NEVI (2016)
[91] See NEVI (2016)

P/SM competency model using the KODE®X Analysis Tool

The PERFECT project jointly derived between 150 and 200 skills from academic literature. However, it was impossible to work with that amount of different skills to compare them. A solution was found in an existing skill model called KODE®X, that is the abbreviation of Komptenz-Diagnostik und Entwicklung or in English: Competency Diagnostics and Development. The model is based on four central competencies that assess, measures and diagnoses individual competencies. The KODE®X skill model consists of four main groups:

1. P - Personal Competences
2. A - Activity and Action Competences
3. S - Socio-communicative Competences
4. M – Methods and Professional Competences[92]

These categories are split into 16 sub-groups by combining two of the main categories, e.g. "*PA - Personal / Activity and Action Competencies. Important: devotedness, and change driven"* and "*PS - Personal / Socio-Communicative Competencies. Important: honesty, diplomacy, trustworthiness and openness"*[93]. The 16 sub-groups are all split into four groups to 64 sub-groups with mostly three synonym notations per sub-sub-group.

The skills that were derived from academic literature were all coded into the subgroups in the KODE®X model. That way, skills with different titles and indications were categorized. However, research of Stek (2016), as part of the PERFECT project, showed that the model was not sufficient for further research, because it is not able to code skills specific requirement in detail[94].

2.4 The P/SM maturity model of Schiele (2007)

The link between P/SM maturity models and the financial performance of firms

The part of the total turnover of a modern industrial firm in Europe that is directly transferred to suppliers increased substantially. The current business environments presents a strong competition in global markets, with high expectations from both the customer and client to satisfy their needs and requirements[95]. To support these new challenges, P/SM is evolved as a

[92] See Kuhlmann and Sauter (2008)
[93] See for all categories: Perfect (2016), p. 27
[94] See Stek (2016), p. 56
[95] See Pollice and Fleury (2011), p. 1

strategic partner to the business, contributing to the total business performance. In this situation, a better performance by the purchasing function can increase the overall firm performance and could give a significant competitive advantage[96]. However, the level of fulfilment of this responsibility depends on the development level or maturity of purchasing[97].

Purchasing maturity is defined as "*the level of professionalism in the purchasing function*"[98]. A purchasing maturity model describes stages of maturity attached to managerial dimensions an organization is going through in achieving greater overall performances[99]. Greater maturity is associated with better performances[100]. Therefore, measuring the level of maturity is useful for testing the link between the professionalism in the purchasing function and its contribution to the performance of the firm in general and its financial performance.

Measuring a firm's maturity level with maturity models

Many authors developed purchasing maturity models, but mostly conceptual in nature and thus not empirically tested[101]. What the different models have in common is that they differentiate from a limited number of maturity stages, ranging from three to five or six[102]. Schiele (2007) developed and tested a tool to asses a firm's maturity level. A comparison with other maturity models revealed that most did not include all aspects that were in relation to the classical managerial functions of planning, organising, leadership and control[103]. This resulted in a profile following five dimensions, with a total of 111 items to be assessed[104]. Table 2.3 shows the five dimensions and several items per dimension.

[96] See Carr and Pearson (2002), p. 1048; Monczka et al. (2010), p. 12; Pollice and Fleury (2011), p. 1
[97] See Schiele (2007), p. 276
[98] See Rozemeijer, Weele, and Weggeman (2003), p. 5
[99] See Schiele (2007), p. 274
[100] See Schiele (2007), p. 283
[101] See Schiele (2007), p. 276
[102] See Rozemeijer (2000), p. 61; Schiele (2007), p. 275
[103] See Schermerhorn (2011), p. 236
[104] See Schiele (2007), p. 284-291

Table 2.3 Five purchasing maturity dimensions and its management function categories[105]

#	*Dimension*	*Management functions*
1	Procurement planning	Demand planning, pooling planning, environment scan, innovation planning
2	Organisation structure of purchasing	Structure & mandates, strategic integration
3	Process organisation	Sourcing strategy, supplier selection, supplier evaluation, supplier development, purchasing early involvement in development processes, early supplier involvement process, process involvement with other functions
4	Human resources and leadership	Job descriptions & competencies, personnel selection and integration, performance appraisal & career development
5	Purchasing controlling structures	Controlling system, controlling process & structure, controlling methods & tools

Maturity stages in the maturity model

As mentioned, different stages are used to measure the maturity of the purchasing function in a company. In Schiele's model, four stages are defined to have a complete maturity profile. These four stages are defined for each of the 111 items:

Stage 1 reflects present knowledge about the tool or method in the company.

Stage 2 is met when a position or person is assigned to perform the task.

Stage 3 is met when the process for completing the task is both documented and applied.

Stage 4 cross-functional integration in the company while basic requirements are met[106].

An underlying assumption is that a company that is highly developed cannot depend on one individual's performance, but is matured throughout the organisation and is sufficiently structured[107].

Validation of the P/SM maturity model: significant relationship between maturity and savings

Purchasing maturity has been tested by audits in 14 firms based on the maturity model by Schiele (2007) and cost-reduction workshops were done simultaneously to the audits to measure financial performance. It was found that more mature firms had larger savings potential than less matured firms. The purchasing absorptive capacity offers an explanation,

[105] Based on Schiele (2007), p. 284-291
[106] See Schiele (2007), p. 278
[107] See Schiele (2007), p. 278

since it provides a theoretical explanation for the profit that more mature companies have from newly introduced knowledge[108]. After all, because of the large impact the purchasing performance has on a firm's bottom line, cost saving is still the primary objective of P/SM which is validated by several researchers in the context of the purchasing maturity process[109].

The maturity model proves it efficiency while covering the different steps of the purchasing lifecycle. Therefore, the five dimensions used by Schiele (2007) in the maturity model are key in this research. These dimensions will be used as main dimensions in the P/SM model that this research will develop to map the Dutch purchasing education and the academic purchasing literature. The next chapter will describe the development of the P/SM skill model.

3 Methodology: developing the P/SM skill model and using it to map Dutch purchasing courses

This chapter describes the development of the P/SM skill model and its use. This chapter will furthermore describe how the data was collected and compared.

3.1 Developing the P/SM skill model

Collection of P/SM skills in academic literature

Members of the PERFECT group jointly reflected academic literature that discusses the skills and competencies necessary for P/SM professionals to perform their work in their environment. A systematic approach was used to identify key sources and to ensure that a wide variety of sources were identified so that the skill set represents the full scope of these skills[110]. The search was made in "Scopus" and "Google Scholar" using the following search terms: purchasing, purchasing + professional, procurement, buyer AND competence, competencies, skill and education. These terms were selected because in well-known and many cited articles on purchasing these terms were used as keywords[111]. The search resulted in a total of 29 academic papers and were further refined to establish a key set of skills, which are shown in appendix 2. An overview with the skills that were nominated by academic literature was made and is shown in appendix 3.

[108] See Schiele (2007), p. 283
[109] See e.g. Schiele (2007), p. 283, Gonzalez-Benito (2007), p. 913; Hartmann, Kerkfeld, and Henke (2012), p. 32; Foerstl et al. (2013), p. 706
[110] See Perfect (2016), p. 16
[111] See Perfect (2016), p. 16

Sorting skills based on the dimensions of Schiele (2007)

In total, 798 nominations were done by academic literature for P/SM professionals to be necessary to perform their work in their environment. These nominated skills were further analysed on occurrence and frequency. The structured overview in appendix 3 shows many skills that had many nominations, showing a higher relevance. Next, the skills were assigned to one of the dimensions that were based on the maturity model of Schiele (2007). One extra dimension was added, for the skills that could not easily matched to one of the dimensions. The six dimensions and its definitions used in this research are displayed in table 3.1.

Table 3.1 Dimensions in the P/SM skill model

Number	*Dimension*	*Definition*
1	Planning and strategy	First operational steps of purchasing lifecycle, like market analysis and technology planning.
2	Structural organisation	Structure as the second step after strategy. Important for purchasing to fulfil duties, like purchasing's strategic integration, logistics and marketing.
3	Process organisation	Sourcing strategies and plans on performances, like supplier selection, evaluating offers, supplier development and risk management.
4	Human resources and leadership	Professionalism and skill level is important to purchasing, like train staff, personality and communication skills.
5	Controlling	Performance measurement and controlling systems, like data analysis, cost reduction techniques and procurement IT systems.
6	Other	Can include not included purchasing skills or non-purchasing related skills.

While matching the skills, sometimes a skill could apply to several dimensions or even to not any specific dimension. The latter skills were noted in the additional sixth column. Skills were not noted twice, but multiple nomination were counted behind the term to be able to consider the weighting in further analysis. That way, the relevance of a skill compared to others was easily visible. The overview of the six dimensions and its assigned skills can be found in appendix 4.

Creating the P/SM skill model: clustering and reducing the number of P/SM skills

After assigning the skills to a dimension, skills had to be summarized and the total number of skills had to be reduced. Skills were clustered to keep it usable for the data collection part in this research. Several PERFECT members jointly created these skill clusters to get multiple views on the skill clustering and reduction. In total, 61 skills were chosen to be used in the research. Since more than 61 skills were nominated, the not selected skills were displayed as so-called *sub-skills* below its corresponding skill. The number of skills per dimension differed between 6 and 16.

The final P/SM skill model was created in excel, so it could easily be used to map the data. It was important that a clear definition of each skill was formulated, so that no ambiguities could arise during the data collection. Therefore, a clear description of the 61 main skills was included in the model. Since more than 61 skills were nominated, not selected skills were displayed as so-called *subskills* below its corresponding skill. The sixth dimension "Other" was included in the model to be used when a skill was not included in the model, but the *not purchasing related skills* was not analysed since it had no relation with purchasing. The final P/SM skill model can be found in appendix 5.

3.2 Data collection: deriving information from purchasing skills nominated by academic literature and taught at Dutch universities

Academic literature: nomination of purchasing skills

The purchasing skills that were identified collaboratively by project members of PERFECT were also mapped in the P/SM model based on the frequency of nominations. That way, this research can find in what dimension most skills were nominated by academic literature.

The skills with a minimum of five nominations were identified and resulted in a list of 798 nominations divided over 88 skills (see appendix 6). Each nomination was worth one point, so percentages could be calculated in the end. For example, the *negotiation* skill was nominated 28 times and thus 28 points were awarded. The *supplier negotiation* skill was nominated five times and is a subskill of the *negotiation* skill. Therefore, the five awarded points for *supplier negotiation* were summed up with the *negotiation* skill points and *negotiation* was thus worth 33 points.

Furthermore, literature was not clear about whether a soft skill was or should be retrieved in explicit or indirect way. Since the P/SM skill model has a clear division between explicitly and indirectly taught, it was assumed that the nominated soft concerned explicitly taught skills

so the skills could be nominated in the P/SM model. Finally, no skills were nominated in the *other* dimension so this dimension was excluded for further research.

Dutch universities: overview of the institutions

To map the Dutch educational landscape, an overview of Dutch universities was elaborated. There were many websites offering a list of universities, but these lists differ. Therefore, data was gathered via the website of Studielink and Studiekeuze123[112]. Studielink involves close collaboration between the Dutch Ministry of Education, Culture and Science, the Netherlands Association of Universities of Applied Science, VSNU, DUO and institutions of higher education[113]. Studiekeuze123 is an independent collaboration between the Dutch Ministry of Education, students, and higher educational institutes[114]. Both offer complete and reliable information about all recognized education offered at Dutch universities. The total list contained 19 universities, see appendix 7.

Dutch universities: online documentary analysis

A documentary analysis was done via freely accessible websites of all institutes to find whether the institute offered a purchasing programme. If this was not found, further analysis was done to find specific courses about purchasing within other programmes. Terms to find these programmes and courses were: purchasing, procurement, supply chain management and sourcing.

To analyse the purchasing courses, syllabi were needed to be collected. Almost all institutions offered an online syllabus that could be freely accessed. Several aspects were kept in one data repository for tracking and storage. First, a descriptive analysis of the syllabi was executed to describe the basic features of the purchasing courses included in this study. It is a first summary about the sample and simply describes what the syllabi show. Logically, each syllabus showed different information about a course but common aspects were found. The common aspects that were found are displayed in table 3.2. By May 2016, the database included 24 purchasing courses from eight different universities, whereof six courses were offered bachelor level and 16 at master level.

[112] See Studiekeuze (2015); Studielink (2016)
[113] See Studielink (2016)
[114] See Studiekeuze (2015)

Table 3.2 Common aspects that were investigated in online syllabi from Dutch universities

	Aspect
1	Course name
2	Educational institute
3	Level of course (bachelor or master)
4	Program name
5	Course contents
6	Learning objectives
7	Education/teaching method
8	Number of ECTS
9	Contact person

Dutch universities: interviews

The next phase of the analysis involved an analysis of the skills offered at Dutch universities using the P/SM skill model. In-depth interviews were chosen to be the technique to explore the perspectives on the courses. The contact persons, who's information was gathered via the online documentary analysis, were contacted with a cover letter, a brief introduction to the study and the importance of the person's participation. One university did not respond and was thus excluded for further research, nine appointments were made at the different universities.

Dutch universities: interview and mapping in P/SM skill model

Nine in-depth interviews were held to elicit information about the purchasing courses taught at the visited university. The interviews were semi-structured and contained elements of both structured and unstructured interviews. A set of same questions to be answered by all interviewees were prepared and addition questions might be asked during the interview to clarify and/or expand some issues. The first prepared questions referred to general information about the course, like the number of student's participating. Further questions referred to the P/SM skill model. The interviewee was asked to identify a percentage for each of the 61 skills in the P/SM skill model, starting with the first and providing proportionally equal percentages to the remaining skills. The total amount of percentage that was given, was mostly not equal to hundred percent so all percentages were equally reduced to hundred. Furthermore, the total ECTS were filled in the P/SM skill model. That way, the time spend on each skill could be calculated, since the average time spend on one ECTS in the Netherlands is 28 hours[115]. The

[115] See Weingarten (2016)

time spend (in hours) on a skill was calculated by multiplying the percentage given to a skill with the total number of hours spend on a skill (ECTS multiplying with 28) and divided by 100.

Within the *human resources and leadership* dimension, a separation was made between soft skill development taught in explicit and indirect was. A percentage could be given on an explicitly taught skill development, whereas indirectly acquired skill development could be noted as taught or not taught. For example, when a course includes a group assignment, students would work on *team ability* and require that skill in an indirect way. However, if within the same course time was spend on explaining how to work in teams, *team ability* was in that case also taught in explicit way. Finally, no skills were nominated in the *other* dimension so this dimension was excluded for further research.

4 Results: academic literature and Dutch universities courses mapped

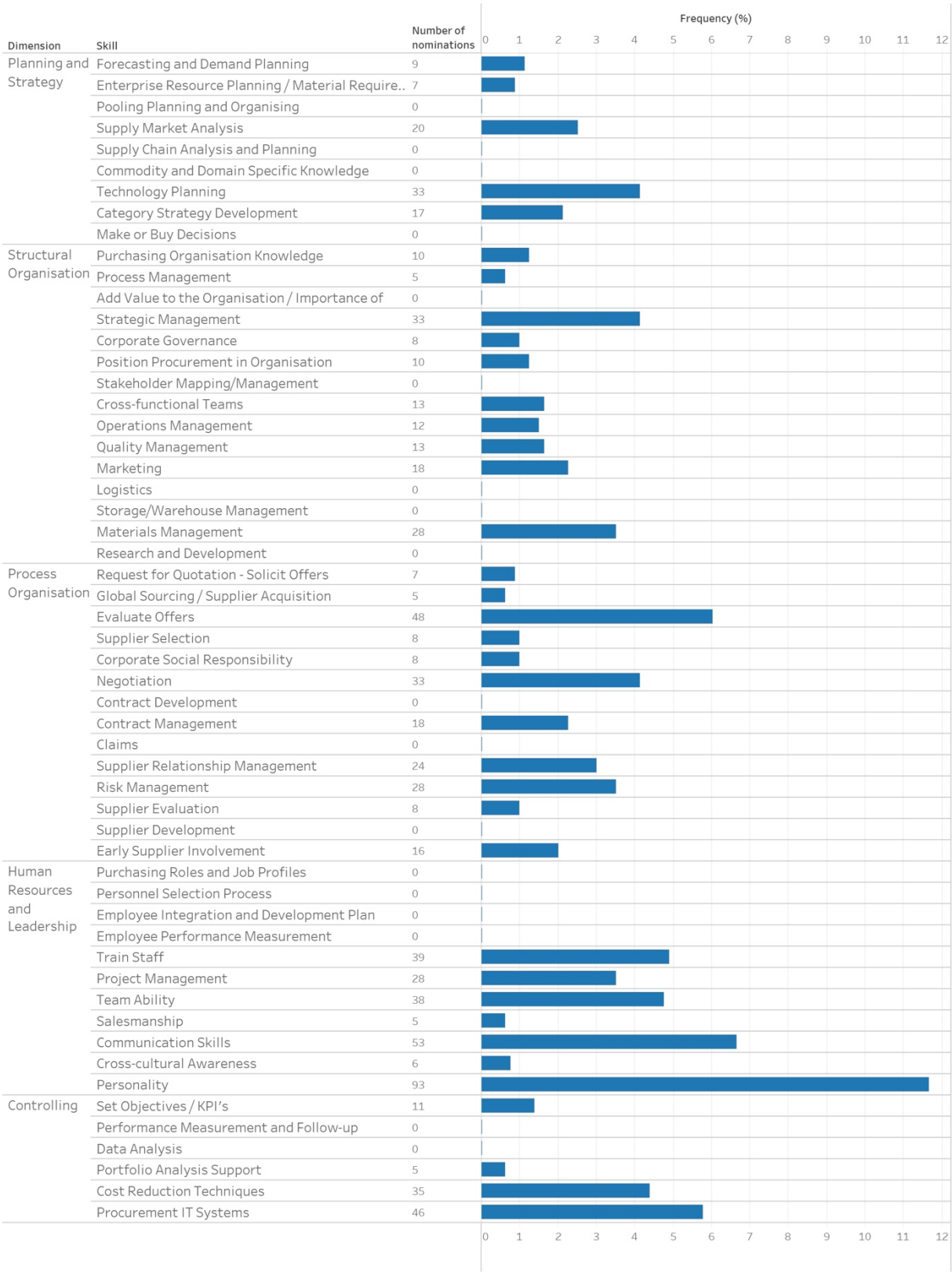
This chapter provides the results. First, the academic literature is described, followed by the courses offered at Dutch universities. The results are organized so that the bachelor courses are evaluated first and the master courses second.

4.1 Skills nominated by academic literature

The nominated skills in academic literature were analyzed to identify skills that were identified as being necessary for P/SM professionals to perform their work in their environment. Purchasing skills that were nominated at least in five academic articles, were listed and are displayed in appendix 6. These skills were mapped in the P/SM skill model.

Frequencies in the data set

In total, 37 skills were nominated at least 5 times with a total of 798 nominations and 18 skills were nominated less than five times and were excluded for further research. The overall overview of all nominations is shown in figure 4.1. In figure 4.2 it is shown that most skills are nominated in the *human resources and leadership* dimension and least in the *planning and strategy* dimension.



Dimension	Skill	Number of nominations
Planning and Strategy	Forecasting and Demand Planning	9
	Enterprise Resource Planning / Material Require..	7
	Pooling Planning and Organising	0
	Supply Market Analysis	20
	Supply Chain Analysis and Planning	0
	Commodity and Domain Specific Knowledge	0
	Technology Planning	33
	Category Strategy Development	17
	Make or Buy Decisions	0
Structural Organisation	Purchasing Organisation Knowledge	10
	Process Management	5
	Add Value to the Organisation / Importance of	0
	Strategic Management	33
	Corporate Governance	8
	Position Procurement in Organisation	10
	Stakeholder Mapping/Management	0
	Cross-functional Teams	13
	Operations Management	12
	Quality Management	13
	Marketing	18
	Logistics	0
	Storage/Warehouse Management	0
	Materials Management	28
	Research and Development	0
Process Organisation	Request for Quotation - Solicit Offers	7
	Global Sourcing / Supplier Acquisition	5
	Evaluate Offers	48
	Supplier Selection	8
	Corporate Social Responsibility	8
	Negotiation	33
	Contract Development	0
	Contract Management	18
	Claims	0
	Supplier Relationship Management	24
	Risk Management	28
	Supplier Evaluation	8
	Supplier Development	0
	Early Supplier Involvement	16
Human Resources and Leadership	Purchasing Roles and Job Profiles	0
	Personnel Selection Process	0
	Employee Integration and Development Plan	0
	Employee Performance Measurement	0
	Train Staff	39
	Project Management	28
	Team Ability	38
	Salesmanship	5
	Communication Skills	53
	Cross-cultural Awareness	6
	Personality	93
Controlling	Set Objectives / KPI's	11
	Performance Measurement and Follow-up	0
	Data Analysis	0
	Portfolio Analysis Support	5
	Cost Reduction Techniques	35
	Procurement IT Systems	46

Figure 4.1 Skill nominations in academic purchasing literature (n = 798)

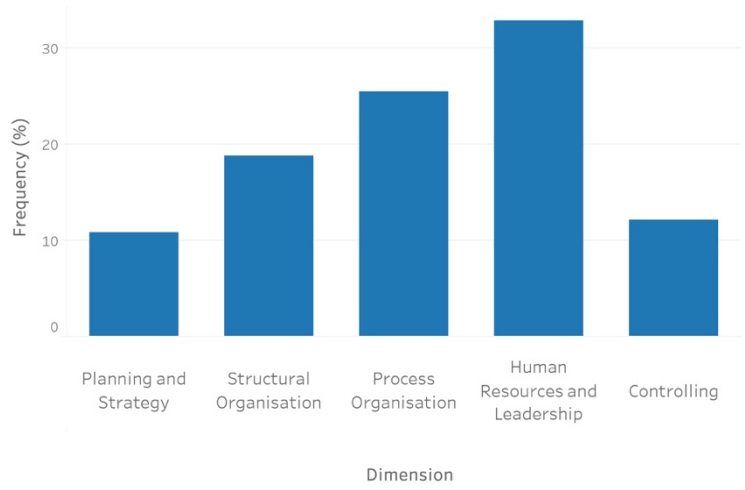


Figure 4.2 Nominations according to academic purchasing literature broken down by dimension (*n* = 798)

Skills without nominations

In table 4.1 is shown that most of the 18 skills that were nominated less than five times belong to the *structural organisation* and *human resources and leadership* dimension with both five skills that were not nominated. It is remarkable that five skills without nominations belong to the *human resources and leadership* dimension, which is almost half of the skills in this dimension. It is contradicting that the biggest part of all nominations in literature belong to this dimension as well.

Table 4.1 Skills without nominations and its corresponding dimensions

Dimension	*Skill*
Planning and strategy	Pooling planning and organising
	Supply chain analysis and planning
	Commodity and domain specific knowledge
	Make or buy decisions
Structural organisation	Add value to the organisation/importance of
	Stakeholder mapping/management
	Logistics
	Storage/warehouse management
	Research and development
Process organisation	Contract development
	Claims
	Supplier development

Human resources and leadership	Purchasing roles and job profiles
	Personnel selection process
	Employee integration and development plan
	Employee performance measurement
	Performance measurement and follow-up
Controlling	Data analysis

Most nominated skills

The overview on skill level in table 4.2 shows that the biggest part of the skills that are most nominated belong to the dimension of *human resources and leadership*. It is notable that the most nominated skill, *personality*, is almost twice as much nominated than the second most nominated skill, *communication*.

Table 4.2 Top 10 most nominated purchasing skills in academic literature (*n* = 798)

Skill	*Dimension*	*Frequency (n)*	*Frequency (%)*
Personality	Human resources and leadership	93	12
Communication skills	Human resources and leadership	53	7
Evaluate offers	Controlling	48	6
Procurement IT systems	Human resources and leadership	46	6
Train staff	Human resources and leadership	39	5
Team ability	Human resources and leadership	38	5
Cost reduction techniques	Controlling	35	4
Technology planning	Planning and Strategy	33	4
Strategic management	Structural organisation	33	4
Negotiation	Process organisation	33	4

Soft skill nominations

In table 4.3 an overview of the soft skills and the number of nominations is displayed. The number of nominations vary between five and 93 times. *Personality* is the most nominated skill, followed by *communication skills*. Least nominates were given to *salesmanship* and *cross-cultural awareness*. The soft skills cover together thirty percent of the total skill nominations.

Table 4.3 Soft skill nominations and its frequencies

Skill	*Frequency (n)*	*Frequency (%)*
Project management	28	4
Team ability	38	5
Salesmanship	5	1
Communication skills	53	7
Cross-cultural awareness	6	1
Personality	93	12

4.2 Dutch university courses mapped: bachelor level

4.2.1 Results from documentary analysis

Overview of the bachelor courses

Six bachelor courses were mapped and an overview is displayed in table 4.4. The courses' corresponding ECTS, the number of participating students and whether the course is obligated or elective are given.

Table 4.4 Overview purchasing courses at Dutch universities on bachelor level

Institution	*Course name*	*ECTS*	*Number of Students*	*Obligated or elective*
University of Twente	Business Operations Management	2	190	Obligated
	Supply Management	15	60	Obligated
	Designing in the Healthcare	15	60	Obligated
Technical University Eindhoven	Buying Behaviour and Innovation	5	300	Obligated
Tilburg University	Operations Management	6	150	Depends on study
University of Groningen	Purchasing and Supply Chain Management	5	160	Elective

Learning objectives

Each course syllabus was analyzed and provided a wide variety of information about learning objectives. The amount of learning objectives differed between two and seven per course. However, common learning goals could be found among the courses and included:

- deepen the student's knowledge about important theories and concepts in field of purchasing management (e.g. sourcing, outsourcing, relationship management);

- interpreting and critically evaluating a broad range of purchasing topics;
- learning to apply concepts of purchasing on practical, tactical and strategical level in specific situations;
- analyzing problems in purchasing settings and reflecting on it in a critical manner using relevant literature, theory and data.

Assessment methods

All bachelor purchasing courses in this sample assessed the student's knowledge by individual exams combined with group assignments (n = 6). The number of individual exams per course varied between one to five. The percentage that these exams represented the final grade of a course varied from thirty to fifty percent in this sample. Group assignments represented a larger part and varied between fifty and seventy percent. The final product of most courses was formatted as an academic paper that should be made in a group setting. Some courses required the students to present this paper in a closing seminar. It was specifically mentioned that students were trained in professional business presentations by seminars and that students were supervised by content tutors that were experts in the defined purchasing topics. One course required professional writing skills as part of the exam, but no specific goals or contents were given. One course assessed the students on their English language proficiency and their presentation skills. Tutorials were given to do assessments on these skills and provide feedback and tips for improvement.

Instruction method

The students were in all bachelor instructed via lectures and tutorials (n = 6). Within two courses responsive lectures where students were required to participate were used as well. Furthermore, almost all course syllabi specifically mentioned self-study or unguided self-study as an instruction method. It can be assumed that within students are required to do self-study without guidance.

4.2.2 Frequencies in the data set

Overview per dimension

In total six bachelor courses were mapped in the P/SM skill model, with a total of 33 ECTS that was related to purchasing. In figure 4.4. it is shown that most time and thus ECTS is devoted to the dimension *planning and strategy*, followed by *process organisation.* It is notable that

these dimensions cover together about 65 percent of the total time. Only two and three percent was devoted to respectively *human resources and leadership* and *controlling*.

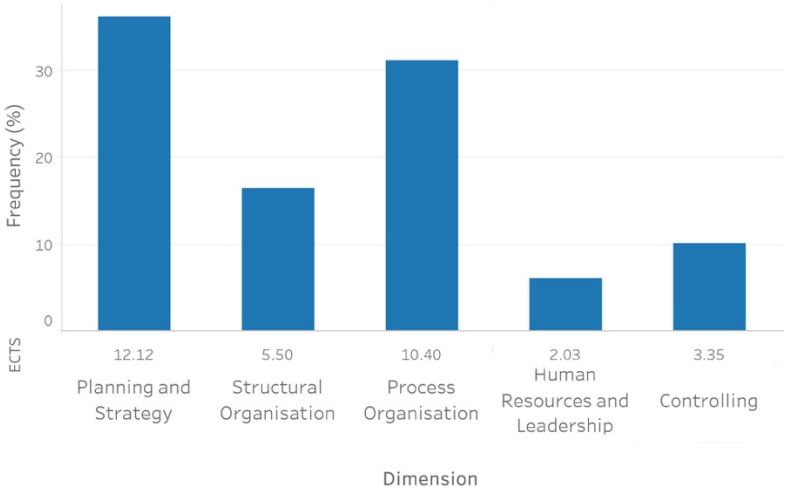


Figure 4.3 Skills taught in bachelor courses in percentages and ECTS, broken down by dimension (n = 6)

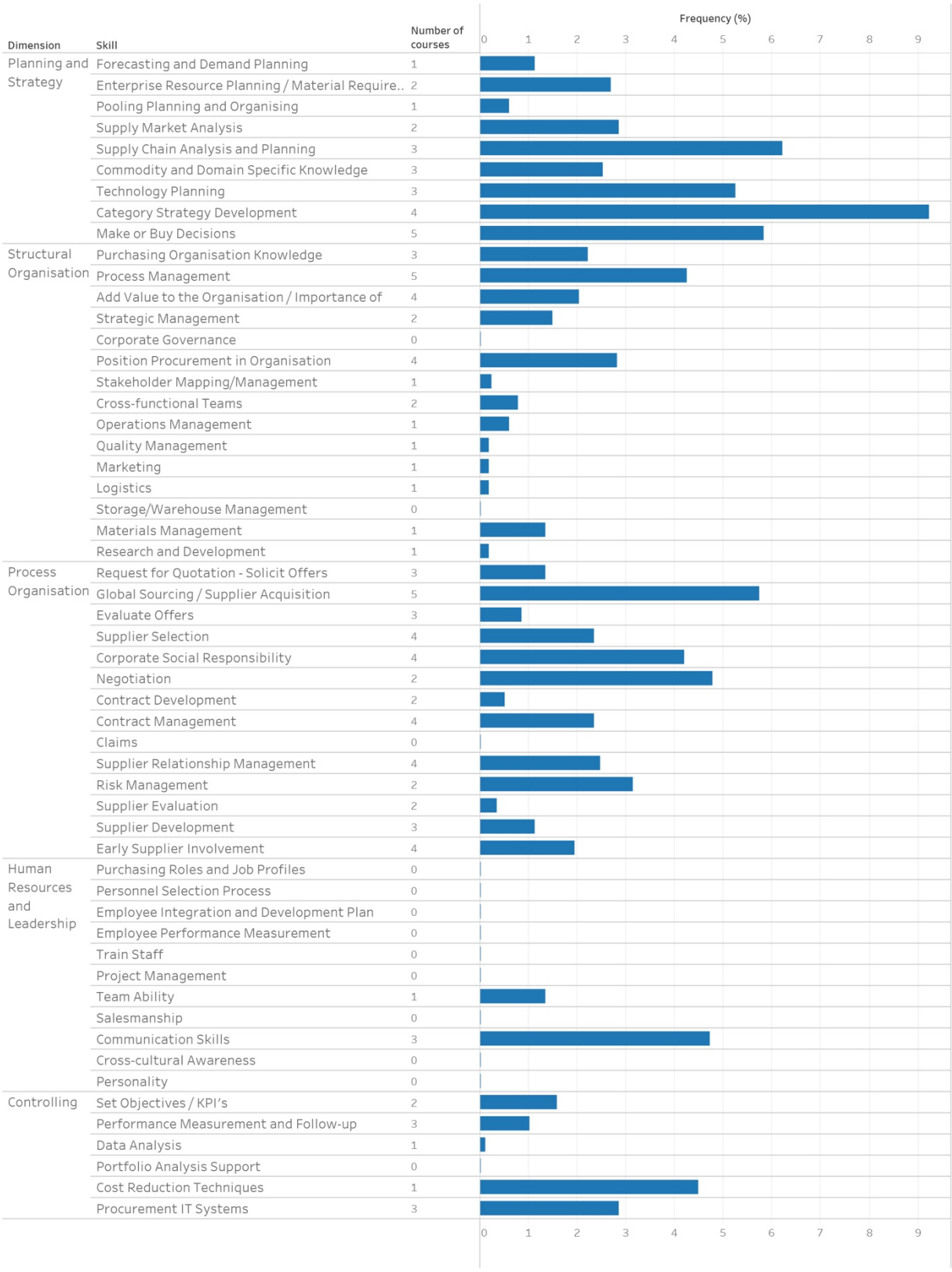


Figure 4.4 P/SM skills taught in bachelor courses, broken down by skill (n = 6)

Not covered skills

In table 4.5 is shown that there were 13 skills were no time was devoted to in any of the courses. It is remarkable that nine of these belonged to the *human resources and leadership* dimension, whereof four skills are classified as *soft skills*. After subtracting these of the total number of skills, 43 skills remain as being covered in Dutch bachelor courses.

Table 4.5 Not covered skills in bachelor courses and their corresponding dimension (n = 6)

Dimension	*Skill*
Structural organisation	Corporate governance
	Storage / warehouse management
Process organisation	Claims
Human resources and leadership	Purchasing roles and job profiles
	Personnel selection process
	Employee integration and development plan
	Employee performance measurement
	Train staff
Human resources and leadership (soft skill)	Project management
	Salesmanship
	Cross-cultural awareness
	Personality
Controlling	Portfolio analysis support

Most taught skills in comparison to most ECTS spend on a skill

A top ten of skills taught in most of the courses was identified, but a skill that is taught in many courses does not directly mean that many ECTS is spend on teaching that skill since courses differ in the total number of ECTS. Therefore, a comparison is shown in table 4.6 between the skills that were taught by most courses and the skills where most ECTS was devoted in total. The results are ranked from high to low.

The four skills taught in most courses, *make or buy decisions*, *process management*, *global sourcing/supplier acquisition* and *category strategy development,* were also part of the top ten skills where most ECTS was devoted to by all bachelor courses. The skill *supplier selection* is also part in both top ten's. These five skills were taught in most courses and most ECTS was spend on teaching them, it proves thus their importance in bachelor courses.

Table 4.6 Top 10 most taught skills compared to most ECTS spend on a skill

#	*Most taught skill*		*Most ECTS spend on skill*		
	Skill	*Frequency (n)*	*Skill*	*Frequency (n)*	*ECTS*
1	Make or buy decisions	5	Category strategy development	4	3.08
2	Process management	5	Supply chain analysis and planning	3	2.08
3	Global sourcing/supplier acquisition	5	Make or buy decisions	5	1.95
4	Category strategy development	4	Global sourcing/supplier acquisition	5	1.92
5	Add value to the organisation/importance of	4	Technology planning	3	1.75
6	Position procurement in organisation	4	Negotiation	2	1.59
7	Supplier selection	4	Communication skills	3	1.58
8	Corporate social responsibility	4	Cost reduction techniques	1	1.50
9	Contract management	4	Process management	5	1.42
10	Supplier relationship management	4	Corporate social responsibility	4	1.40

Soft skill development

Five soft skills were embedded in the P/SM skill model and were differentiated in being taught indirectly and being taught explicitly. A skill taught in indirect way was measured via a dichotomous question and could be taught or not taught. An explicitly taught skill was measured in a percentage, so the time spend on the skill was given.

In table 4.8 is shown that five skills were taught indirectly, where *project management* was taught in most of the courses, followed by *team ability* and *communications skills*. *Salesmanship* was not indirectly taught in any of the courses. Furthermore, only two soft skills were explicitly taught: *communication skills* followed by *team ability.* In total, bachelor courses devoted 2 ECTS to explicitly teaching soft skills.

Table 4.7 Soft skills: indirectly and explicitly taught (*n* = 6)

Skill	*Indirect*	*Explicit*		
	Frequency (n)	*Frequency (n)*	*Time (h)*	*ECTS*
Project management	4	0	0.00	0.00
Team ability	3	1	12.60	0.45
Salesmanship	0	0	0.00	0.00
Communication skills	3	3	44.15	1.58
Cross-cultural awareness	1	0	0.00	0.00
Personality	2	0	0.00	0.00

Total overview frequencies in the dataset

A total overview of all skills and its corresponding number of courses is displayed in figure 4.4. Furthermore, a complete overview of all skills is presented in appendix 10. The number of courses teaching a specific skill was counted and the number of hours of all courses per skill were summed up. The corresponding number of ECTS were calculated as well as the average part of time in percent that was devoted to teaching a skill. The six main dimensions are represented in bold and generated by summing up its subskills.

4.3 Dutch university courses mapped: master level

4.3.1 Results from documentary analysis

Overview of the master courses

A total of 16 master courses were mapped and an overview is displayed in table 4.8. Per course, the corresponding institution, ECTS, number of participating students. Furthermore, it is shown whether a course is obligated for students or if it is offered as an elective.

Table 4.8 Overview purchasing courses at Dutch universities on master level (*n* = 16)

Institution	*Course name*	*ECTS*	*Number of Students*	*Obligated or elective*
University of Twente	Purchasing Strategy and Systems	5	40	Elective
	Purchasing Management	5	42	Elective
	Global Sourcing and Organization	5	30	Elective
	Supply Chain Management and Innovation	5	30	Elective
	Public Procurement	5	9	Elective
	Supply Chain Management and ICT	7.5	35	Elective
	Healthcare Purchasing	5	30	Obligated
	Procurement Strategies and Tendering	7.5	30	Elective
Technical University Eindhoven	Strategic Sourcing and Supply Management	5	60	Elective
Maastricht University	Supply Chain Strategy	5	118	Obligated
Erasmus University Rotterdam	Purchasing and Supply Management	4	150	Obligated
	Strategic Sourcing	6	50	Elective
	Healthcare Procurement and Value Chain Management	5	30	Elective
Tilburg University	Purchasing Management	6	120	Obligated
University of Groningen	Purchasing	5	66	Elective
TIAS School for Business and Society	Purchasing	4.8	18	Obligated

Learning objectives

The learning objectives of all courses were analyzed by using the information provided on the online syllabi. There was a wide variety of learning objectives included on the syllabi, which is no surprise. However, common themes could be found at master level. The courses in this sample averaged between two and eight learning objectives. The general learning objectives at master courses included:

- understanding and assessing the strategic importance and impact of purchasing on organizations;
- analyzing, developing and applying purchasing knowledge in a situation;

- knowing the main characteristics and concepts of purchasing and the consequences thereof;
- learning to improve the strategic management of purchasing.

Other objectives were course specific, such as strategic sourcing, systematic literature research performing and writing a paper by integrating purchasing knowledge.

Assessment methods

The assessment methods of the 16 master courses were analyzed. The online syllabi provided information about the different methods. It was generated by counting the different methods each course used. In total, two courses used one assessment method, seven courses used two different methods and seven courses used three different methods.

Almost all master courses used individual exams as assessment method (n = 13), whereof two courses used no other methods and 11 used one or two other methods. Exams are mostly combined with one or more assignments (n = 14), in either a group setting or as an individual. The percentage that the exams represented the final grade of a course varied from 25 to 60 percent in this sample, where assignments varied from 25 to 70 percent. Papers were in five courses also used as an assessment method, either made by a group or an individual. Two courses used participation as an assessment method. The students worked in groups solving cases and visiting companies to engage in active collaboration with the company's employees. That way, participation was part of the assessment method. Three courses used other methods, like an oral exam, quizzes and a presentation. The oral exam represented 30 percent of the final grade of a course, but no further information was given. The quizzes represented 25 percent, but no further information was given on the presentation assessment method.

Instruction method

The students were taught by lectures in all master courses (n = 16). This was the only instruction method that was used in four courses. The other courses used tutorials (n = 6), guest lectures (n = 4), workshops (n = 2) and/or colstruction (n = 1). Colstruction is an instruction method that combines lectures and tutorials, so that within a lecture can start with theory and end with working on assignments. Also, some syllabi specifically mentioned self-study as an instruction method. It can be assumed that in this phase of a study, students must study themselves to pass a course.

4.3.2 Frequencies in the data set: master courses

Overview per dimension

The 16 master courses were mapped in the P/SM skill model, with a total of 82 ECTS related to purchasing. An overview per dimension is shown in figure 4.6 and it is shown that *process organisation* and *planning and strategy* are the most taught dimension. Together they cover more than 65 percent of the total time. Least time was devoted to *human resources and leadership* and *controlling,* with respectively three and eight percent. In figure 4.7 the results per skill are shown.

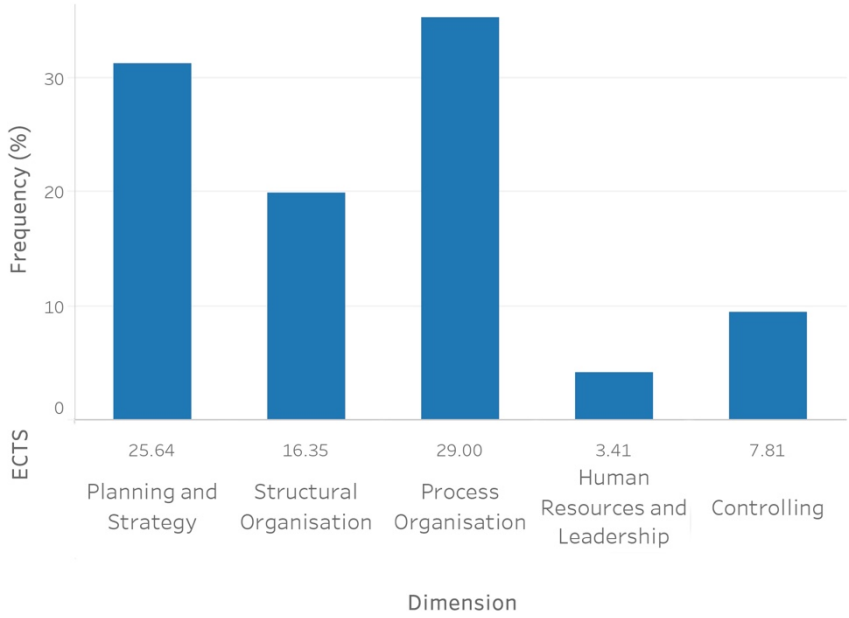


Figure 4.5 P/SM skill analysis in master courses, broken down by dimension (n = 16)

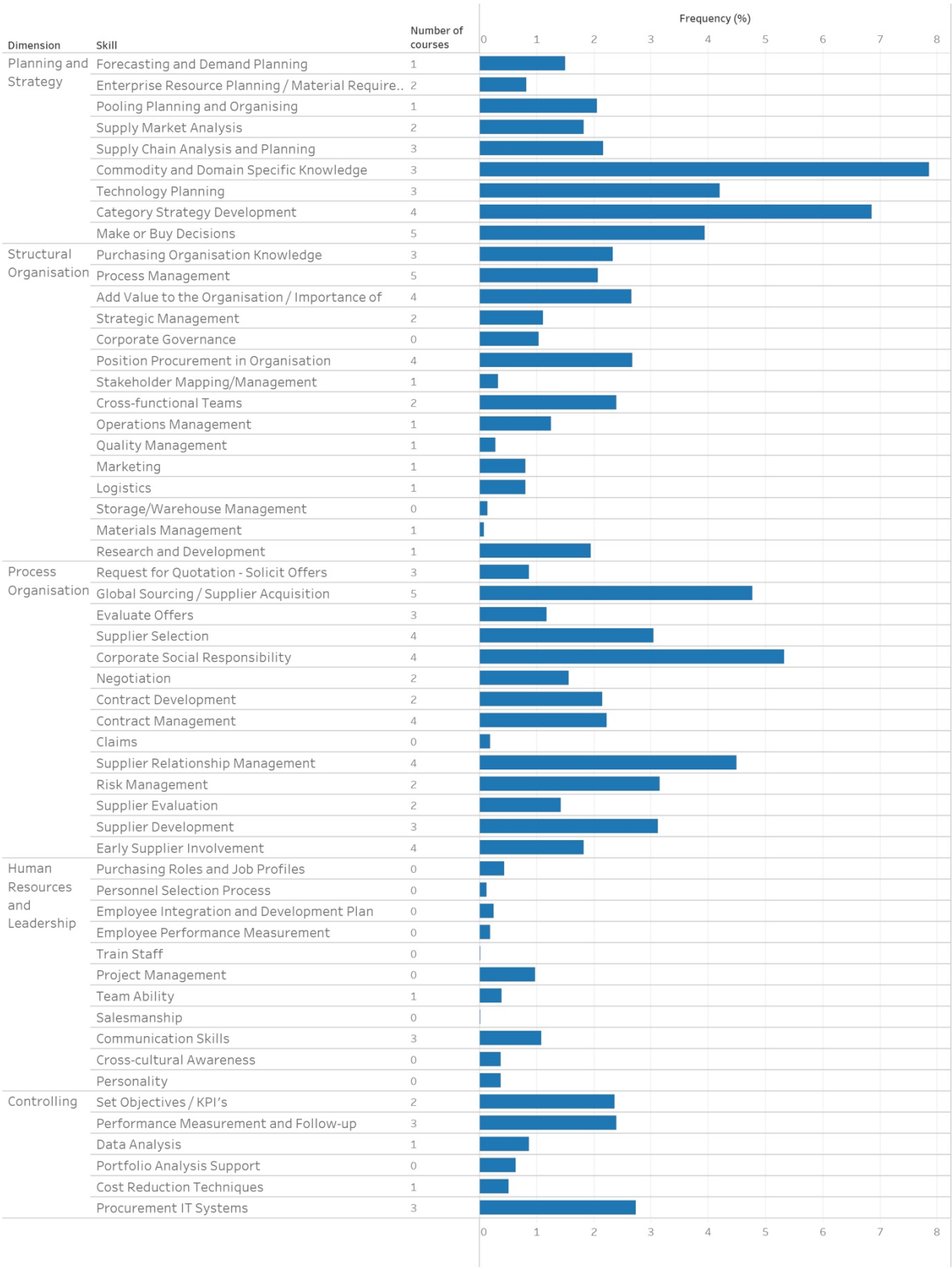


Figure 4.6 P/SM skill analysis in master courses, broken down by skill (n = 16)

Not covered skills

Two skills were not covered in either one of the courses and are shown in table 4.9. Both skills belong to the dimension *human resources and leader*ship. Subtracting these of the total number of skills, 53 skills remain as being taught in master courses at Dutch universities.

Table 4.9 Uncovered skills in master courses (*n* = 16)

Skill	*Area*
Train staff	Human resources and leadership
Salesmanship	Human resources and leadership (soft skill)

Most taught skills in comparison to most ECTS spend on a skill

In table 4.10 is a comparison between most taught skills and most ECTS spend on skill shown. Many courses pay attention to the skills in the most taught skill top ten, but do not spend many time on all of them as well. The first five mostly taught skills are also the skills where most ECTS is spend on, but the other five skills are not displayed in the top ten most ECTS spend on.

The table shows that most ECTS is spend on *commodity and domain specific knowledge*, despite that it is only taught in eight courses. The same holds for *global sourcing/supplier selection*, which is taught in nine courses, but holds the fourth place in the top ten most ECTS spend on that skill.

Table 4.10 Top master P/SM skills (*n* = 16)

	Most taught skill		*Most ECTS spend on skill*		
#	*Skill*	*Frequency (n)*	*Skill*	*Frequency (n)*	*ECTS*
1	Corporate social responsibility	14	Commodity and domain specific knowledge	8	6.45
2	Category strategy development	13	Category strategy development	13	5.64
3	Supplier relationship management	12	Corporate social responsibility	14	4.38
4	Supplier selection	11	Global sourcing/supplier selection	9	3.92
5	Supplier development	11	Supplier relationship management	12	3.70

6	Set objectives/KPI's	11	Technology planning	8	3.46
7	Performance measurement and follow-up	11	Make or buy decisions	9	3.24
8	Procurement IT systems	11	Risk management	9	2.59
9	Purchasing organisation knowledge	10	Supplier development	11	2.56
10	Position procurement in organisation	10	Supplier selection	11	2.50

Soft skill development

Soft skills were analyzed in the P/SM model and differentiated by being explicitly and indirectly taught. The results of the analysis are shown in table 4.11. It is shown that all skills were indirectly taught, where *communication skills* were taught most followed by *team ability*. Only one course indirectly taught *salesmanship*, which was not taught in explicit way too. The other skills were all taught at least once in explicit way. Most time was devoted to teaching *communication skills* and *project management.* The ECTS per skill taught in explicit way varied between zero and one and they cover together about three ECTS.

Table 4.11 Soft P/SM skill analysis (*n* = 16)

Skill	*Indirect*	*Explicit*		
	Frequency (n)	*Frequency (n)*	*Time (h)*	*ECTS*
Project management	8	3	22.20	0.79
Team ability	9	2	8.87	0.32
Salesmanship	1	0	0.00	0.00
Communication skills	13	4	24.72	0.88
Cross-cultural awareness	7	1	8.40	0.30
Personality	8	2	8.56	0.31

Total overview master courses

A total overview of all skills and the corresponding number of courses teaching the skill is displayed in figure 4.6. The figure shows huge outliers in the *planning and strategy* dimension, namely on *commodity and domain specific knowledge*. It also shows where most time is devoted to, mainly in the upper part of the figure where the skills belong to the area of *planning and strategy* and halfway, which skills belong to the dimension of *process organisation*. Least time is devoted to the skills in the dimension *human resources and leadership*. The analysis of all

skills and its exact numbers are presented in appendix 11. The six main dimensions are represented in bold and are generated by summing up the data of its subskills.

5 Discussion and conclusion, remaining observations, applicability of P/SM skill model, limitations and recommendations for further research

In the first part of this chapter, the research questions are answered first. This is followed by remaining observations, applicability of the P/SM skill model and limitations of this research. Finally, recommendations for further research are given.

5.1 Discussion and conclusion

5.1.1 Research question 1: represented P/SM skills according to academic literature

This paragraph answers the first research question: What P/SM skills are identified by academic literature as necessary for P/SM professionals to perform their work in their environment?

***Personality* is the most nominated skill**

Academic purchasing literature mentions *personality* as the most necessary skill for a P/SM professional to have in the field. Of all nominations, 12 percent is given to *personality*. These nominations were spread over many sub-skills, like *persuasive, creativity, entrepreneurial, trustful/integrity, adaptability, proactive, flexibility* and *curiosity*.

Soft skills are most important followed by process organisation

The results of the academic literature analysis show a clear skill profile. Skills in the *human resources and leadership* dimension is considered most showing its importance. The nominations in this dimension cover 33 percent of all nominations. Not only *personality* was nominated many times, *communication skills, train staff* and *team ability* were nominated also many times. Along with skills in the *human resources and leadership* dimension comes the *process organisation* dimension. *Evaluate offers* and *negotiation* were most nominated in this latter dimension. A skill profile focussing on the professionalism of the purchasing function and its skill level combined with a focus on sourcing plans and strategies appear to be most required according to academic literature.

Planning and strategy and controlling least important

Skills included in the first operational steps of the purchasing lifecycle, like supply chain analysis and planning and make or buy decisions were least mentioned by academic literature. Only 11 percent of all skills that were nominated belonged to the *planning and strategy* dimension. The skills *technology planning* and *supply market analysis* were mainly nominated in this dimension. Together with *cost reduction techniques* and *set objectives/KPI's* within the *controlling* dimension, these skills appeared to be the least important according to academic literature. Controlling purchasing and supply chains can be hard, since many companies jointly operate within a competitive environment[116]. This might be the reason why so few controlling related skills were nominated as being important by academic literature.

5.1.2 Research question 2: differences and similarities in represented skills in bachelor and master courses

This paragraph answers the second research question: What are the differences and similarities in represented skills between Dutch bachelor and master purchasing courses at Dutch universities?

Slight difference in number of students

Analysis was done on the education that was offered at Dutch universities, both at bachelor and master level. In total, 22 courses were analysed whereof 6 at bachelor level and 16 at master level. Respectively, more students followed a bachelor course (n = 980) than a master course (n = 858). This might be related to the fact that five out of six purchasing courses at bachelor level are obligated for students who follow the program, against five out of sixteen in master purchasing courses.

No differences found in learning objectives

Learning objectives of the bachelor and master courses were mapped by a documentary analysis. A comparison between the learning objectives hardly show any differences. Both at bachelor and master level, courses aim to deepen the student's knowledge about theories and concepts in purchasing management and its consequences. Student's should be able to analyse,

[116] See Seuring (2006), p. 12

develop and apply a broad range of purchasing knowledge in situations as mentioned by both bachelor and master courses.

Differences in assessment and instruction methods

A comparison was made between the different instruction and assessment methods used by the courses. All bachelor courses used individual exams combined with group assignments to assess the student's knowledge, but almost no other assessment methods were used. At master level, other assessment methods were used as well: oral exams, quizzes and presentations.

Hardly any differences found in the skills that were taught

A comparison on dimension level was done to identify differences between bachelor and master courses. In figure 5.1 an overview of the P/SM skill analysis of the bachelor and master sample broken down by dimensions. Hardly any differences can be found, since the bachelor and master courses agree on 92 percent of the time spend. The eight percent that they differ is divided over all dimension, but mainly in the *planning and strategy* and *process organisation* dimension. Bachelor courses spend about five percent more on the first category and master courses devoted about four percent more on *process organisation.* The figure displays a summation of all bachelor and master courses, but a boxplot would give more information about skewness, outliers and distributions. Therefore, a boxplot of this sample is shown in figure 5.2.

The boxplot in figure 5.2 shows the overall patterns of response of the courses. They provide a useful way to visualise the range and responses for the bachelor and master group per dimension. The medians per dimension are all almost at the same level, meaning that the courses all agree on the different skills being taught. However, the boxplots in the *planning and strategy* dimension shows differences. The boxplot of the bachelor courses is comparatively short, suggesting that overall bachelor courses have a high level of agreement with each other. The boxplot of the master courses is comparatively tall, suggesting that master courses hold quite different opinions about this aspect. Despite these differences, they have almost the same median. The boxplots at the remaining dimension have almost the same mean and do not differ much in the spread of the boxplots.

A comparison on skill level was executed and its results are shown in figure 5.3.

Figure 5.1 P/SM skill analysis in 3 bachelor and 6 master courses at the University of Twente

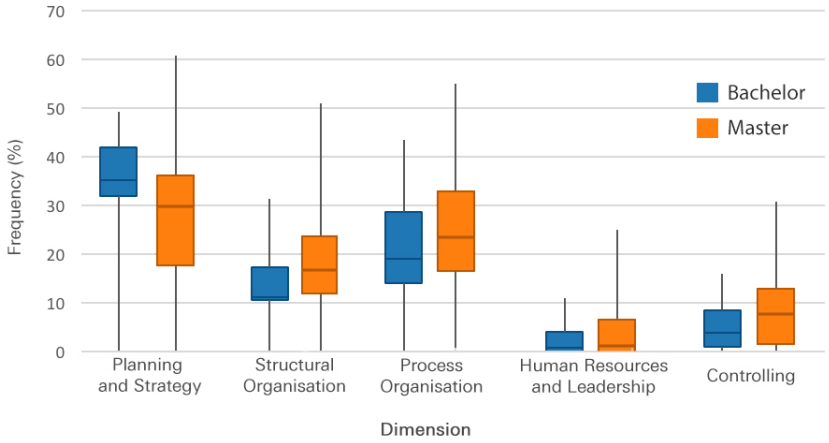


Figure 5.2 P/SM skill analysis in 3 bachelor and 6 master courses at the University of Twente

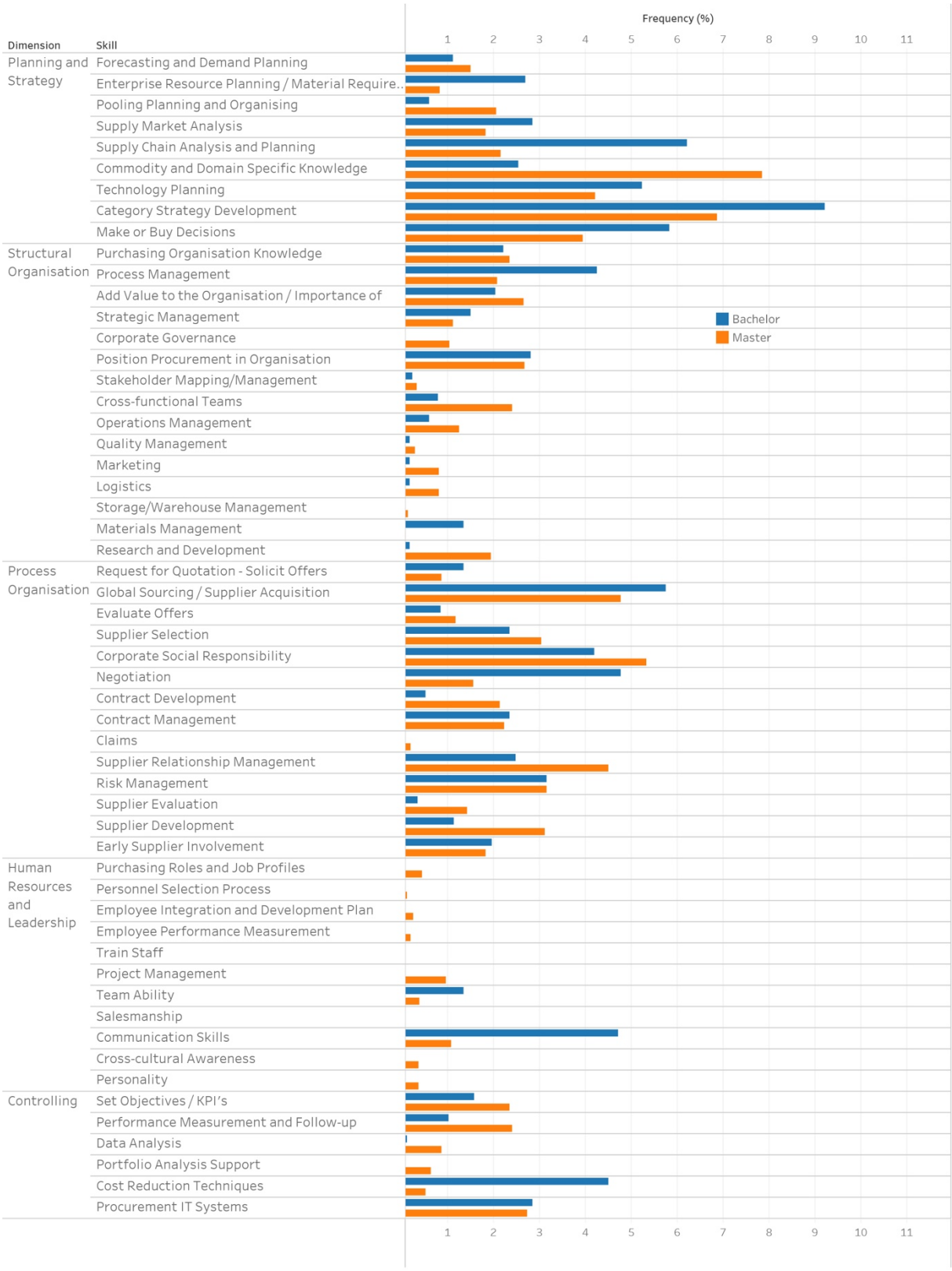


Figure 5.3 P/SM skill comparison between bachelor and master courses (bachelor $n = 6$, master $n = 16$)

P/SM skill analysis at university level

Analysis was done on university level to identify similarities and differences. These are shown in appendix 12. A comparison between courses at bachelor and master level could be done on four universities because they had at least one bachelor and one master course: University of Twente, Technical University of Eindhoven, Tilburg University and University of Groningen. The analysis shows that there is least agreement at the University of Eindhoven with about 50 percent and is shown in figure 5.4. Most agreement is at the University of Groningen with about 80 percent and is shown in figure 5.5. The University of Twente and the Tilburg University both have an agreement of about 65 percent.

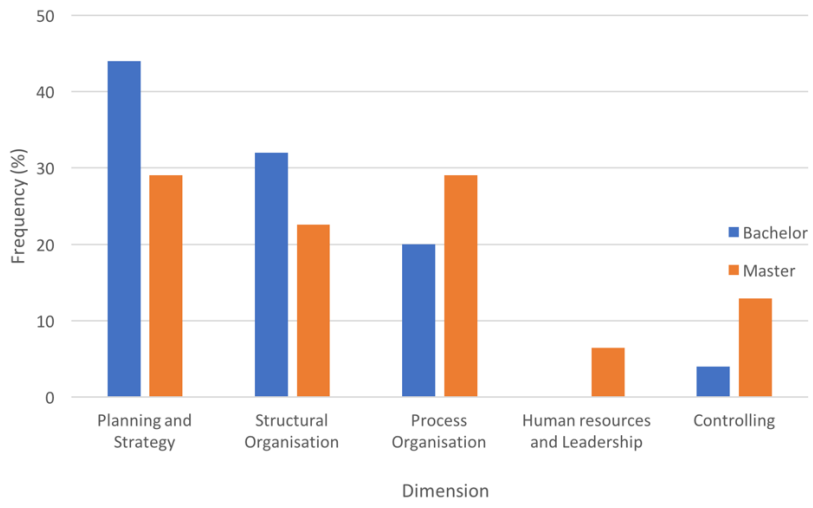


Figure 5.4 P/SM skill analysis at the University of Eindhoven (bachelor *n* = 1, master *n* = 1*)*

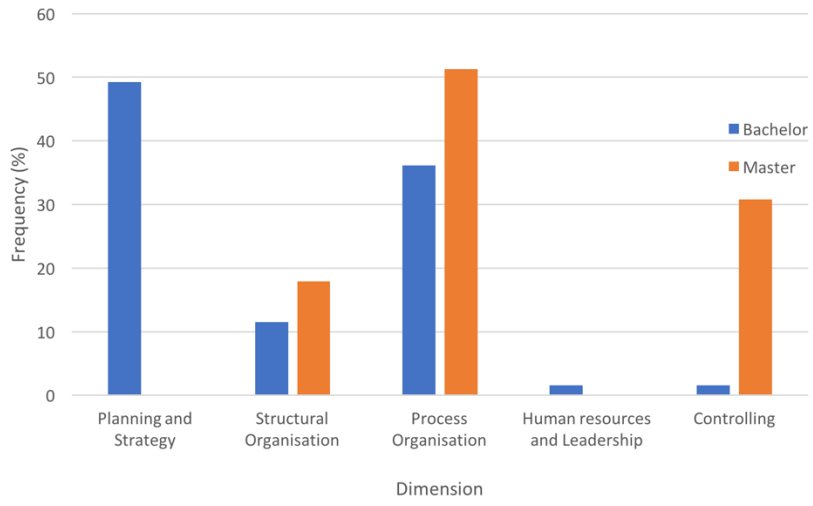


Figure 5.5 P/SM skill analysis at the University of Groningen (bachelor *n* = 1, master *n* = 1*)*

Slight differences in soft skill development

The soft skill development in courses could be done in indirect or explicit way. Soft skill development was not done in abundance, but slight differences could be found. It appeared that bachelor courses paid less attention on teaching soft skills than master courses. Only two skills were taught at bachelor level, namely *team ability* and *communication skills*. At master level, anything but *salesmanship* was taught.

5.1.3 Research question 3: differences and similarities in represented skills in academic literature and university courses

This paragraph answers the third research question: What are the differences and similarities in represented skills between academic literature and Dutch university courses?

Differences found in the skills that were taught

A P/SM skill analysis was done between academic literature and bachelor and master courses. In figure 5.6 is shown that the biggest difference is displayed in the *human resources and leadership* dimension, followed by the *planning and strategy* dimension. Apparently, bachelor and master courses mainly aim at teaching skills that are assigned to the first operation steps of the purchasing lifecycle, where literature focuses on the professionalism of the purchasing professional. Paying attention to the skill level is most important according to academic literature, like *personality* and *communication skills.* Overall, there is 70 percent coherence between the university courses and skills nominated by academic literature. An overview per skill is displayed in figure 5.7.

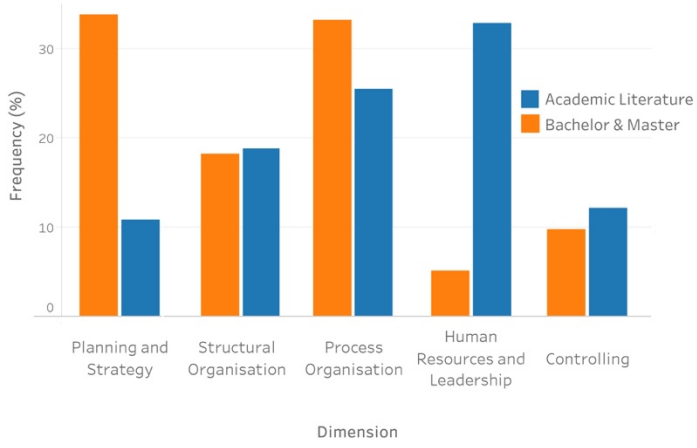


Figure 5.6 P/SM skill analysis between academic literature and bachelor & master courses

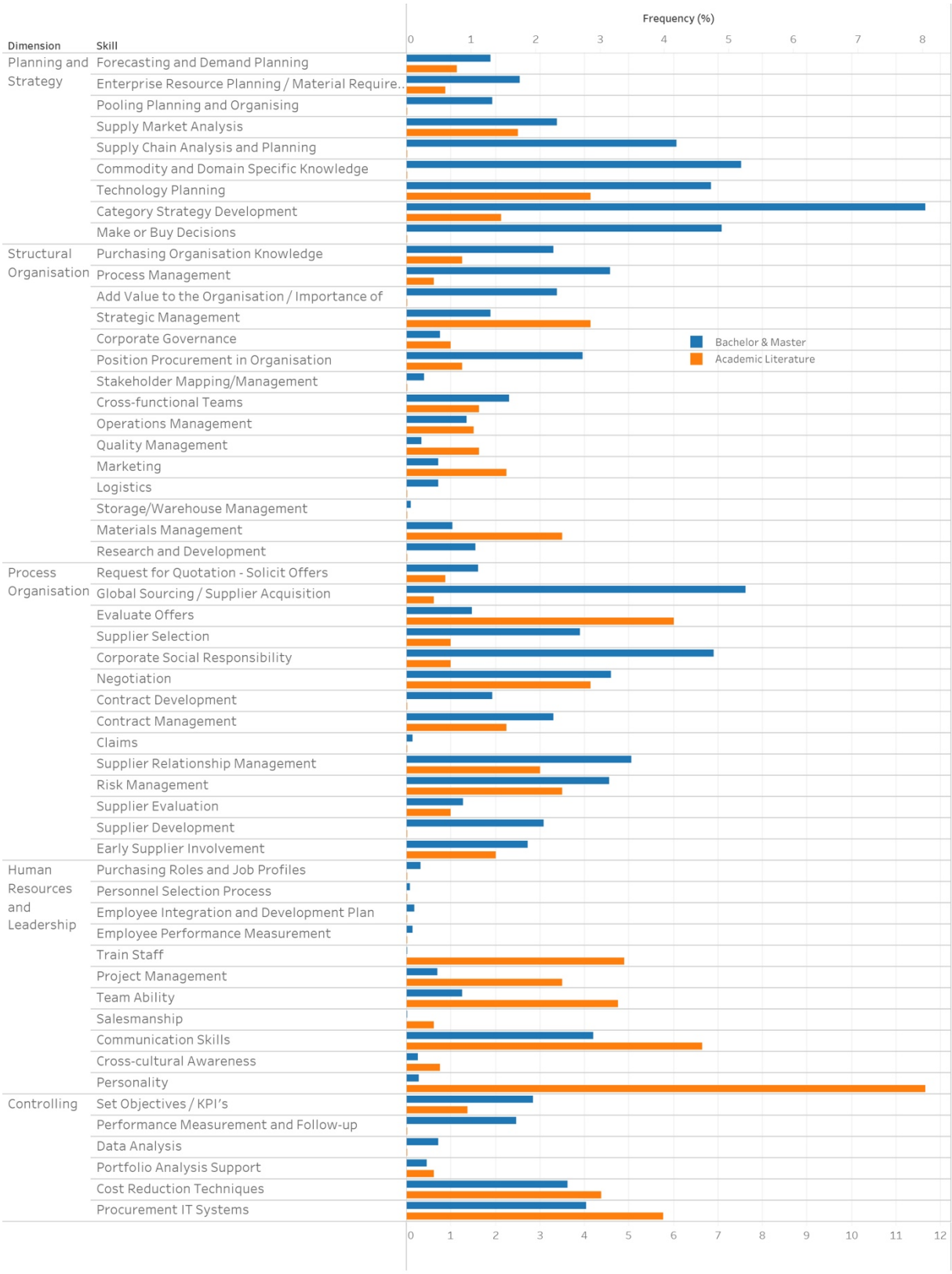


Figure 5.7 P/SM skill analysis between bachelor & master courses and academic literature

Differences and similarities found in soft skill development

Academic literature nominated about a third of its skills to the *human resources and leadership* dimension, mostly on *personality* and *communication skills*. Moreover, *personality* was the skill that was overall the most nominated skill. Comparing this to the universities, least skills were nominated in the *human resources and leadership* dimension. It is striking that according to literature, soft skills are the number one skills necessary for a purchasing professional to perform their job when universities are paying almost no attention on teaching those skills. University courses are mainly focused on teaching skills that are related to the first operational steps of the purchasing lifecycle, while literature identifies those skills as least necessary.

Both universities and academic literatures identifies skills in the *process dimension*, focusing on sourcing plans and strategies, as second most important. However, universities teach more than a third on these skills, while the academic literature identifies a quarter of the skills. Furthermore, skills related to the *structural organisation* and *controlling* are also almost equally identified by universities and academic literature.

5.2 Remaining observations

5.2.1 P/SM skills taught at Dutch universities of applied sciences

There are many universities of applied sciences located in the Netherlands, also called HBO (Hoger Beroeps Onderwijs). According to DUO (2016), there are 34 recognized HBO institutions by the Dutch Ministry of Education, Culture and Sciences, whereof 14 have 10.000 students or more, 12 between 1.000 and 10.000 and 8 smaller than 1000[117]. One minor and one course taught by the Hanzehogeschool was mapped in the P/SM skill model to get a first insight in the HBO education. Together, they cover 45 ECTS and 272 students are participating. The P/SM skill results are generated and displayed in appendix 13.

Differences in learning objectives

Analysis was done on the differences between courses taught at universities and universities of applied sciences. First, differences can be found in the learning goals as set by the courses. Students who follow a course at a HBO mainly focus on gaining knowledge different purchasing processes and concepts. Students were being taught to learn from a business perspective, also in collaboration with other specialisms within purchasing. Students at

[117] See DUO (2016), p. 1

universities learn not only to gain knowledge, but also to apply this on different levels within an organization and learn to improve purchasing from a strategic level.

Explicitly taught skills

Analysis was done on the main dimensions as taught at universities compared with the HBO institution. In figure 5.7 is shown that there is a high level of consistency between these courses at about 90 percent. Where the universities spend most of its time on *planning and strategy* and *process organisation*, the HBO institution spend most of its time first on *process organisation* and second on *planning and strategy.* Remarkable is the differences between the time devoted to *human resources and leadership*. The university courses spend about twice as much time on this dimension.

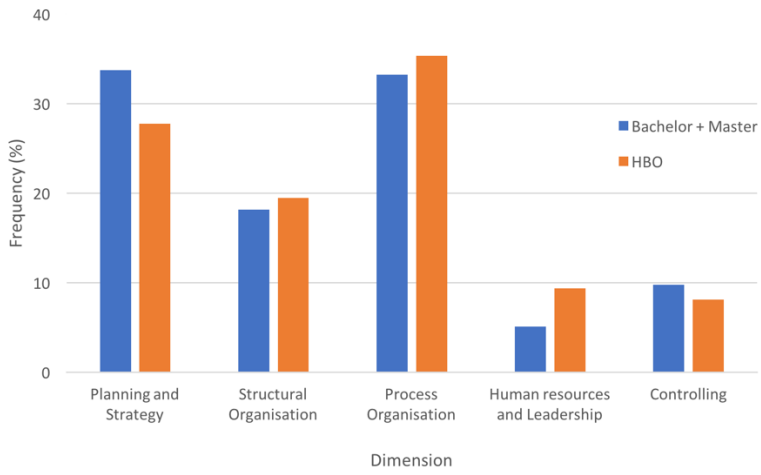


Figure 5.8 P/SM skill comparison between university courses and HBO

Almost no differences in soft skill development

The soft skills that were taught in indirect and explicit way were compared. At the universities, less attention was paid to indirectly teaching soft skills. More than half of the university courses did not teach the skills, whereas the HBO taught in one course all skills and the other four of the skills. Furthermore, the explicitly taught soft skills at the universities covered three percent of the total time, against five at the university of applied sciences.

5.2.2 Comparison between Dutch university education and American higher education

To see how this research relates to others, a comparison was done with the American higher education. Research by Birou et al. (2016) in undergraduate and graduate courses in the USA established the current P/SM education. Teaching approaches, evaluation criteria, course content and topics were obtained to provide guidance for courses content and development in supply chain management programs[118].

A clear difference could be found in the learning objectives in American higher education between undergraduate and graduate courses, where this is hardly the case in the Dutch bachelor and master level courses. It was found that undergraduate courses focused more on techniques and skills while graduate courses focused more on strategies on a higher level[119]. Moreover, the teaching approaches clearly differs between the graduate and undergraduate courses in a way that undergraduate courses use a wide variety of teaching approaches due to the wide range of topics covered in the courses, where graduate courses tend to use an integrative approach and use project to teach skills[120]. Dutch universities courses are using an integrative approach on each level by combining both assignments and exams to assess the students' knowledge.

The American higher education mainly focusses in undergraduate courses on providing basic information associated with P/SM concepts whilst graduate courses focus more on strategy and improvement, possibly due to the different experience between undergraduate and graduate students[121]. The Dutch bachelor courses do not have a clear division between the topics taught at bachelor and master level.

5.2.3 Current Dutch university education provision compared with job advertisements

The current education provision in the Netherlands is insufficient comparing to the employers' demands in job advertisement. The current education provision at universities show a greater focus on that hard(er) skills were more taught than the soft(er) skills. However, traditionally associated P/SM skills focus more on soft skills. Academic purchasing literature nominates soft skills as most important skills, with personality and communication skills as most important.

[118] See Birou et al. (2016), p. 71-85
[119] See Birou et al. (2016), p. 83
[120] See Birou et al. (2016), p. 83
[121] See Birou et al. (2016), 82-82

However, Dutch employers prefer to hire experienced purchaser with explicit skills and a range of soft skills[122]. Firms are looking for *'trustworthy and responsible team players'*, which is found to be the standard within firms[123]. Furthermore, a purchaser should oversee the purchasing involvement with other functions in the neighbouring field like operations, quality management, marketing, and logistics[124], which is in accordance with the academic literature found in this research but lacks in the current education provision.

Only in six percent of the job ads, in the Netherlands and Austria, ask for a master's degree and even in senior functions more employers ask a bachelor or master degree, indicating that undergraduate applicants are invited as well[125]. The fact that employers are satisfied with undergraduate applicants might indicate the lack of a harmonized academic P/SM curriculum needed in Europe. The future pan-European P/SM academic curricula need to be designed in accordance with the soft skills being an important issue in the curricula.

5.3 Applicability of P/SM skill model

The P/SM skill model appeared to be a good model to map purchasing skills, both hard and indirect and explicitly taught soft skills. Skills were categorized in the model based on the dimensions of the maturity model of Schiele (2007) and skills were found via a systematic approach to identify key sources so that the skill set represents the full scope of purchasing skills. There was also the possibility to map skills in the dimension *others*, wherein purchasing related skills that were not included in the model and non-purchasing related skills could be mapped. During the data collection, it appeared that several courses used the *other: non-purchasing related skill* dimension, mainly courses that were not fully focused on purchasing. Furthermore, no courses used the *other: purchasing related skills* dimension showing that the skills in the P/SM skill model indeed represents the full scope of purchasing skills.

5.4 Limitations of the research

The mapping of the skills in the P/SM skill model was done by teachers teaching the specific course, being only one person. Most teachers used no other teaching materials to map the skills. It would be more specific when mapping was done according to materials like a weekly

[122] See Stek (2016), p. 46-48
[123] See Stek (2016), p. 47
[124] See Stek (2016), p. 47
[125] See Stek (2016), p. 48

overview of the course or PowerPoints. However, the method of mapping the courses was done carefully and overall in a similar way.

5.5 Recommendations for further research

Required changes to close the gap: universities, companies and students

The current Dutch university education is not focused on teaching soft skills at all, while academic literature has a strong focus on soft skills. Universities are currently not to be the place where soft skills should be taught, but they should take this responsibility, since this is highly identified by academic literature and in job advertisements of employers. Literature confirms the requirements by employers by identifying soft skills as most important skills. To close the gap between education and the field, changes should be made by universities, companies and students.

Reflect and change: hardly any differences between bachelor and master courses at Dutch universities

This research showed that there are hardly any differences between skills that are taught at bachelor and master level, while given the impact of P/SM it is imperative that the course contents are relevant and rigorous enough to meet industry needs. However, it seems like that the introduction of the Bologna process a while ago did not result in differences between the Dutch bachelor and master courses in purchasing education. It is striking to see that even the learning objectives have no differences in skills being taught, while it would be expected that courses at bachelor level focus more on teaching concept and terms in the field of purchasing. Master course should be more focused on making strategic purchasing decisions on a higher degree.

The current university education implies that there is hardly any difference between a student who followed bachelor courses and a student who followed mater courses. However, a bachelor should educate a purchasing to be ready for first job qualifiers, like the first purchasing role identified by NEVI[126]. Following courses at bachelor level should be more specialized, in being a partner on business level, making decisions on strategic level and ensuring that the goals are met. There should be a clear difference between bachelor and master courses so that a student can be education stepwise to become a purchasing professional.

[126] See Hulsebos (2011), p. 33

Close the gap: differences in soft skills

Almost no soft skills are taught at universities while this is considered as important by academic literature. Universities should take this responsibility by facilitating students with for example, guest lectures, casus, internship and contact with companies. The current focus lies on teaching explicit knowledge (via e.g. books, either traditional or online) instead of tacit knowledge (e.g. via roleplays, teamwork, reflection sessions or mentoring). A change is indispensable to meet the employers' demands.

Investing in future professionals: employers

Not only universities should change, employers should change as well. Employers can help developing future professionals by getting more involved in their education via guest lectures, workshops, internships or close contact with the universities. Professional purchasers can transmit their experiences and thereby helping student gaining more soft skills. Furthermore, by having close contacts with universities, they can develop long-term relationships with the universities but also with the students who might become their future employee.

Take responsibility: students

Not only universities and employers should adapt, also students need to take responsibility. When the student is known with the fact that soft skills are required by employers and seen as most important by academic literature, they can work on developing their own soft skills. Currently, the higher education is not the place where they can achieve new soft skills or develop them so they must start looking for extracurricular activities like becoming a board member of a study association or attend committees at sport-, culture-, student-, or study associations. Students can also initiate their own internships by contacting companies.

Develop: pan-European P/SM curriculum

Project PERFECT should develop a standardised pan-European P/SM education with a strong focus on soft skills besides explicit knowledge. The future curriculum is ideally developed in a pan-European way which allows students to move between countries via the ERASMUS program and even integrating in (international) internships. That way, students can be educated with soft skills, like *languages, communication skills* and *cross-cultural awareness.* However, an appropriate balance should be considered between ways of teaching the explicit and tacit knowledge.

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Appendix 1 – Project sheet

Project Sheet

PERFECT

Purchasing Education & Research for European Competence Transfer

CHALLENGE IN PURCHASING & SUPPLY MANAGEMENT (PSM)

More than half of the total turnover of a modern industrial firm in Europe is directly transferred to suppliers. The Purchasing & Supply Management (PSM) function of a firm manages these suppliers. Moreover, the bulk of supplies now is no longer of domestic origin, but European and international. As this network economy with a low depth of production and high reliance on international suppliers is a recent phenomenon that has emerged in the last two decades, firms are still struggling to find effective and efficient ways to cope with it. At the same time, professionalism of Human Resources Management in PSM as well as purchasing staff competences have been put forward as important performance drivers.

NEED FOR STANDARDIZED PSM CURRICULUM

Despite this importance, unlike other disciplines such as marketing or finance, PSM does not have any standardized higher education curriculum. This issue is seen at national, European and regional/international (e.g. North America) levels.
This makes it necessary for companies to hire university graduates with other specializations and often spend years bringing them up to a skill level that graduates in other disciplines already possess. For students, a significant challenge lies in finding appropriate university courses and matching them to their course portfolio during international exchanges. For the higher education institutions involved, the varying course contents and depth in exchange programs hinder a stringent teaching of basic modules first, and then building on them further for PSM.

To seize this opportunity, the overall objective of project PERFECT (Purchasing Education and Research for European Competence Transfer) is to develop an empirically validated European best practice curriculum for both a bachelor's and a master's program in Purchasing and Supply Management (PSM) and in the next step to establish an international studying program at participating universities for higher education in PSM.

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The creation of these resources has been (partially) funded by the ERASMUS+ grant program of the European Union under grant no. 2015-1-DE01-KA203-002174.
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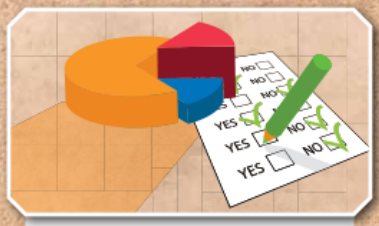
PERFECT

Purchasing Education & Research for European Competence Transfer

THE PERFECT PROJECT INCLUDES THE FOLLOWING MILESTONES:

Firstly, based on a conceptual skill model the project will conduct a benchmarking study analysing best practice examples from universities, corporations and associations' educational programs.



Secondly, the insights gained will be validated by a survey with European firms in order to identify those skills and competencies distinguishing successful companies and effective and efficient PSM.

Thirdly, based on this first ever comprehensive competence assessment, project PERFECT is going to design a European purchasing curriculum.

Finally, in order to promote fast and broad dissemination, PERFECT is going to develop a self-assessment tool for PSM skill evaluation and prepare a Massive Open Online Course (MOOC) for basic PSM skills, which can be used by students and organisations to gauge the levels of their PSM skills.

THE BENEFIT

The Benefit of a pan-European curriculum for PSM education that is based on a combination of identified best practices and industry requirements will ensure that indivdual students are provided with the necessary knowledge and learning to join a purchasing department of any size of organisation in any industrial setting ready to engage in different aspects of purchasing. It provides opportunities for students to gain experience in other European countries e.g. through student exchange programs which will help them to further develop their professional as well as their personal skills.

For the participating academic organisations, this provides an opportunity to strengthen their pan-European ties and ensure that their purchasing curricula reflect the requirements of an increasingly pan-European industry. Pan-European organisations often adopt collaborative buying activities and an understanding of the European dimension of these activities will ensure that their staff is prepared. SMEs, which may not have a pan-European presence, but will nonetheless buy from suppliers in many different countries and will therefore also benefit from this knowledge.
Additional target groups include purchasing related associations. Reaching them is facilitated by the participants' memberships in various relevant associations such as IPSERA (International Purchasing and Supply Education and Research Association) and IFPSM (International Federation of Purchasing and Supply Management).

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Appendix 2 – List of academic journal papers on P/SM skills

1. Anderson, M. G., & Katz, P. B. (1998). Strategic sourcing. *The International Journal of Logistics Management*, *9* (1), 1-13.
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Appendix 3 – P/SM skills from academic literature

Table A3.1 P/SM skills analysis from academic literature

Literature	Cavinato	Keough	Kolchin and Giunipero	Baily et al.	Down and Liedtka	Killen and Kamauff	Murphy	Carter and Narasimhan	Cruz and Murphy	Pagell et al.	Anderson and Katz	McKeefry	Giunipero	Carr and Smeltzer	Giunipero and Pearcy	Faes et al.	Muller	Burt and Dobler	Cousins and Spekman	Trent and Monczka	Giunipero and Handfield	Giunipero et al.	Mulder et al.	Giunipero et al.	Tassabehji et al.	Eltantawy et al.	Kern et al.	Knight et al.	Zawawi et al.	Total
	1987	1993	1993	1994	1994	1995	1995	1996	1996	1996	1998	1998	1999	2000	2000	2001	2001	2003	2003	2003	2004	2005	2005	2006	2008	2009	2011	2014	2014	
Negotiation		x	x	x		x	x		x				x		x				x		x	x	x		x	x		x	x	16
Problem-solving			x	x	x					x	x		x	x	x		x				x	x			x	x		x		14
Leadership			x	x	x	x				x			x		x	x					x	x		x		x		x		13
Analytical			x		x							x	x		x		x				x	x				x				9
Influencing		x	x										x		x						x	x		x	x			x		9
Strategic thinking								x	x				x		x			x			x	x				x		x		9
Technical	x						x					x	x		x		x				x	x				x				9
Blueprint reading													x	x	x						x	x			x			x	x	8
Supply chain management						x		x	x		x						x	x							x	x				8
Conflict resolution			x							x			x		x						x	x						x		7
Cost analysis		x		x						x	x			x											x			x		7
Decision-making				x								x									x		x	x	x	x		x		7
Product knowledge	x			x		x				x		x													x			x		7
Project management							x				x			x							x				x	x		x		7
Ability to work on a team													x	x	x						x	x						x		6
Computer literacy			x							x			x		x							x						x		6
Computers	x				x			x									x	x								x				6
Creativity			x										x		x	x					x	x								6
Customer focus			x										x		x							x				x		x		6
Interpersonal communication			x										x		x				x		x	x								6
Managing internal customers													x		x						x	x			x			x		6
Supplier evaluation							x				x						x								x	x		x		6
Time management			x										x		x						x	x			x					6
Ability to make decisions			x										x		x						x	x								5
Communication					x	x		x									x									x				5
Forecasting				x										x									x		x			x		5
Listening				x		x															x		x		x					5
Managing change			x										x		x						x	x								5
Organization													x		x							x			x	x				5
Persuasion			x							x			x								x							x		5
Specification development													x		x						x	x						x		5
Strategic supplier selection					x		x										x	x								x				5
Tactfulness in dealing with others			x										x		x						x	x								5
Understanding business conditions													x		x						x	x						x		5
Analytical skills		x								x				x														x		4
Materials mgt. inv.JIT	x							x				x														x				4
Research				x			x																		x	x				4
Risk management												x													x	x		x		4
Structuring supplier relationships													x		x						x	x								4
Supplier cost targeting													x		x							x						x		4
Supplier relations	x							x									x									x				4
Supply base research													x		x							x						x		4
Written communication													x		x						x	x								4
Change Management																									x	x		x		3
Computational															x						x	x								3
Computer skills							x					x		x																3
Conflict management						x																			x	x				3
Creative thinking				x																					x	x				3
Inquisitiveness													x		x							x								3
International buying								x																	x	x				3
Interpersonal					x			x																		x				3
Mathematical skills														x											x			x		3
Planning			x	x																	x									3
Professional presence/bus perspective					x							x														x				3
Quality	x							x				x																		3
Quality management														x												x		x		3
Salesmanship															x						x	x								3
Team building facilitation								x										x								x				3
Technology planning													x		x							x								3
Analytical skills Investigation																		x							x					2
Communication skills														x														x		2
Coordinating skills														x														x		2
Educational background					x			x																						2
Financial management																					x		x							2
Global sourcing development										x															x					2
Integral thinking						x																	x							2
Integrity						x										x														2
Knowledge/supply management Items	x																	x												2
Negotiating										x	x																			2
Organizational skills — paperwork			x											x																2
Presentation skills														x							x									2
Production systems	x																									x				2

Literature	Cavinato	Keough	Kolchin and Giunipero	Baily et al.	Down and Liedtka	Killen and Kamauff	Murphy	Carter and Narasimhan	Cruz and Murphy	Pagell et al.	Anderson and Katz	McKeefry	Giunipero	Carr and Smeltzer	Giunipero and Pearcy	Faes et al.	Muller	Burt and Dobler	Cousins and Spekman	Trent and Monczka	Giunipero and Handfield	Giunipero et al.	Mulder et al.	Giunipero et al.	Tassabehji et al.	Eltantawy et al.	Kern et al.	Knight et al.	Zawawi et al.	
	1987	1993	1993	1994	1994	1995	1995	1996	1996	1996	1998	1998	1999	2000	2000	2001	2001	2003	2003	2003	2004	2005	2005	2006	2008	2009	2011	2014	2014	Total
Risk taking										x											x									2
Risk taking/entrepreneurial													x		x															2
Sales interface																									x	x				2
Supplier relationship management																									x			x		2
Team-based working						x													x											2
Technical writing																									x			x		2
Total cost analysis	x																									x				2
A total systems cost mindset		x																												1
Ability to be flexible														x																1
Ability to develop global contracts																				x										1
Ability to follow up														x																1
Ability to handle multiple tasks simultaneously														x																1
Ability to listen																x														1
Ability to negotiate																				x										1
Ability to think holistically beyond a site or region																				x										1
Accounting skills																					x									1
Adaptability																x														1
Advising (The purchaser is able to effectively communicate relevant advice on purchasing.)																							x							1
An understanding of strategy development																				x										1
Analysis and strategic sourcing																									x					1
Analytical abilities																							x							1
Assessing ethical situations																					x									1
Be able to get to the root cause of a situation														x																1
Be patient														x																1
Be proactive														x																1
Being organized																					x									1
Belief in product and company																x														1
Broad business perspective											x																			1
Broad-based business skills																					x									1
Business analysis skills																													x	1
Business case analysis											x																			1
Business management knowldege							x																							1
Business skills																									x					1
Buyer–supplier relationship management																											x			1
Calculation				x																										1
Category management																									x					1
Challenging materials specifications		x																												1
Close linkage with marketing and sales functions											x																			1
Collecting information about purchases in a common format		x																												1
Commercial awareness																			x											1
Commercial education																x														1
Common sense																					x									1
Communicate and sell message/strategy internally																									x					1
Communicates well						x																								1
Company business knowledge				x																										1
Competitive bidding		x																												1
Compromises						x																								1
Compromising																								x						1
Computer compatible				x																										1
Computer literacy in using popular application software packages																					x									1
Computing skills																									x					1
Computional													x																	1
Conceptual thinking				x																										1
Contract Design skills																													x	1
Contract management																					x									1
Contract management skills																													x	1
Contract writing																					x									1
Contracting											x																			1
Cost accounting and making the business case																								x						1
Cost analytic skills																				x										1
Cost driver																									x					1
Cost driver analysis																									x					1
Creative contract writing											x																			1
Cross-cultural awareness																									x					1
Cross-functional integration																											x			1
Cross-functional teams																					x									1
Cross-functional teamwork		x																												1
Cultural awareness																									x					1

Literature	Cavinato	Keough	Kolchin and Giunipero	Baily et al.	Down and Liedtka	Killen and Kamauff	Murphy	Carter and Narasimhan	Cruz and Murphy	Pagell et al.	Anderson and Katz	McKeefry	Giunipero	Carr and Smeltzer	Giunipero and Pearcy	Faes et al.	Muller	Burt and Dobler	Cousins and Spekman	Trent and Monczka	Giunipero and Handfield	Giunipero et al.	Mulder et al.	Giunipero et al.	Tassabehji et al.	Eltantawy et al.	Kern et al.	Knight et al.	Zawawi et al.	
	1987	1993	1993	1994	1994	1995	1995	1996	1996	1996	1998	1998	1999	2000	2000	2001	2001	2003	2003	2003	2004	2005	2005	2006	2008	2009	2011	2014	2014	Total
Customer focus (on final customers)																					x									1
Customer orientation (The purchaser is able to determine the needs of the internal customer and is able to cater to or to anticipate on these needs.)																							x							1
Data analysis				x																										1
Decisonmaker						x																								1
Delegationg				x																										1
Demand forecasting skills																													x	1
Demonstrate ability to add value throughout the organisation																									x					1
Design liaison				x																										1
Design/Technical Skills																													x	1
Detail-oriented														x																1
Disassembling the components		x																												1
Drafting skills (CAD)														x																1
Economic literacy																					x									1
Effective communication																				x										1
Effectively managing change										x																				1
Effectively managing internal and external relationships										x																				1
Ego-drive																x														1
Eloquence																x														1
Empathy																x														1
End market business knowlege				x																										1
Entrepreneurial behavior																					x									1
Environmental awareness																x														1
Environmental/sustainability skills																													x	1
E-procurement																									x					1
Ethics																					x									1
E-tools																											x			1
Evaluating				x																										1
Execution																								x						1
Extraversion																x														1
Facilitation and team building											x																			1
Finance												x																		1
Financial analysis				x																										1
Financial engineering skills																													x	1
Functional credibility		x																												1
General business skills		x																												1
Generalising (The purchaser is able to draw a conclusion at a general level from some specific actions or decisions.)																							x							1
Goal-setting																								x						1
Good appearance																x														1
Good report and letter writer						x																								1
Government regulations										x																				1
Group dynamics										x																				1
Honesty																x														1
Human capital skills																													x	1
Human relationship				x																										1
Identifying and solving problems						x																								1
Incentive system																											x			1
Influence										x																				1
Information management																							x							1
Initiator																x														1
Innovation management																					x									1
Inquisitive nature																					x									1
Interest in different cultures																x														1
Internal motivation																									x					1
Internatinal cultural awareness										x																				1
Interviewing				x																										1
Investigative nature			x																											1
Is able to analyze various strategic options and their direct potential and indirect impact on the organization						x																								1
Is knowlegeable about the organization´s business						x																								1
Knowledge management																											x			1
Knowledge/supply management Items																										x				1
Legal-solving abilities																							x							1
Legislation																									x					1
Life-cycle costing skills																													x	1
Likes to research						x																								1
Logical thinking				x																										1

Literature	Cavinato	Keough	Kolchin and Giunipero	Baily et al.	Down and Liedtka	Killen and Kamauff	Murphy	Carter and Narasimhan	Cruz and Murphy	Pagell et al.	Anderson and Katz	McKeefry	Giunipero	Carr and Smeltzer	Giunipero and Pearcy	Faes et al.	Muller	Burt and Dobler	Cousins and Spekman	Trent and Monczka	Giunipero and Handfield	Giunipero et al.	Mulder et al.	Giunipero et al.	Tassabehji et al.	Eltantawy et al.	Kern et al.	Knight et al.	Zawawi et al.	
	1987	1993	1993	1994	1994	1995	1995	1996	1996	1996	1998	1998	1999	2000	2000	2001	2001	2003	2003	2003	2004	2005	2005	2006	2008	2009	2011	2014	2014	Total
Stakeholder management skills																													x	1
Stakeholder mapping proficiency																									x					1
Strategic management				x																										1
Strategic supplier management																											x			1
Stress management														x										x						1
Supplier negotiation management																											x			1
Supplier performance management																											x			1
Supplier selection				x																										1
Supply base strategy																											x			1
Supply market business knowledge				x																										1
Supply risk management																											**x**			1
Tactical supplier management																											x			1
Takes appropriate risks						x																								1
Takes initiative						x																								1
Talent management																											x			1
Target management																											x			1
Target setting system																											x			1
Team working				x																										1
Team-building																									x					1
Technical business writing														**x**																1
Technical education																x														1
Technical expertise																**x**														1
technical knowledge				**x**																										1
Technical product or service knowledge											**x**																			1
Thinking in the abstract						x																								1
Time management — prioritize														x																1
Tool capacity																									x					1
Total Quality Management																									**x**					1
Total quality managemnt										**x**																				1
Understand continuous inventory review system														x																1
Understand manufacturing processes, terminology														x																1
Understand other departments														x																1
Understanding																									**x**					1
Understanding general business			**x**																											1
Understanding manuf. process																												**x**		1
Understanding manuf. terminology																												**x**		1
Understanding materials (e.g., plastics)														x																1
Understanding tool capability, tool life														x																1
User liaison				x																										1
Using the Internet																					**x**									1
Web-enabled research and sourcing analysis																								x						1
Work in cross-functional team																									x					1
Work planning				**x**																										1
Working effectively with other cultures																				x										1
Working with internal customers/other functions														x																1
Works well with department members, other departments and suppliers						x																								1
Writing																								x						1
Written and oral communication										x																				1

Appendix 4 – Maturity model dimensions and classified skills

The tables below show the skills retrieved from academic purchasing literature and their assignment with one of the six dimensions of the P/SM Skill model.

Table A4.1 Planning and strategy dimension and its assigned skills

Planning and strategy		
Strategic thinking (14)	Contract management (12)	Best practice knowledge
Ability to implement business strategies	Set objectives	Strategic sourcing (4)
Technology planning (4)	Commodity specific knowledge (3)	Contract law (4)
Supplier relationship management (16)	Strategy development (7)	Strategic agility (2)
Manage strategic partnerships (2)	Market analysis (7)	Supplier development (4)
Customer focus (12)	Business case development (4)	Supply base research (2)
Business/management knowledge (8)	Corporate social responsibility (3)	Contract development (3)
CAD skills (4)	Implement policies (2)	Risk management (19)
ERP/MRP/APS (7)	Customer relationship management (6)	Holistic thinking (5)
Market trends (4)	Demand management (2)	Target-oriented (3)
Product knowledge (11)	Market knowledge (5)	(Open) innovation (6)
Stakeholder mapping/management (5)	Strategic industry management	Crowdsourcing (4)
Ethical issues (8)	Results focused (2)	Global connectivity (3)
Sustainability (8)	Category strategy	EU procurement regulations (3)
Diversity (5)	Global citizenship	Supplier-enabled innovation
Corporate governance	Health	Long-term financial planning
Social justice principles (2)	Safety	Scarce resources
Business management (3)	Market intelligence (2)	Global competition
Materials management (6)	Compliance (2)	Dynamic, volatile markets
Planning and organising (4)	SC design	Knowledge/supply management Items (3)
Scheduling techniques	SC analysis	Manage external advisors
Product design	Trend-setter	Preparation (2)
Collaborative partnerships (8)	Growth driver	Commercial awareness
Specification development (7)	Scenario analysis (2)	Sector knowledge
Growing regions (2)	SWOT analysis	Category management
Outside-in view	Monitor political developments	P/SM tools (e.g. RFx) (3)
Innovation management		

Table A4.2 Structural organisation dimension and its assigned skills

Structural organisation		
Add value to the organisation (3)	Technology application (5)	Handling complexity (4)
Structure supplier relationships (5)	Procurement systems	Foreign currency (3)
Change management (19)	Position procurement in organisation	Product development
Multi-divisional, cross-functional (6)	Technology know-how (8)	Early supplier involvement (2)
Managing internal customers (7)	Organisational agility (2)	Interdisciplinary qualifications
Internal negotiation	Manage internal relationships (5)	Suppliers linked to it
Understand manufacturing systems and processes (7)	Make or buy decisions	Alliances (3)
Legal, regulatory aspects (6)	Outsourcing (3)	Insolvency law
Category management (5)	Centralised procurement	Differentiate strategic and operational
Interdisciplinary understanding (4)	Management information systems	Guidelines
Operations management (2)	Mobile technologies	Buy integrated solutions
Enterprise economics (2)	Combination procurement + R&D	Industry 4.0 implementation
Plant maintenance	Sales interface (2)	Assistance systems
Intellectual property rights (2)	Augmented/virtual reality (2)	Cloud based computing
Incoterms (3)		

Table A4.3 Process organisation dimension and its assigned skills

Process organisation		
Supply base research (2)	Research (8)	Solicit offers (3)
Supplier negotiation (5)	Investigation (2)	Evaluate offers (3)
Supplier acquisition (3)	Continuous process improvement (3)	Evaluate internal processes
SCM (13)	Six sigma	Logistics (3)
Global sourcing (3)	Lean management	Capacity planning
International buying (5)	Tender evaluation (3)	Interface to logistics service providers (2)
It enabled sourcing	Supplier management (8)	Obsolescence management (2)
Passing on/share information (4)	Supplier development (4)	Price negotiation
Blueprint reading (11)	Negotiation preparation	Contract administration (3)
E-procurement (6)	Conduct negotiation (2)	Manage performance (2)
Inventory management (9)	International finance	Accounting (2)

TQM (2)	Quality management (13)	Claims
Supplier evaluation (8)	Distribution (4)	Disposal (2)
Procurement technology systems	Transportation (4)	Incoming goods
Marketing (2)	Storage/warehouse management (4)	Project plan
3D printing (2)	Process management (5)	Business administration
Handle digital information (2)	Efficiency	Import/export
E-auctions, e-tenders	Variable processes	Reverse logistics
Digitalisation (5)	Early procurement involvement in development (22)	Supplier selection (8)
E-business	Standardise processes	Contract writing (2)
Process thinking	Internal communication	Bidding
Reduction of maverick buying	Technical knowledge (13)	Understand business conditions (4)
Automation (4)	Modelling	Internal and external interfaces

Table A4.4 Human resources and leadership dimension and its assigned skills

Human resources and leadership		
Leadership (20)	Train staff (3)	Inter-disciplinary qualifications
Time management (11)	Association contacts	Honesty (2)
Project management (17)	Certifications	Technology capability
Conflict management (15)	Prioritise work (2)	Negotiation skills (28)
Problem solving (22)	Business conduct standards (3)	Professionalism (7)
Goals setting (2)	Delegate (2)	Adaptability (2)
Teamwork (15)	Initiation (6)	Networking (5)
Salesmanship (5)	Moderation (2)	Coaching
Cross-cultural awareness (6)	Influencing (2)	Expert knowledge
Computer and internet literacy (8)	Self-development	Visualisation
Interpersonal communication skills (16)	Team building (8)	Thinking in alternatives
Risk taking (9)	Trust (2)	Discipline
Entrepreneurship (3)	Oral communication (5)	Share knowledge
Creativity (13)	Dynamic	Openness
Curiosity (7)	Coordination (2)	Critical thinking
Written communication (11)	Intrapreneurship	Talents shortage
Listening (7)	Language skills (esp. English) (3)	Selection
Presentation skills (6)	Resilience	Well educated (2)
Stress management (5)	Assertiveness	Credibility

Persuasive (4)	Motivation (oneself and others) (9)	Conceptual thinking
Multi-tasking (2)	Commitment	Logical thinking
Patience (4)	Thoroughness	Abstract thinking
Flexibility (5)	Intercultural competences (3)	Commercial education
Proactive (5)	Reliable	Generalising
Detail-oriented (4)	Open-minded (3)	Tactful (5)
Integrity (5)	Relationship building	Knowledge management
Continuous learning (5)	HR management (4)	Self-confidence (3)
Effective communication (10)	Self-discipline	Technical education
Reading	Empathy	Technical writing (2)
Decision making (18)	Quick response capability	Incentives
Develop oneself and others (5)	Talent management	Organisational skills (10)
Responsibility (5)	Skills management (3)	Persuasive (8)
Support staff (2)	Performance tracking	Good appearance
Extraversion	Common sense	Give advice
Interview	Compromise	

Table A4.5 Controlling dimension and its assigned skills

Controlling		
Follow-up (2)	Life cycle costing (3)	Risk analysis (2)
Target costing (3)	Audit	Budgeting
Cost analysis (17)	KPIs (4)	Supply base analysis (5)
Cost reduction techniques (2)	Measure performance (4)	Procurement controlling (2)
Understand computational techniques (5)	Reporting (3)	Cost controlling
Finance knowledge (11)	Data management	Cost transparency
Forecasting (9)	Data control	Early warning systems (2)
Analytical skills (24)	TCO (6)	Regression analysis
Mathematical skills (5)	Evaluate contractor	Predictive modelling
Statistics (2)	Handle big data, smart data (4)	Spend analysis
Data analysis (3)	Price analysis (2)	Calculation
Benchmarking (4)	Portfolio analysis	Cost driver analysis
Information control	Critical path analysis	Financial health suppliers
Quality control		

Table A4.6 Other dimension and its assigned skills

Other		
Email system Lotus Notes	Job experience	Popular software packages
MS-office	Driving licence	Computer skills (9)
SAP	Mobility	Computing skills (2)
MS Navision (ERP)	Social networks	E-tools
PSI (solution production management, logistics)		

Appendix 5 - P/SM skill model

P/SM Skill Cluster Model

Course Name: *Number Students Participating:*

Institution: *Education Level:*

Amount EC's: 1

	Management Function	Description	Percentages	EC observed
Total			**0.0**	**0.00**
PL	**Planning and Strategy**		**0.0**	**0.00**
PL1	Demand Planning		**0.0**	**0.00**
	Forecasting and Demand Planning	Planning of annual demands based on the sales forecast and experience as input for annual negotiations.		
	Spend Cube Analysis			
	Obsolescence Management			
	Demand Management			
	Enterprise Resource Planning/Material Requirements Planning/Advanced Planning and Scheduling	IT skills necessary to extract planning data from employed ERP system.		
PL2	Pooling Planning		**0.0**	**0.00**
	Pooling Planning and Organising	One of the most powerful tools of purchasing is to bundle the entire demands of the firm/group of companies. Pooling requires careful planning, demand identification and the application of organisational solutions (lead buyer concept, centralisation, purchasing councils).		
	Supply Chain Analysis			
	Supply Chain Design			
PL3	Market Analysis and Planning		**0.0**	**0.00**
	Supply Market Analysis	Analysis of the supply market i.e. the suppliers of a particular good and their properties/relationships to each other. Analysis of competitive pressure and market power.		
	Commodity Analysis			
	Supply Base Research			
	Market Trends			

	Market Analysis			
	Market Knowledge			
	Market Intelligence			
	Research			
	Investigation			
	Supply Chain Analysis and Planning	Analysis and planning not only of the immediate supply market, but consideration of the entire supply chain.		
	Commodity and Domain Specific Knowledge	Knowledge on a special purchasing domain, e.g. automotive industry, construction, purchasing of health etc.		
PL4	Innovation Analysis and Planning		**0.0**	**0.00**
	Technology Planning	Contribution to innovation is one of the novel tasks purchasing has to fulfil. This requires knowledge on the technological requirements of its own company, as well as systematic scans of the solutions available on the supply market.		
	Product Knowledge			
	Product Design			
	Collaborative Partnerships			
	Open Innovation			
	Technology Know-how			
PL5	Sourcing Strategy Planning		**0.0**	**0.00**
	Category Strategy Development	Development of the sourcing strategy for a particular category or family of purchasing goods, including strategic analysis and category classification (e.g. Kraljic).		
	Strategy			
	Structure Supplier Relationships			
	Ability to Implement Business Strategies			
	Business Case Development			
	Strategic Agility			
	Strategic Industry Management			
	Category Strategy			
	Strategic Sourcing			
	Make or Buy Decisions	Choosing between manufacturing a product in-house or purchasing it from an external supplier.		
	Mob			
	Outsourcing			

SO	**Structural Organisation**		**0.0**	**0.00**
SO1	Organisational Structure and Mandates		**0.0**	**0.00**
	Purchasing Organisation Knowledge	Knowledge on purchasing in an organisation, e.g. systems, organisational agility and best practice knowledge.		
	Procurement Systems			
	Organisational Agility			
	Centralised Procurement			
	Best Practice Knowledge			
	Process Management	The design of processes and the updating as well as reading and understanding processes.		
SO2	Strategic Integration with Board		**0.0**	**0.00**
	Add Value to the Organisation/Importance of	Knowledge on the added value of purchasing to the organisation/importance of purchasing to the organisation.		
	Strategic Management	Strategic integration refers to the preparation of purchasers to work as a board member. Sourcing strategy development is covered is covered above in planning.		
	Change Management			
	Business Knowledge			
	Enterprise Economics			
	Strategic Thinking			
	Corporate Governance	Knowledge on how organisations are governed, including board, role of advisory board, stakeholders etc.		
	Business Management			
	Position Procurement in Organisation	How to ensure that purchasing plays an adequate role in the organisation.		
	International Finance			
	Business Administration			
	Implement Policies			
	Holistic Thinking			
	Target-oriented			
	Stakeholder Mapping/Management			
SO3	Purchasing Involvement with other Functions		**0.0**	**0.00**
	Passing on/Share Information			
	Cross-functional Teams	Explicit training in how to function and run cross-functional teams.		
	Managing Internal Customers			

	Internal Negotiation			
	Interdisciplinary Understanding			
	Operations Management	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
	Plant Maintenance			
	Manage Internal Relationships			
	Understand Manufacturing Systems and Processes			
	Lean Management			
	Quality Management	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
	Total Quality Management			
	Marketing	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
	Distribution			
	Customer Focus			
	Customer Relationship Management			
	Logistics	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
	Capacity Planning			
	Interface to Logistic Service Providers			
	Reverse Logistics			
	Transportation			
	Storage/Warehouse Management	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
	Incoming Goods			
	Materials Management	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
	Scheduling Techniques			
	Inventory Management			
	Supply Chain Management			

	Research and Development	In order to collaborate with other functions, purchasers profit from a) knowing basics about the other function and b) knows about how to specifically design the interface.		
PO	**Process Organisation**		**0.0**	**0.00**
PO1	Supplier Selection		**0.0**	**0.00**
	Request for Quotation - Solicit Offers	Suppliers are invited to submit a bid which meets the requirements as laid down in the request for quotation against the lowest possible price.		
	Specification Development			
	Project Plan			
	Global Sourcing/Supplier Acquisition	Sourcing materials, processes, designs, technologies and suppliers from global market across worldwide countries/acquiring new suppliers.		
	Supplier Acquisition			
	Foreign Currency			
	Import/Export			
	INCOTERMS			
	International Buying			
	EU Procurement Legislation			
	EU Procurement Regulations			
	Global Connectivity			
	Evaluate Offers	The suppliers available should be evaluated. Aspects needs to be taken into account: diversity, ethical issues, and cost/price.		
	Diversity			
	Ethical Issues			
	Cost/Price Analysis			
	Decision Making			
	Supplier Selection	Evaluating the offers and selecting a supplier (or more) with whom the delivery of the product will be negotiated, including the tendering process.		
	Tender Evaluation			
	Corporate Social Responsibility	A business model that requires active compliance with the spirit of the law, ethical standards and national or international norms.		
	Social Justice Principles			

	Sustainability			
PO2	Negotiation		**0.0**	**0.00**
	Negotiation	A contract has to be drawn up. The specific commercial and legal terms vary per contract. A satisfactory settlement should be reached.		
	Negotiation Preparation			
	Negotiation Skills			
	Price Negotiation			
	Conduct Negotiation			
	Supplier Negotiation			
PO3	Contract Development and Management		**0.0**	**0.00**
	Contract Development	Designing of contracts, application of standard vs. customised contracts.		
	Contract Law			
	Legal Issues			
	Contract Management	Once the contract has been signed, it must be monitored and enforced.		
	Contract Administration			
	Disposal			
	Legal, Regulatory Aspects			
	Claims	A novel form for suppliers to increase their margin is claims management, according to which the product is sold below its price and the margin comes from subsequent extra charges. Purchasers react by limiting the contractual potential for claims management.		
	Compliance			
	Supplier Relationship Management	Here the focus is on the ongoing management of the suppliers after contracting. Sometimes SRM is also defined as strategically planning for, and managing, all interactions with suppliers. Most of the planning is covered before, though.		
	Manage Strategic Partnerships			
	Supplier Management			
PO4	Supplier Risk Management		**0.0**	**0.00**
	Risk Management	Reducing risk in relation to its supply markets.		
	Financial Health Suppliers			
	Risk Analysis			

	Risk Management			
PO5	Supplier Evaluation		**0.0**	**0.00**
	Supplier Evaluation	Process of measuring and monitoring the performance of current suppliers.		
	Evaluate Contractor			
PO6	Supplier Development		**0.0**	**0.00**
	Continuous Process Improvement			
	Six Sigma			
	Supplier Development	Collaboration with suppliers to improve their processes and product capabilities.		
PO7	Early Supplier Involvement		**0.0**	**0.00**
	Blueprint Reading			
	Early Supplier Involvement	The supplier is involved in the product development process from a very early stage.		
	Technical Knowledge of Purchaser			
	Computer Aided Design Skills			
	Product Development			
	Technology Application			
	Intellectual Property Rights			
HR	**Human Resources and Leadership**		**0.0**	**0.00**
HR1	Job Descriptions and Competences		0.0	**0.00**
	Purchasing Roles and Job Profiles	The different roles of a purchaser and its profiles.		
HR2	Personnel Selection and Integration		**0.0**	**0.00**
	Personnel Selection Process	Knowledge about the Human Resource process of selecting new personnel.		
	Employee Integration and Development Plan	Knowledge about the Human Resource process of employee integration and its development plan.		
HR3	Performance Appraisal and Career Development		**0.0**	**0.00**
	Employee Performance Measurement	Knowledge on employee performance measurement: monitoring and evaluating employees.		
	Train Staff	Knowledge how to improve the knowledge and skills of employees.		
	Develop Oneself and Others			
	Coaching			
	Leadership			

	Continuous Learning			
HR4	Soft Skills Development (Explicit Training)		**0.0**	**0.00**
	Project Management	The discipline of initiating, planning, executing, controlling, and closing the work of a team to meet specific goals.		
	Goals Setting			
	Time Management			
	Team Ability	The ability to work in a group of persons acting together as a team.		
	Conflict Management			
	Team Building			
	Salesmanship	Having the skills and knowledge of how to sell.		
	Communication Skills	Having the skills and knowledge of how to communicate (written and oral).		
	Interpersonal Communication Skills			
	Written Communication			
	Oral Communication			
	Language Skills (esp. English)			
	Cross-cultural Awareness	The ability to become aware of cultural values, beliefs and perceptions of yourself and other cultures.		
	Personality	The totality of qualities and traits that are peculiar to a specific person (e.g. persuasive, creative, entrepreneurial, adaptability).		
	Persuasive			
	Creativity			
	Entrepreneurial			
	Academic Skills			
	Trustful/Integrity			
	Adaptability			
HR5	Soft Skills Development (No EC, Indirectly Acquired)			
	Project Management	The discipline of initiating, planning, executing, controlling, and closing the work of a team to meet specific goals.		
	Goals Setting			
	Time Management			
	Team Ability	The ability to work in a group of persons acting together as a team.		

	Conflict Management			
	Team Building			
	Salesmanship	Having the skills and knowledge of how to sell.		
	Communication Skills	Having the skills and knowledge of how to communicate (written and oral).		
	Interpersonal Communication Skills			
	Written Communication			
	Oral Communication			
	Language Skills (esp. English)			
	Cross-cultural Awareness	The ability to become aware of cultural values, beliefs and perceptions of yourself and other cultures.		
	Personality	The totality of qualities and traits that are peculiar to a specific person (e.g. persuasive, creative, entrepreneurial, adaptability).		
	Persuasive			
	Creativity			
	Entrepreneurial			
	Academic Skills			
	Trustful/Integrity			
	Adaptability			
CO	**Controlling**		**0.0**	**0.00**
CO1	Controlling Target System		**0.0**	**0.00**
	Set Objectives/Key Performance Indicators	Definition of Key Performance Indicators and their implementation.		
	Key Performance Indicator's			
	Data Management			
	Data Control			
	Quality Control			
	Manage Performance			
	Set Objectives			
	Finance Knowledge			
CO2	Purchasing Controlling Process and Structure		**0.0**	**0.00**
	Systems Application and Products in Data Processing			

	Performance Measurement and Follow-up	Continuous monitoring of performance and target achievement, degree of implementation logic, incl. Project controlling. Performance of the purchasing function. Performance of suppliers is part of "supplier evaluation".		
	Follow-up			
	Measure Performance			
	Reporting			
	Budgeting			
	Accounting			
CO3	Methods and Tools Support		**0.0**	**0.00**
	Data Analysis	Definition and knowledge of data analysis methods.		
	Benchmarking			
	Handle Big Data, Smart Data			
	Price Analysis			
	Portfolio Analysis Support	Describing a classification of purchases.		
	Critical Path Analysis			
	Supply Base Analysis			
	Cost Reduction Techniques	Act of cutting costs to improve profitability (e.g. by analysis and statistics).		
	Analytical Skills			
	Mathematical Skills			
	Statistics			
	Supplier Cost Targeting			
	Cost Analysis			
	Life Cycle Costing			
	Total Cost of Ownership			
	Lever Analysis Support			
CO4	Supportive IT		**0.0**	**0.00**
	Procurement IT Systems	Knowledge about the computerized system designed to manage the procurement process.		
	E-procurement			
	Understand Computational Techniques			
	Information Control			
	Automated Tools			

	Management Information Systems			
	IT Enabled Sourcing			
OT	**Other**		**0.0**	**0.00**
OT1	Other (purchasing)		**0.0**	**0.00**
OT1	Other (non-purchasing)		**0.0**	**0.00**

Appendix 6 – P/SM skill list according to frequency of nomination

Table A6.1 Ranking of P/SM skills according to frequency of nominations (with at least five nominations)

Skill	*Frequency (N)*
Negotiation skills	28
Analytical skills	24
Problem solving	22
Leadership	20
Change management	19
Risk management	19
Decision making	18
Cost analysis	17
Project management	17
Interpersonal communication skills	16
Supplier relationship management	16
Conflict management	15
Teamwork	15
Strategic thinking	14
Creativity	13
SCM	13
Technical knowledge	13
Quality management	13
Contract management	12
Customer focus	12
Blueprint reading	11
Finance knowledge	11
Product knowledge	11
Time management	11
Written communication	11
Effective communication	10
Organisational skills	10
Computer skills	9
Forecasting	9
Inventory management	9
Motivation (oneself and others)	9
Risk taking	9
Business/management knowledge	8
Collaborative partnerships	8
Computer and internet literacy	8
Ethical issues	8
Persuasive	8
Research	8
Supplier evaluation	8

Supplier management	8
Supplier selection	8
Sustainability	8
Team building	8
Technology know-how	8
Curiosity	7
ERP/MRP/APS	7
Listening	7
Managing internal customers	7
Market analysis	7
Specification development	7
Strategy development	7
Understand manufacturing systems and processes	7
Cross-cultural awareness	6
Customer relationship management	6
E-procurement	6
Initiation	6
Legal, regulatory aspects	6
Materials management	6
Multi-divisional, cross-functional	6
(Open) innovation	6
Presentation skills	6
TCO	6
Category management	5
Continuous learning	5
Develop oneself and others	5
Digitalisation	5
Diversity	5
Flexibility	5
Holistic thinking	5
Integrity	5
International buying	5
Manage internal relationships	5
Market knowledge	5
Mathematical skills	5
Networking	5
Oral communication	5
Proactive	5
Process management	5
Responsibility	5
Salesmanship	5
Stakeholder mapping/management	5
Stress management	5

Structure supplier relationships	5
Supplier negotiation	5
Supply base analysis	5
Tactful	5
Technology application	5
Understand computational techniques	5

Appendix 7 – List of universities

Table A7.1 List of universities[127]

University	*City*
Erasmus Universiteit Rotterdam	Rotterdam
Nyenrode Business Universiteit	Breukelen
Open Universiteit	Heerlen
Protestantse Theologische Universiteit	Amsterdam/Groningen
Radboud Universiteit Nijmegen	Nijmegen
Rijksuniversiteit Groningen	Groningen
Technische Universiteit Delft	Delft
Technische Universiteit Eindhoven	Eindhoven
Theologische Universiteit Apeldoorn	Apeldoorn
Theologische Universiteit Kampen	Kampen
Universiteit Leiden	Leiden
Universiteit Maastricht	Maastricht
Universiteit Twente	Enschede
Universiteit van Amsterdam	Amsterdam
Universiteit van Tilburg	Tilburg
Universiteit voor Humanistiek	Utrecht
Vrije Universiteit Amsterdam	Amsterdam
Wageningen Universiteit	Wageningen

[127] See Studiekeuze (2015); Studielink (2016)

Appendix 8 – Overview purchasing courses at universities

Table A8.1 Overview purchasing courses of Dutch universities

Institution	*Level*	*Course Name*	*ECTS*	*Number of Students*
University of Twente	Bachelor	Business Operations Management	2	190
University of Twente	Bachelor	Supply Management	15	60
University of Twente	Bachelor	Designing in the Healthcare	15	60
University of Twente	Master	Purchasing Strategy and Systems	5	40
University of Twente	Master	Purchasing Management	5	42
University of Twente	Master	Global Sourcing and Organization	5	30
University of Twente	Master	Supply Chain Management and Innovation	5	30
University of Twente	Master	Public Procurement	5	9
University of Twente	Master	Supply Chain Management and ICT	7.5	35
University of Twente	Master	Healthcare Purchasing	5	30
University of Twente	Master	Procurement Strategies and Tendering	7.5	30
Technical University Eindhoven	Bachelor	Buying Behaviour and Innovation	5	300
Technical University Eindhoven	Master	Strategic Sourcing and Supply Management	5	60
Maastricht University	Master	Supply Chain Strategy	5	118
Erasmus University Rotterdam	Master	Purchasing and Supply Management	4	150
Erasmus University Rotterdam	Master	Strategic Sourcing	6	50
Erasmus University Rotterdam	Master	Healthcare Procurement and Value Chain Management	5	30
Tilburg University	Bachelor	Operations Management	6	150
Tilburg University	Master	Purchasing Management	6	120
University of Groningen	Bachelor	Purchasing and Supply Chain Management	5	160
University of Groningen	Master	Purchasing	5	66
TIAS School for Business and Society	Master	Purchasing	4.8	18

Appendix 9 – P/SM skill analysis of academic literature

Table A9.1 Skill nominations in academic purchasing literature and its frequencies (*n* = 798)

Skill	*Frequency (n)*	*Frequency (%)*
Planning and Strategy	**86**	**10.78**
Forecasting and Demand Planning	9	1.13
Enterprise Resource Planning /Material Requirements Planning /Advanced Planning and Scheduling	7	0.88
Pooling Planning and Organising	0	0.00
Supply Market Analysis	20	2.51
Supply Chain Analysis and Planning	0	0.00
Commodity and Domain Specific Knowledge	0	0.00
Technology Planning	33	4.14
Category Strategy Development	17	2.13
Make or Buy Decisions	0	0.00
Structural Organisation	**150**	**18.80**
Purchasing Organisation Knowledge	10	1.25
Process Management	5	0.63
Add Value to the Organisation/Importance of	0	0.00
Strategic Management	33	4.14
Corporate Governance	8	1.00
Position Procurement in Organisation	10	1.25
Stakeholder Mapping/Management	0	0.00
Cross-functional Teams	13	1.63
Operations Management	12	1.50
Quality Management	13	1.63
Marketing	18	2.26
Logistics	0	0.00
Storage/Warehouse Management	0	0.00
Materials Management	28	3.51
Research and Development	0	0.00
Process Organisation	**203**	**25.44**
Request for Quotation - Solicit Offers	7	0.88
Global Sourcing/Supplier Acquisition	5	0.63
Evaluate Offers	48	6.02
Supplier Selection	8	1.00
Corporate Social Responsibility	8	1.00
Negotiation	33	4.14

Contract Development	0	0.00
Contract Management	18	2.26
Claims	0	0.00
Supplier Relationship Management	24	3.01
Risk Management	28	3.51
Supplier Evaluation	8	1.00
Supplier Development	0	0.00
Early Supplier Involvement	16	2.01
Human Resources and Leadership	**262**	**32.83**
Purchasing Roles and Job Profiles	0	0.00
Personnel Selection Process	0	0.00
Employee Integration and Development Plan	0	0.00
Employee Performance Measurement	0	0.00
Train Staff	39	4.89
Project Management	28	3.51
Team Ability	38	4.76
Salesmanship	5	0.63
Communication Skills	53	6.64
Cross-cultural Awareness	6	0.75
Personality	93	11.65
Controlling	**97**	**12.16**
Set Objectives/KPI's	11	1.38
Performance Measurement and Follow-up	0	0.00
Data Analysis	0	0.00
Portfolio Analysis Support	5	0.63
Cost Reduction Techniques	35	4.39
Procurement IT Systems	46	5.76

Appendix 10 – P/SM skill analysis of bachelor courses

Table A10.1 Skill analysis of bachelor courses (n = 6)

Skill	*Frequency (n)*	*Time (h)*	*ECTS*	*Mean frequency (%)*
Planning and Strategy	**6**	**339.4**	**12.12**	**36.29**
Forecasting and Demand Planning	1	10.47	0.37	18.69
Enterprise Resource Planning / Material Requirements Planning / Advanced Planning and Scheduling	2	25.20	0.90	6.00
Pooling Planning and Organising	1	5.60	0.20	4.00
Supply Market Analysis	2	26.60	0.95	4.50
Supply Chain Analysis and Planning	3	58.15	2.08	13.18
Commodity and Domain Specific Knowledge	3	23.69	0.85	4.31
Technology Planning	3	49.00	1.75	7.67
Category Strategy Development	4	86.21	3.08	10.80
Make or Buy Decisions	5	54.48	1.95	6.48
Structural Organisation	**6**	**154.03**	**5.50**	**16.47**
Purchasing Organisation Knowledge	3	20.65	0.74	3.96
Process Management	5	39.78	1.42	5.13
Add Value to the Organisation / Importance of	4	18.96	0.68	2.80
Strategic Management	2	14.00	0.50	3.00
Corporate Governance	0	0.00	0.00	0.00
Position Procurement in Organisation	4	26.29	0.94	3.79
Stakeholder Mapping/Management	1	2.15	0.08	1.54
Cross-functional Teams	2	7.28	0.26	2.50
Operations Management	1	5.60	0.20	4.00
Quality Management	1	1.68	0.06	1.00
Marketing	1	1.68	0.06	1.00
Logistics	1	1.68	0.06	1.00
Storage/Warehouse Management	0	0.00	0.00	0.00
Materials Management	1	12.60	0.45	3.00
Research and Development	1	1.68	0.06	1.00
Process Organisation	**6**	**291.24**	**10.40**	**31.14**
Request for Quotation - Solicit Offers	3	12.64	0.45	2.43
Global Sourcing / Supplier Acquisition	5	53.71	1.92	4.98
Evaluate Offers	3	7.92	0.28	1.78
Supplier Selection	4	21.92	0.78	2.84
Corporate Social Responsibility	4	39.20	1.40	7.73

Negotiation	2	44.62	1.59	7.34
Contract Development	2	4.77	0.17	3.11
Contract Management	4	21.92	0.78	2.84
Claims	0	0.00	0.00	0.00
Supplier Relationship Management	4	23.16	0.83	3.81
Risk Management	2	29.40	1.05	6.50
Supplier Evaluation	2	3.20	0.11	1.71
Supplier Development	3	10.54	0.38	2.26
Early Supplier Involvement	4	18.24	0.65	2.82
Human Resources and Leadership	**6**	**56.75**	**2.03**	**6.07**
Purchasing Roles and Job Profiles	0	0.00	0.00	0.00
Personnel Selection Process	0	0.00	0.00	0.00
Employee Integration and Development Plan	0	0.00	0.00	0.00
Employee Performance Measurement	0	0.00	0.00	0.00
Train Staff	0	0.00	0.00	0.00
Project Management	0	0.00	0.00	0.00
Team Ability	1	12.60	0.45	3.00
Salesmanship	0	0.00	0.00	0.00
Communication Skills	3	44.15	1.58	4.85
Cross-cultural Awareness	0	0.00	0.00	0.00
Personality	0	0.00	0.00	0.00
Controlling	**6**	**93.85**	**3.35**	**10.03**
Set Objectives / KPI's	2	14.70	0.53	3.25
Performance Measurement and Follow-up	3	9.50	0.34	1.64
Data Analysis	1	1.05	0.04	1.87
Portfolio Analysis Support	0	0.00	0.00	0.00
Cost Reduction Techniques	1	42.00	1.50	10.00
Procurement IT Systems	3	26.60	0.95	4.00

Appendix 11 – Skill analysis of master purchasing courses

Table A11.1 Skill analysis of master courses (*n* = 16)

Skill	*Frequency (n)*	*Time (h)*	*ECTS*	*Mean frequency (%)*
Planning and Strategy	**16**	**717.96**	**25.64**	**31.18**
Forecasting and Demand Planning	6	34.36	1.23	4.32
Enterprise Resource Planning /Material Requirements Planning /Advanced Planning and Scheduling	5	18.92	0.68	2.74
Pooling Planning and Organising	8	47.29	1.69	4.14
Supply Market Analysis	8	42.03	1.50	3.54
Supply Chain Analysis and Planning	6	49.55	1.77	4.96
Commodity and Domain Specific Knowledge	8	180.61	6.45	13.51
Technology Planning	8	96.75	3.46	8.57
Category Strategy Development	13	157.83	5.64	8.02
Make or Buy Decisions	9	90.62	3.24	6.24
Structural Organisation	**16**	**457.73**	**16.35**	**19.89**
Purchasing Organisation Knowledge	10	53.79	1.92	3.81
Process Management	6	47.66	1.70	5.32
Add Value to the Organisation/Importance of	9	60.95	2.18	4.59
Strategic Management	3	25.60	0.91	6.18
Corporate Governance	5	23.97	0.86	3.11
Position Procurement in Organisation	10	61.29	2.19	4.05
Stakeholder Mapping/Management	2	7.39	0.26	2.30
Cross-functional Teams	9	55.10	1.97	4.27
Operations Management	6	28.94	1.03	3.17
Quality Management	3	6.39	0.23	1.52
Marketing	4	18.50	0.66	3.14
Logistics	4	18.45	0.66	2.81
Storage/Warehouse Management	2	3.20	0.11	0.82
Materials Management	2	1.63	0.06	0.59
Research and Development	5	44.87	1.60	6.07
Process Organisation	**16**	**811.91**	**29.00**	**35.28**
Request for Quotation - Solicit Offers	5	19.83	0.71	2.78
Global Sourcing/Supplier Acquisition	9	109.62	3.92	8.41
Evaluate Offers	6	27.14	0.97	3.13
Supplier Selection	11	69.92	2.50	4.39
Corporate Social Responsibility	14	122.54	4.38	5.85
Negotiation	6	35.93	1.28	4.04

Contract Development	8	49.24	1.76	4.00
Contract Management	10	51.19	1.83	3.55
Claims	2	4.22	0.15	1.34
Supplier Relationship Management	12	103.47	3.70	5.78
Risk Management	9	72.47	2.59	5.30
Supplier Evaluation	7	32.81	1.17	3.41
Supplier Development	11	71.68	2.56	4.45
Early Supplier Involvement	8	41.85	1.49	3.21
Human Resources and Leadership	**16**	**95.46**	**3.41**	**4.15**
Purchasing Roles and Job Profiles	3	10.07	0.36	2.40
Personnel Selection Process	1	2.80	0.10	2.00
Employee Integration and Development Plan	2	5.64	0.20	1.68
Employee Performance Measurement	1	4.20	0.15	3.00
Train Staff	0	0.00	0.00	0.00
Project Management	3	22.20	0.79	4.95
Team Ability	2	8.87	0.32	2.67
Salesmanship	0	0.00	0.00	0.00
Communication Skills	4	24.72	0.88	3.76
Cross-cultural Awareness	1	8.40	0.30	5.00
Personality	2	8.56	0.31	2.56
Controlling	**16**	**218.54**	**7.81**	**9.50**
Set Objectives/KPI's	11	54.17	1.93	3.56
Performance Measurement and Follow-up	11	55.10	1.97	3.57
Data Analysis	3	20.04	0.72	4.12
Portfolio Analysis Support	2	14.72	0.53	3.63
Cost Reduction Techniques	4	11.71	0.42	2.13
Procurement IT Systems	11	62.80	2.24	3.71

Appendix 12 – P/SM skill analysis per university

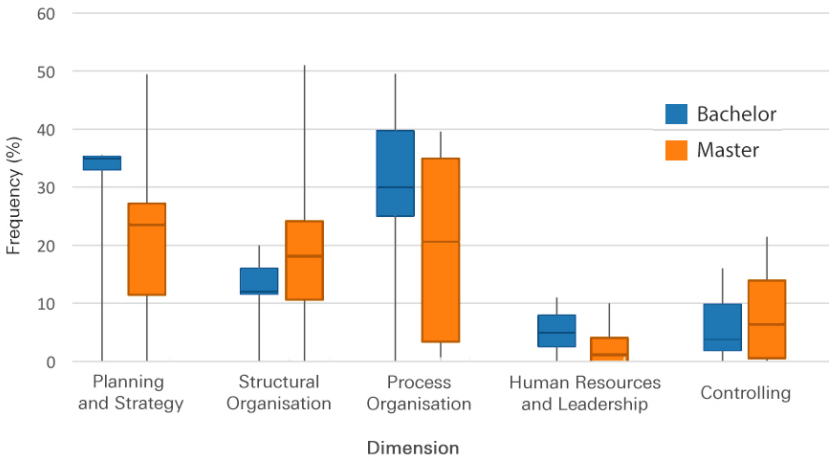

Figure 13.0.1 P/SM skill analysis at the University of Twente (*bachelor n = 3, master n = 8)*

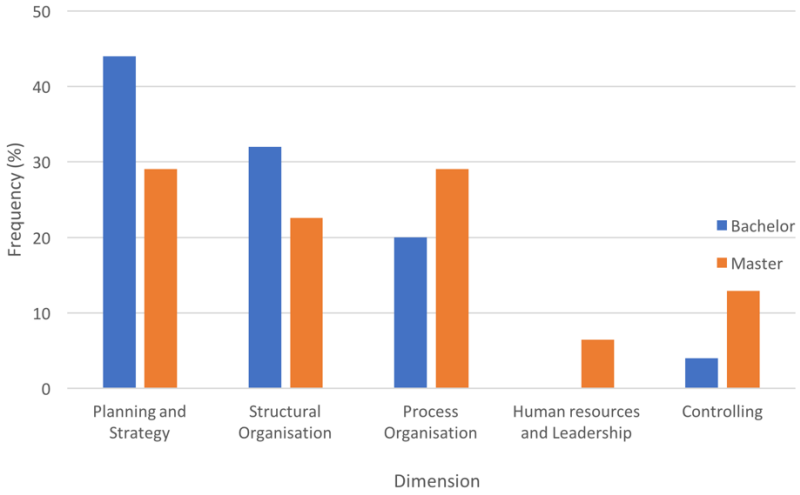

Figure 13.0.2 P/SM skill analysis at the Technical University of Eindhoven (*bachelor n = 1, master n = 1)*

Figure 13.0.3 P/SM skill analysis at the Maastricht University (*n* = 1)

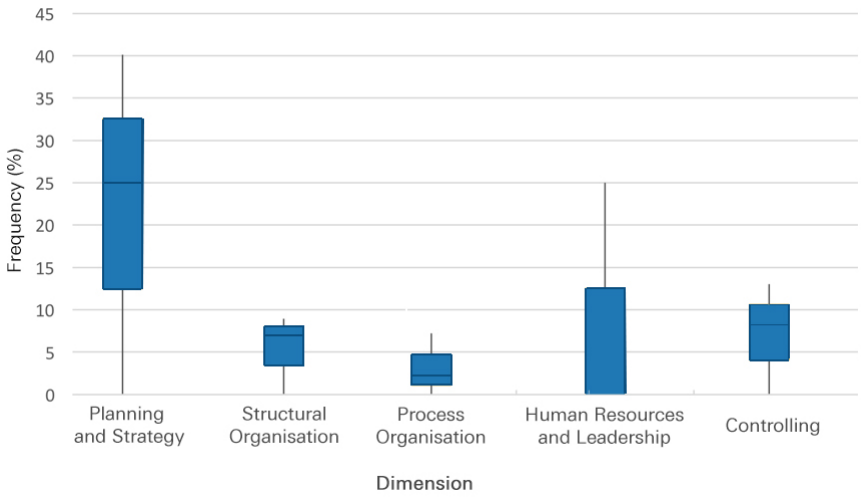

Figure 13.0.4 P/SM skill analysis at the Erasmus University of Rotterdam (*n* = 3)

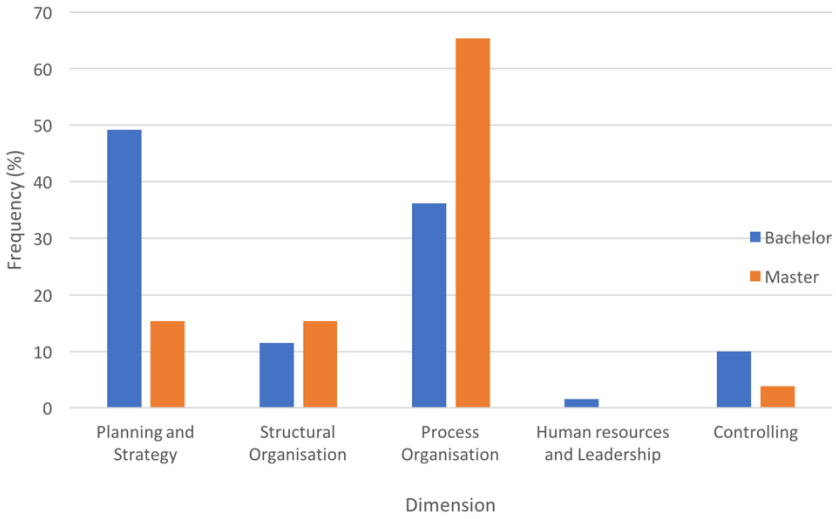

Figure 13.0.5 P/SM skill analysis at the Tilburg University (*bachelor n = 1, master n = 1)*

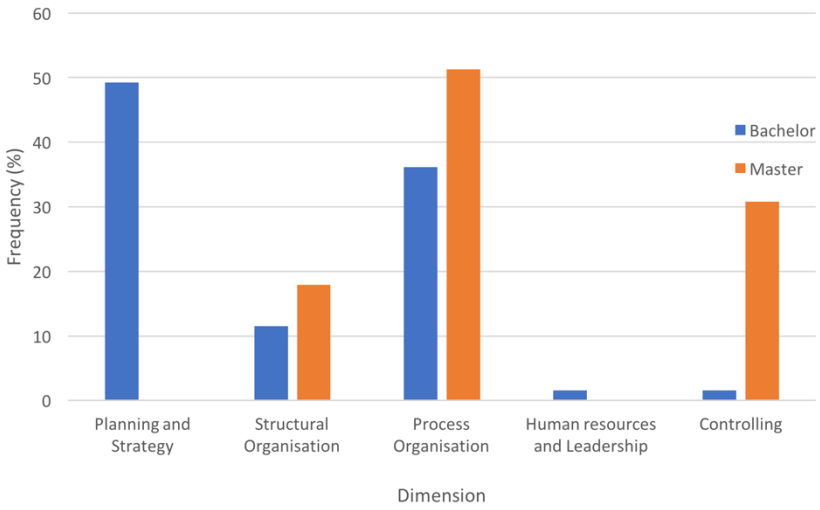

Figure 13.0.6 P/SM skill analysis at the University of Groningen (*bachelor n = 1, master n = 1)*

Figure 13.0.7 P/SM skill analysis at TIAS School for Business and Society (*n* = 1)

Appendix 13 – P/SM skill analysis of HBO courses

Table A13.1 Skill analysis of HBO (*n* = 2)

Skill	*Frequency (n)*	*Time (h)*	*ECTS*	*Mean frequency (%)*
Planning and Strategy	**2**	**318.95**	**11.39**	**27.74**
Forecasting and Demand Planning	2	126.91	4.53	11.04
Enterprise Resource Planning /Material Requirements Planning /Advanced Planning and Scheduling	1	5.50	0.20	0.48
Pooling Planning and Organising	2	24.82	0.89	2.16
Supply Market Analysis	2	49.70	1.78	4.32
Supply Chain Analysis and Planning	1	7.74	0.28	0.67
Commodity and Domain Specific Knowledge	1	16.49	0.59	1.43
Technology Planning	1	7.74	0.28	0.67
Category Strategy Development	2	55.20	1.97	4.80
Make or Buy Decisions	2	24.85	0.89	2.16
Structural Organisation	**2**	**223.67**	**7.99**	**19.45**
Purchasing Organisation Knowledge	1	38.71	1.38	3.37
Process Management	2	30.34	1.08	2.64
Add Value to the Organisation/Importance of	2	24.85	0.89	2.16
Strategic Management	1	5.50	0.20	0.48
Corporate Governance	2	9.94	0.36	0.86
Position Procurement in Organisation	2	30.34	1.08	2.64
Stakeholder Mapping/Management	2	21.55	0.77	1.87
Cross-functional Teams	1	19.74	0.71	1.72
Operations Management	2	13.24	0.47	1.15
Quality Management	0	0.00	0.00	0.00
Marketing	1	7.74	0.28	0.67
Logistics	2	9.76	0.35	0.85
Storage/Warehouse Management	1	2.20	0.08	0.19
Materials Management	1	2.20	0.08	0.19
Research and Development	1	7.56	0.27	0.66
Process Organisation	**2**	**406.07**	**14.50**	**35.32**
Request for Quotation - Solicit Offers	2	80.05	2.86	6.96
Global Sourcing/Supplier Acquisition	2	44.21	1.58	3.85
Evaluate Offers	2	22.60	0.81	1.97
Supplier Selection	2	33.60	1.20	2.92
Corporate Social Responsibility	2	28.10	1.00	2.44
Negotiation	2	60.70	2.17	5.28

Contract Development	2	33.60	1.20	2.92
Contract Management	2	30.34	1.08	2.64
Claims	1	7.74	0.28	0.67
Supplier Relationship Management	2	20.98	0.75	1.82
Risk Management	1	11.61	0.41	1.01
Supplier Evaluation	2	22.60	0.81	1.97
Supplier Development	0	0.00	0.00	0.00
Early Supplier Involvement	2	9.94	0.36	0.86
Human Resources and Leadership	**2**	**107.76**	3.85	**9.37**
Purchasing Roles and Job Profiles	1	46.45	1.66	4.04
Personnel Selection Process	0	0.00	0.00	0.00
Employee Integration and Development Plan	0	0.00	0.00	0.00
Employee Performance Measurement	0	0.00	0.00	0.00
Train Staff	0	0.00	0.00	0.00
Project Management	0	0.00	0.00	0.00
Team Ability	1	19.35	0.69	1.68
Salesmanship	1	5.50	0.20	0.48
Communication Skills	2	17.11	0.61	1.49
Cross-cultural Awareness	0	0.00	0.00	0.00
Personality	1	19.35	0.69	1.68
Controlling	**2**	**93.27**	3.33	**8.11**
Set Objectives/KPI's	2	30.34	1.08	2.64
Performance Measurement and Follow-up	1	7.74	0.28	0.67
Data Analysis	1	10.99	0.39	0.96
Portfolio Analysis Support	1	19.35	0.69	1.68
Cost Reduction Techniques	2	24.85	0.89	2.16
Procurement IT Systems	0	0.00	0.00	0.00