

At first sight – How is SME Purchasing Organised?

Discussing research process, the role of customer strategies & personality of owners and purchasing improvement, based on students' purchasing case studies within four Dutch manufacturing Small and Medium-sized Enterprises.

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Abstract (100 w)

Purchasing within Small and Medium-sized Enterprises (SMEs) is important for the overall SME firm performance. However, purchasing within SMEs is not the same as purchasing within larger organisations and there is limited conclusive research on how to improve the purchasing performance of SMEs. This article describes research done by four bachelor students on the purchasing function within four Dutch manufacturing SMEs.

Purpose: The article focuses both on the students' research process and their research outcomes.

Design / method / approach: the paper highlights extant literature on purchasing within SMEs and on involving students in case study research. It then discusses the research process the students went through and their research outcomes.

Findings: zie C&A

Research implications and limitations: zie C&A

Practical implications and limitations: zie C&A the article shows that undergraduate students can conduct explorative research in an academic setting.

Original: Although students are often involved in purchasing research at universities, so far the process of students' case study research has not been described.

Type: explorative and deductive case study research

Keywords: *Small and Medium-sized Enterprises (SMEs); purchasing and supply management; case study research; student research; tertiary education.*

[main text 5500 words]

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1. Introduction and research methodology of this paper

The Purchasing Management Professoriate at Hanze University of Applied Sciences (headed by Professor Gert Walhof) conducts applied research on the purchasing function within Small and Medium-sized Enterprises (SMEs) in the northern part of the Netherlands. In this context *SMEs* have between 50 – 250 employees and a turnover between 2- 50 million euro (European Commission, 2013). The term *purchasing* is seen here as incorporating both sourcing and buying goods and services, and managing suppliers and customers (Van Weele 2010, p. 8-11).

In the last decades, purchasing within large enterprises and within public organisations gained considerably in importance and a wealth of academic literature is available. In Google Scholar the four search terms *purchasing* or *buying* or *sourcing* or *procurement* together yield approximately 20.000 articles from 2000 - 2014, which mostly relate to the scientific discipline of purchasing. However for the same timeframe with these four search terms Google Scholar gives 57 results on *purchasing* within *SMEs*. Using related terms or synonyms for *SMEs* and using broader search terms like *clustering*, *integration*, *collaborating*, *networking*, *alliance* or *supply chain management* or *supply chain integration* Google Scholar and Web of Science reveals around 350 documents on purchasing within *SMEs*². This small amount of extant academic research is in stark contrast to the important role *SMEs* play in national economies (see e.g. the OECD report of 2010) and also in stark contrast if one considers the financial and operational importance of the purchasing function to the overall *SME* performance (see also Ramsay, 2007). Prolific researchers on purchasing within *SMEs* are Ellegaard (2006, 2009), James (2011, 2012), Morrissey (2003, 2004, 2006, 2011), Paik (2009a 2009b, 2009c, 2011), Pressey (2009) Quayle (2002a, 2002b, 2003), Thakkar (2008a, 2008b,) with in total approximately (only) 250 citations. In 2013 the Hanze Professoriate started a three-year research programme with Windesheim University on purchasing within *SMEs*, and it wanted to use time and money as efficient as possible. Therefore four students participated in essential parts of its research. This however raised a number of potential issues with the requirements on the students in their roles as junior researchers.

This article describes a pilot research conducted by four bachelor students on the purchasing function within four Dutch manufacturing *SMEs* between March and June 2013. This research served three objectives: (1) for the students it was partial evidence that they could rightfully obtain a bachelor degree, (2) for the *SMEs* it had to bring added-value, and (3) for the Hanze Professoriate it had to deliver results. This article focuses on the 3rd objective: the students' research had to be of academic quality and had to serve as a pilot for future students' research. Hence, the Professoriate was interested in the *students' research process* and the *students' research outcomes* as formulated in five research questions:

- RQ1: What are the students' research processes (design and methodology)?
- RQ2: What are the students' research outcomes?
- RQ3: What is the quality of the students' research processes (design, methodology)?
- RQ4: What is the quality of the students' research outcomes?
- RQ5: What are general and specific implications for future research?

² In Google Scholar and in Web of Science we used the search string (SME OR SMEs OR "small firm" OR "small firms" OR "small business" OR "small businesses" OR "small company" OR "small companies" OR "small and medium sized firm" OR "small and medium firm") combined with the search string (Purchasing OR procurement OR supplier OR supply OR buyer OR buyers OR supplier OR suppliers OR buying OR "supply chain" OR "supply management" OR "supply base" OR "supplier base"). Data retrieval: 15 February 2014.

This article starts with a brief literature review to better contextualize the research. Section 3 describes the students' research designs of two case studies. Section 4 discusses the students' research outcomes. Section 5 discusses the students' research process and the quality of the research outcomes. The article ends in section 6 with implications for further research.

2. Literature review

This section is i.a. based on a more extensive review of literature of Hagelaar *et al* (2014). National or international statistics (see e.g. European Commission, 2005; OECD, 2010) indicate the importance of SMEs for economic development. SMEs are seen as the engine of the growth for national economies with a very large proportion of micro companies (often up to 10 employees), a large proportion of small companies (often up to 50 or 100 employees) and a small proportion of medium-sized companies (often up to 250 employees).

Literature and practitioners traditionally concluded that the purchasing performance of SMEs is at a lower level (see e.g. Boodie, 2002; and also Walhof & Versendaal, 2010). As an explanation, Ellegaard (2006), Ramsay (2007) and others referred to a lack of financial resources and limited buying power. Next to that, the purchasing knowledge, skills and capacity in SMEs are reported to be less developed (see e.g. Morrissey 2006). In general, SMEs seem to be resilient and flexible but run higher purchasing risks than larger enterprises do (OECD, 2010). Pressey (2009) concluded that a lack of formalized purchasing does *not* necessarily indicate bad purchasing skills. Mudambi (2004) and also Paik (2009) related more formalized purchasing to larger companies (100 - 500 employees).

Some research showed that SME owners / managers³ recognize the importance of (strengthening) their purchasing function to increase the overall SME performance (Dollinger & Kolchin, 1986; Ellegaard, 2006; Pressey 2009; Overweel, 2007; Staal & Walhof, 2011). However Morrissey and Knight (2011; p. 1145) concluded that there is "lack of agreement" on this aspect. From a Dutch survey Overweel (*ibid*) e.g. concluded that 50% of Dutch SMEs think that purchasing is of strategic importance ; Overweel correlated this importance to the purchasing spend and to the industry type. In his broad study, Quayle (2002) however reported that 65% out of 253 British SMEs with less than 200 employees thought that purchasing was *not* important. The findings of Quayle corresponded with Burns (2001) who found that SME owners prefer to focus on internal organisational processes and on fulfilling customer wishes.

Our previous research (Staal & Walhof, 2011) found that a high SME purchasing spend may not always implicate high management attention on purchasing. Moreover we found that many SME owners cannot or will not hire external expertise or establish a formal purchasing department.

Morrissey (2004) and later research remarked that SMEs are *not* a homogeneous group and concluded that SME purchasing differs from purchasing within large enterprises. The SME structure, the personal objectives and the personal characteristics of SME owners will vary (see e.g. Burns 2001; Keijzer, 2006; Meijaards, 2007; Simon, 2007) and this will have a large impact on the SME organisation and on its purchasing function.

For research on student involvement we refer to Ryser *et al.* (2009) and Fenn *et al.* (2010). From this brief literature review, we concluded that the importance of purchasing, the

³ We do not separate SME owners from SME managers but posit that they have an important influence on overall SME management. (See e.g. Burns, 2001).

purchasing maturity and performance, and operational purchasing strategies will vary between SMEs. We also concluded that SME purchasing research is relevant to academics and business and that it is not always clear *where* and *how* SME purchasing can best be improved.

3. The students' research process (RQ1)

We started a three-year joint research programme on SME purchasing together with the Windesheim University of Applied Sciences, which is supported by the Dutch organisation of Purchasing Professionals (NEVI). This research programme runs from 2014 - 2017.

As Hanze University is a university of applied sciences, our bachelor students often participate in applied purchasing research. For this pilot four senior students successfully applied for a 5-month assignment (with approximately 400 effective student hours) as junior researchers within the Professoriate. The students obtained dual supervision: from senior lecturers of their faculty on their role as graduating students and from a researcher of the Professoriate on their role as student researchers.

The Professoriate gave the students a broad overview of the research subject and an initial research statement. Students then had to write individual research plans to be approved by the researcher and by their faculties' supervisors. For this plan, they conducted desk research within literature provided by the Professoriate and additional desk research via Google Scholar. They then organised a first workshop with experts (university researchers/lecturers) to obtain feedback on their initial thoughts on narrowing down the research objective and on their research designs. The Professoriate's ideas were that the students' research would be explorative with elements of action research (Delnooz, 2006). However the students wanted more structure and developed conceptual models and research questions as tools and guidance for their case studies (Swanborn, 2013). After conducting their field research within the SMEs, the students presented findings within the SMEs and then discussed findings in a second workshop with university experts and professionals. They produced a joint summary of their research and finished their reports which they successfully defended as a part of their graduations.

3.1 Students' research question, design and methodology (RQ1)

The initial research question was:

How do SMEs purchase, what are best practises, what are areas of improvement?

The students were allowed to narrow down this broad question. After their literature study, it was decided that *three students* would conduct a *cross-case study* research within SME1, SME2, SME3 on the influence of customer strategies and the personality of SME owners on the SME purchasing processes. The *fourth student* would conduct a *separate case study* within SME4 on best practises and areas of improvement (see Table 1).

All four SMEs are active in the manufacturing industry and are small or medium-sized according to the definition of the European Union (2013). The companies are still in business despite a four-year recession. For reasons of confidentiality, the company names remain anonymous. The original (Dutch language) student reports have been archived at the Professoriate.

Table 1: Data on SME1- SME3 in cross-case study; on SME4 in separate case study (*n.a. is not available*).

	SME1	SME2	SME3	SME4
Produces	reinforcement steel for concrete	climate controls equipment	printing labels for bottles	window frames for construction
Turnover (m €)	9	15	n.a.	6
Purchasing spend	n.a.	70%	60%	50%
Balance sheet (m €)	7	11	12	4
Purchasing responsible	General Manager / Purchaser	Purchasing Manager	Purchasing Manager	Commercial Director
Key suppliers	n.a.	Key suppliers 40 Total suppliers 110	Key suppliers 30	Material suppliers 75
Employees in SME	47	110 (175)	80	51
Employees Purchasing	1	2 (3)	2 -3	1 (2)

3.2 On the units of analysis (RQ1)

The students had to research manufacturing SMEs within 100 kilometres from the University, with 25 to 125 employees, and a balance sheet total over 2 million euro. This sub-set approximately comprises 5000 SMEs (dataset EIM, 2014). The students' research had to focus on purchasing primary goods and services (Bill of Material). By selecting these variables in *size*, *sector* (industry) and *balance sheet*, and in *primary purchasing* we hoped to find companies where the purchasing function comparable and relevant to the SME owner. SMEs were selected from the industry network of members of the Professoriate.

The students had to ensure trust and cooperation from the SME owner. They had to obtain adequate access to purchasing and organisational data and processes/systems, had to interview, and observe SME staff. Students hence started with interviewing the SME owner, asked him to fill in two questionnaires, and asked permission to interview the staff. On average, each student worked 100 - 200 hours on site.

3.3 The design of the cross-case study within three SMEs (RQ1)

This sub-section discusses the design of the cross-case study as part of Research Question 1. As indicated earlier the personality of the SME owner has a large impact on the company and for SMEs it is important to have a focus on customers. Therefore, in the SME cross-case studies students investigated how SME purchasing processes were impacted by SME customer strategies and by personal characteristics of SME owners. (See Figure 2).

The students wanted to conduct several interviews and observations for data gathering. They also wanted to apply relatively easy models. This had the advantage that a) SME staff would understand what the students were looking for, and that b) the students would not be biased or hindered by using complicated models. Students were thus able to explore the industry-practise more open-mindedly. This was in line with conclusions from our earlier research (Staal & Walhof, 2011) where students had difficulty in using a more complicated model.

Students used the six-step purchasing process model of Van Weele (1988, 2010, p. 29) which starts from the demands of the internal customer and ends with the supply of a supplier. In operationalizing the SME customer strategy, students used the value discipline model of Treacy & Wiersema (*also called customer strategy, or value proposition*, 1998) and applied a Treacy & Wiersema questionnaire kindly provided by the consultancy firm Ordina (Van der Marck, 2007). This model has the focus on the customer demands and hence shows application of supply chain thinking (value chain thinking) within the three SMEs. For determining the personal characteristics of the SME owners, the students used a self-test questionnaire from the Herrmann Brain Institute (Herrmann, 1995; Ireland, 2012) called the Herrmann Dominance Brain Instrument (HDBI). This is a cognitive-style assessment

instrument which distinguishes four personality traits based on different thinking styles and learning preferences. Their conceptual model is shown in Figure 2 (De Haan, 2013; Post, 2013; Van Olst, 2013).

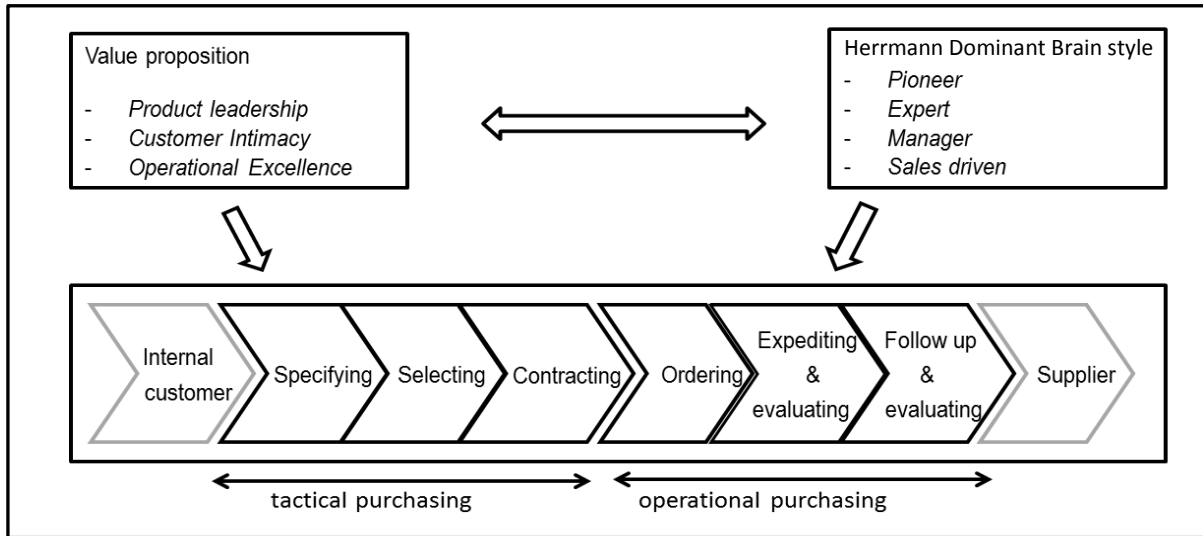


Figure 2: Conceptual model of the cross-case study with three SMEs (De Haan, 2013; Post, 2013; Van Olst, 2013)

3.4 The design of the detailed case study within SME4 (RQ1)

This sub-section discusses the research design of the separate case study as part of Research Question 1.

In SME4 (a manufacturer of metal window structures) the fourth student investigated the relationships of several variables on the purchasing function, and subsequently on the purchasing results (see Figure 3). The objective of his research was to investigate the purchasing function (i.e. the purchasing maturity) and to find opportunities for improving the purchasing performance for this company. Therefore the student designed a model with six moderating variables, but for reasons of time constraint later-on decided to concentrate on two variables. (Figure 3; with the four variables not studied in detail crossed-through). The student first wanted to determine the dominant value discipline according to Treacy & Wiersema via the Ordina self-assessment questionnaire. He then tried to define the impact (alignment) of this value discipline on the purchasing function. The student wanted to apply the SME purchasing maturity and performance model of Batenburg (2010) which Batenburg used on 117 SMEs. Batenburg based this model on a World Class Purchasing questionnaire

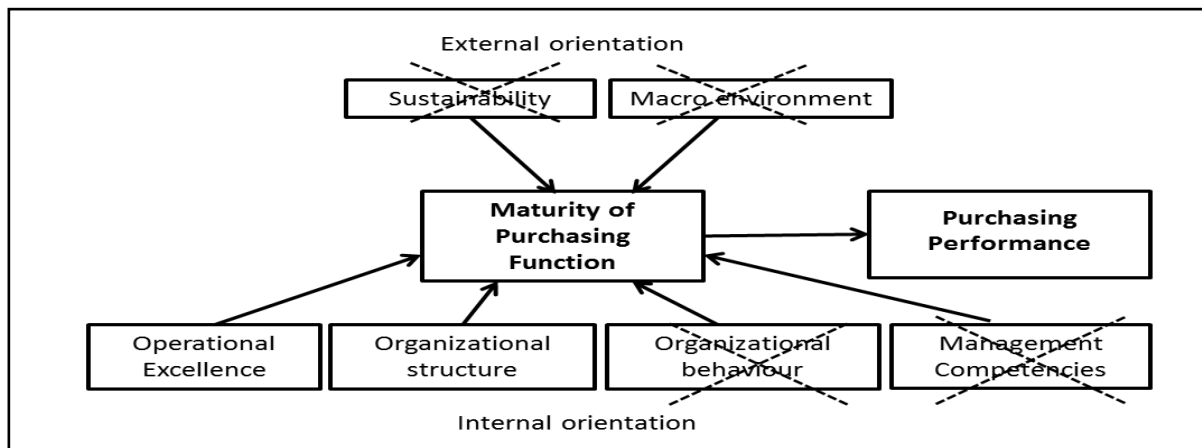


Figure 3: Conceptual model on Purchasing Performance (focussing on not cross-through variables; Beuker 2013)

of Boodie (2002) and on the Business Process Redesign model of Hammer and Champy (2006). In our earlier research within 13 SMEs (Staal & Walhof, 2011) we used a modified version of this model. However, we now required the student to use the original Batenburg model as it would enable better benchmarking to available Batenburg data. This model investigates the purchasing maturity on the six aspects of Strategy (objective), Process, Management, Organisation, Information, and e-Technology. Using the model should enable the student to determine the current state of the purchasing functions of SME4 and give recommendations for improving the purchasing functions related to the six aspects (Beuker, 2013; p. 41).

4. The students' research outcomes (RQ2)

This section discusses the research outcomes of the students in their case studies. It first discusses the cross-case study and then continues to discuss the separate case study.

4.1 Research outcomes on the cross-case study in three SMEs (RQ2)

Students analysed the purchasing process of the three SMEs and the relationship with the Treacy & Wiersema value discipline and the Herrmann dominant brain style (See Figure 2; see results in Table 2 and in Table 3).

The *tactical* part of the purchasing process (specifying, selecting, and contracting) has less management attention within SME1 and SME3 as in both companies the customer influences or even determines the specification. In SME1, the supplier selection is done based on lowest price and past experience, in SME3 the selection is done by the customer. SME2 differs as it has a structured specification process and involves its preferred suppliers when it determines the specification. SME2 uses supplier assessments for supplier selection and also conducts more extensive contract negotiations.

The *operational* part of the purchasing process (ordering, expediting, and follow-up) is fairly standardised in SME1 and SME3. This part of the process however seems less standardised in SME2 as several persons are allowed to order material and as SME2 only reacts in case of a faulty delivery. SME2 tries to manage a long-term relationship with its key suppliers and tries to obtain better conditions.

Table 2: Overview of purchasing processes in the cross-case study

	SME1 Reinforcement steel	SME2 Climate controls	SME3 Printing labels
<i>Specifying</i>	Management and sales determine specs based on customer requirements.	R&D and purchasing determine specification	Customer often determines a detailed specification. SME3 has little influence.
<i>Selecting</i>	Lowest price and past experience	Discuss technical specifications with preferred suppliers; Purchasing does selection (based on assessments) and manages long-term relation.	Customer does supplier selection.
<i>Contracting</i>	No framework agreements, but important clauses confirmed in writing. Uses day pricing for steel.	Management and purchasing manager conduct negotiations; Purchasing drafts the contract.	Framework agreements; Vendor managed inventory (VMI) aimed at continuous production.
<i>Ordering</i>	The operations manager (and the purchaser). Standard procedure	Purchasing manager of purchaser uses MRP system.	Uses MRP / Kanban system.
<i>Expediting</i>	Administration and purchaser; weekly contacts with supplier.	MRP system by purchasing assistant.	No fixed procedure but regular supplier evaluation on delivery quality.

	SME1 Reinforcement steel	SME2 Climate controls	SME3 Printing labels
<i>Follow-up Evaluation</i>	Pay invoices quickly.	In case of extra work phone contact; sometimes also legal support. Supplier evaluations; long-term relationship.	Purchasing evaluates at the end of contract. Faulty deliveries are solved informally; if needed with external legal support.

The scores of the three SME management teams on the Treacy & Wiersema value discipline do not show clear differences (Table 3). The subsequent discussion during workshop 2 with experts and professionals resulted in the following. The lack of clear differences within the three SMEs could be caused by the customer dominance in all three SMEs, or by the on-going recession with a focus on cost-reductions. In more general terms, it could also be possible that *larger* companies are forced to make a choice on one (or two) of the customer strategies, but that SMEs due to their less complex organisation and due to the influence of the owner do not need to differentiate. A *different* reasoning with the same outcome was later found in research of MacBride (2013, p. 1592) who suggested that *operational excellence* is [always] necessary and SMEs need a complementary strategy to serve their customers. For the students research, it was concluded that companies SME1 and especially SME3 showed more *Operational Excellence* as was also reflected in their purchasing processes which was process and task driven, both towards suppliers in the ordering phase and to customers in specifying and selecting phase. Company SME2 had a stronger focus on the tactical purchasing processes and showed the least dominant value discipline. Considering the dominance of R&D, SME2 showed most aspects of Product Leadership towards its suppliers.

Table 3: Overview of similarities and differences found in the cross-case study

	SME1 Reinforcement steel	SME2 Climate controls	SME3 Printing labels
Activities	Project industry; limited products	Project industry; customer-specific solutions	Proces industrie; limited products
Key customers	Regional contractors; long term relations	National installation contractors	Several multi-nationals
Leverage to customers	Supplies (on request) customer-specific products	Customer has a problem and wants a tailor-made solution.	Limited as it has to deliver capacity for customers according to customers' specs
Key suppliers	SME1 selects its own 8 key suppliers; orders on low prices and pays quickly.	Long-term relation with its suppliers.	Customers conduct supplier selection; no Purchasing influence.
<i>Operat. Excellence T&W</i>	40%	37%	44%
<i>Customer Intimacy T&W</i>	36%	34%	30%
<i>Product Leadership T&W</i>	24%	29%	26%
Expert opinion T&W	More Customer Intimacy	More Product Leadership	Operational Excellence
Expert opinion Van Weele management orientation on purchasing.	Strategic / Commercial	Commercial as purchasing and R&D are dominant	Serve the Factory
Students opinion on Herrmann's Typology.	Somewhat more professional and manager	Somewhat more sales person and pioneer.	Manager, pioneer and sales person.

When using a questionnaire for the Herrmann Dominant Brain Style the students wrongly applied a regression on the questionnaire results on the personal characteristics of the SME owners. This invalidated their results. However in discussions of workshop 2 with experts and professionals the students could identify some dominant traits (see also Table 3). The management team of SME1 displayed most traits of a professional and manager, whereas SME2 displayed most traits of a pioneer and a salesperson. It could be speculated that these traits are reflected back in the value discipline and purchasing processes, but there is no data to support this. For SME3 no specific traits could be discovered. During the discussion in workshop 2 students additionally characterised the purchasing orientation of SME management according to Van Weele (1998, 2010; p. 69)⁴. This gave some correlation to both the Treacy & Wiersema typology and to the Herrmann's typology.

The research revealed that the three SMEs were also interested in students' advice on long-term aspects. This contradicts the often-mentioned focus on short-term aspects (Burns 2001) but corresponds with findings e.g. from EIM (dataset 2010) that a large part (75%) of Dutch manufacturing SMEs often prefer continuity and independence to growth or profit.

4.2 Research outcomes on the separate case study SME4 (RQ2)

The findings for SME4 (manufacturing metal window structures) reveal the following. The student found out that SME management considered the dominant customer strategy to be Operational Excellence. However, the student found that SME4 did not align its organisation (including its purchasing function) with this value discipline. SME4 did not use process optimisation, applied no early warning system, used no error analysis and no lean

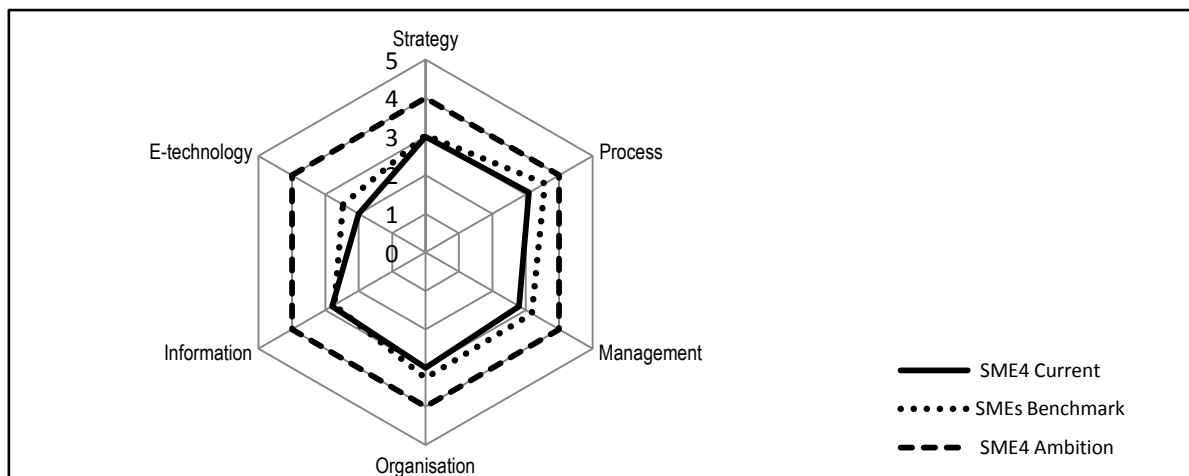


Figure 5: Purchasing Maturity SME4 (current and ambition) compared to Batenburg SMEs Benchmark

technologies nor Six Sigma. However, SME4 did use a pull strategy. The student questioned the fact whether Operational Excellence was the right strategy for this SME4 as it delivered custom-made products in small batches. Student then suggested that perhaps Customer Intimacy would be a better strategy and discussed this within SME4.

⁴ The purchasing orientation (Van Weele / NEVI, 1988) distinguishes four visions of top management related to the benefit and role of the purchasing function: administrative, commercial, logistic and strategic orientation.

Student found that the overall purchasing maturity of SME4 on the six aspects is comparable to the Batenburg benchmark of 117 SMEs, and that the 10 interviewees within SME4 showed a less-than average standard deviation when assessing the maturity on the six Batenburg aspects.

When following the current strategy, the student recommended to reduce the Total Cost of Ownership and supply risk by standardising the purchased components, to reduce the number of suppliers, start a two to four year cooperation with key suppliers and start better integrating these suppliers into the production process (Beuker, 2013; p. 27). The student furthermore suggested to develop a purchasing strategy, to benchmark main suppliers, and to make purchasing a higher management priority. Student found opportunities to reduce the number of suppliers that should bring process and financial savings (Beuker, 2013; p. 50).

The student discussed his recommendations with the SME4 owner and was then asked to write a purchasing plan for implementing his recommendations. Currently (December 2014) it is unknown what the status of this plan is.

5. Discussing the quality of the students' research process (RQ3)

To evaluate the research process of the four students, this section will now discuss the main activities the four students conducted within their research process. This evaluation is done from the perspective and objective of the Professoriate.

Table 4: Evaluation of students' research process

Review of extant literature	No new literature or insights on purchasing within SMEs, although students found and proposed Herrmann Dominant Brain model
Designing research (writing Research Plan)	This took the four students more over five weeks, and hence more time than expected.
Finding and managing SMEs as units of analyses	Finding SMEs was done via the Professoriate's network; students needed 3 weeks to find SMEs and were capable of managing relationship with SMEs.
Executing the research within the SMEs	Reports showed different levels of details and complexity. The report for SME4 showed great details on improvement areas.
Discussing the results within the Professoriate and with experts	Different levels of mastering the subject were compensated among students.
Finalizing research for the Professoriate	Students drafted a joint summary of their report. However due to time constraints the summary was not finalised.

The four students also evaluated their research process. Suggestions for future student research are mentioned in Table 5 with ex-post remarks from the researcher.

Table 5: How the students' evaluated their research process

	Students' positive remarks on their research process	Students' suggestions for improvement	Researchers' ex-post remarks for improvements
1	Mix of students from different faculties (Commerce, Engineering, and Business Administration) worked well.	Involve supervising lecturers and SME owners (others) more in research (contents / process)	<i>Generally, it is difficult to have good students interested in research assignments.</i>
2	Students considered their research interesting and relevant; they stated that they learn a lot.	Students wanted a stringent research framework whereas researchers wanted an explorative research.	<i>A more stringent framework partly contradicts the University's educational requirement for 'conducting independent research'.</i>

	Students' positive remarks on their research process	Students' suggestions for improvement	Researchers' ex-post remarks for improvements
3	Students favoured having direct contact with SME staff and SMEs	It took considerable time for the students to find adequate SMEs willing to cooperate ⁵ .	<i>Suggestions were to use younger year students or a call centre for acquisition.</i>
4	Students' prior knowledge of purchasing and of SMEs was limited.	The Professoriate could establish a must-read list and a nice-to-read list for students.	<i>Only one student had purchasing knowledge on a more advanced level. Students found it difficult to quickly assess purchasing literature and models.</i>
5	Students valued the opportunity to organize or participate in workshops related to their research.	Students want a better training in research methods, and a limited amount of 'possible relevant literature'.	<i>(See also #2, #4).</i>
6	Students liked their role of student researchers	Use experienced purchasing professionals or managers from other organisations to coach students.	<i>This would ensure the research quality and practical use for SMEs and for the Professoriate.</i>
7	Students preferred an assignment within a commercial organisation instead of an assignment within a research setting.	Students suggested engaging the SMEs for a longer period.	<i>A possible solution is to have students conduct their major assignment with the SME (e.g. 60%) and a 40% research assignment for the Professoriate.</i>
8	Students preferred a single point-of-contact within each faculty.		<i>Use these experts more in design and discussion.</i>

In general, the four students were satisfied with the process they went through and the results they generated for the Professoriate and the four SMEs. For future research, they furthermore suggested to involve SMEs for a longer period, and to ensure that SMEs directly benefit from the research.

The Professoriate is satisfied with the quality of the students' research process and suggestions for improvement. The way the students' research was designed and conducted will be useful for further students' research within the Professoriate although the students' limited time will remain an issue.

6. Discussing the quality of the students' research outcomes (RQ4)

In our earlier student research, the role of lecturers and researchers towards the SMEs was more immanent. These two case studies differed as the four bachelor students conducted their field research independently. This section discusses the Professoriates' objective on the research process and on the research results. It hence answers Research Questions 3. This section will discuss the *internal* and *external* validity and the *reliability* of the research of the two case studies combined (Christiaans, 2005: p. 112; p. 120; p. 249).

6.1 Internal validity of the students research outcome (RQ4)

The students' research used three academic models and two questionnaires developed by business practitioners. The three models have found wide application in business and research, can be considered valid (see Table 4), and will not be discussed in this article.

⁵ For similar problems with obtaining an adequate dataset within SMEs, see James (2011)

Table 6: Validation of models used in this research (*Google search terms mentioned within square brackets*).

Theoretical model	Google Scholar	Observations
Process model Van Weele (1988) [Van Weele]	4720 results	Model is used in business and in education. Purchasing research builds on this model.
Value discipline Treacy & Wiersema (1993, 1997) [Treacy Wiersema]	3210 results	Treacy & Wiersema tested model in 80 companies; Is used in business and in education. It is one of the models on value proposition, high value management (MacBride, 2013).
Herrmann Dominant Brain Style [Herrmann Dominant Brain]	1130 results	Seems a practitioner model but e.g. Bunderson (1989) and Ghadiri (2012) consider it valid.

The validity of the two questionnaires is less firm. The Ordina questionnaire, which all four students used for assessing Treacy & Wiersema discipline, is a consultancy tool and has no apparent academic backing other than the original article. Furthermore, the Treacy & Wiersema model is a positioning model i.e. value offerings as perceived by customers. However, in this research the Ordina questionnaire was used as a means of self-assessment by SME owners. This could result in an interviewee or research bias. The Herrmann Dominant Brain Style model may be valid (see Table 6) but the three students used the related questionnaire in the cross-case study with an incorrect regression yielding incorrect results. Due to time-constraints, the students could then only triangulate their research findings on this moderating variable via discussions with SME owners and during the second workshop. The Professoriate accepted the outcome of both questionnaires as a possible limitation to this research.

6.2 External validity of the students research outcome (RQ4)

It is obvious that the outcome of the two case studies as described in this article per-se may not be generalised to a large extent. However it provides an insight into different purchasing activities in four seemingly similar SMEs (Table 4) and also shows improvement potential.

6.3 Reliability of the students research outcome (RQ4)

The fact that four bachelor students conducted this research may seem a factor limiting the reliability of this research. Student researchers are just beginning to grasp the notion of applied research and should be considered researchers with limited experience. Whereas their bachelor education had prepared them well to analyse and improve business problems in applied (deductive) research, it had less prepared them to conduct more conceptual (inductive) action-type research with academia. Nevertheless, with the help of their dual supervision they successfully tackled their research assignments.

The four students had weekly meetings with the research supervisor and had regular meetings with the experienced individual lecturer supervisors. Hence assessing the quality of the students' research indirectly also implies assessing the research quality of these supervisors. The focus of the lecturer supervisors was on assessing and stimulating the students; the focus of the research supervisor was on the students' research outcomes. This article assesses the outcome of the research as laid down in students' reports.

When evaluating the four bachelor theses for writing this article it appeared that the operationalization of their research differed. This is the result of the individual quality and work of each student and is in fact stimulated from an educational point of view. All four students successfully graduated. However, the differences in operationalization will have resulted in different student perceptions and *could* have resulted in (biased) research findings. In this ex-post stage, this cannot be traced back adequately. Apparent research limitations or mistakes have been corrected or have been discussed in this article. Any

remaining flaws in this paper are no longer the responsibility of the students. The lecturer supervisors and the four SMEs indicated in their student assessments that they valued the quality of the research of the four students. Based on the continuous interaction with the four students and their supervisors, with the SMEs, and the experts during the workshops, the Professoriate also appreciates the contribution of the students as also described in the following section.

7. Implications for future research (RQ5)

7.1 Implications from the students' research process for further research (RQ5)

1. Students are capable to assess the purchasing function within an SME; give useful recommendations for further research and for SME owners.
2. Both students and SMEs could benefit from a more business-like assignment. The Professoriate would then give separate research assignments to students.
3. Quality of supervision is important, so is time management on the side of the students.

7.2 Implications from the students' research outcome for further research (RQ5)

This section lists four *specific* and six more *general* implications.

Specific implications

4. The influence and role of customers varied for the four SMEs investigated. Applying the Treacy & Wiersema model on the purchasing function gave some indications but overall proved unsatisfactory. Perhaps the sample-size is too small. Perhaps this model is not differentiating for SMEs, as companies have to manage costs and add value to customers. This would be in line with other research on manufacturing SMEs (MacBride; 2013).
5. The Herrmann Brain Model on personality of the SME owner was applied incorrectly and yielded no results. Although we could not assess the personal characteristic of the SME owner on purchasing, we still consider this an important variable (see also Pressey, 2009; Morrissey and Knight, 2011).
6. The purchasing function in the four SMEs was organised differently. Key customers have a varying influence on the purchasing function and key suppliers are managed in a varying manner.
7. The SMEs prefer advice on short-term (financial) aspects, *and* also on long-term aspects.

More general implications

8. Although the four SMEs have four important variables (*size, industry, balance sheet total, dominance of primary purchasing*) in common, in fact their businesses and their purchasing functions differ. This is in line with the conclusion of Paik (2011) that many variables can moderate the purchasing function. It also supports our impression that the current limited research on SME purchasing cannot give general conclusions.
9. This research did not take into account macro-economic factors, fundamental shifts in competition or in business models. For instance in downturn cycles the focus will be more on cost aspects and hence Operational Excellence could be more dominant than in better economic times. This is in line with research from James (2011) and could have an impact on the SME purchasing function and performance.
10. This research did not take into account the SME position in its supply and demand chain. This and the negotiation power towards customers and suppliers could have an impact on the purchasing function.

The above implications and limitations need discussion for our new round of students' research.

Needless to say, this article and this pilot research owe much to the four bachelor graduates Bart van Olst, Daniel de Haan, Emile Beuker, and Robbert Post. They stood up to the challenge of conducting a difficult but exciting type of research.

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