
Local roots, global markets: exploring the world of manufacturing SMEs in Gelderland, the Netherlands

This paper explores the characteristics of high-quality manufacturing SMEs in Gelderland (the Netherlands) and the challenges they face in today's digitally driven 'fourth industrial revolution'. The paper shows that, as a rule, these companies act as a kind of silent power for the region in which they are based: they have strong local roots, but thanks to their narrow focus they operate on global markets. Major concerns for the manufacturing SMEs in Gelderland are the shortage of qualified technical staff, spatial bottlenecks at the business location as well as cost and risk issues related to smart industry investments. With the help of a 'new industrial policy' that is partly aimed at correcting 'transformation failure', it is argued that regional government can give manufacturing SMEs and their localities a helping hand.

Este artículo explora las características de las pymes fabricantes de alta calidad en la provincia de Güeldres (Países Bajos) y los retos a los que se enfrentan en lo que se ha dado en llamar la 'cuarta revolución industrial digital'. Mostramos que, por regla general, estas empresas actúan como potencia silenciosa para la región en la que se ubican: tienen fuertes raíces en la localidad, pero debido a su rigurosa especialización operan y funcionan en los mercados globales. Las principales preocupaciones para las pymes de Güeldres son la escasez de personal técnico cualificado, 'cuellos de botella' espaciales en la localidad donde se establecen, además de riesgos de coste y temas relacionados con las inversiones en la industria inteligente. Con la ayuda de una 'nueva política industrial', centrada en parte en la corrección del 'fracaso de la transformación', es de suponer que el gobierno regional pueda ayudar a las pymes y a las localidades donde estas se ubican.

Artikulu honek Gelderland-en (Herbehereak) kalitate handiko fabrikatzaileak diren ETE-en ezaugarriak aztertzen ditu eta horiek dituzten «laugarren industria-iraultza digitala»-ren erronkak. Adierazi dugu, oro har, enpresa horiek isilpeko potentzia gisa jarduten dutela ezarrita dauden eskualdeetan: sustrai sendoak dituzte herrian, baina daukaten espezializazio zorrotza dela –eta merkatu globaletan dihardute. Gelderland-eko ETE-en kezka nagusiak langileria tekniko kualifikatuaren eskasia, enpresa ezartzen duten herriaren espazioagatiko itoguneak, kostua-ekin lotutako arriskuak eta industria adimentsuko inbertsioekin lotutako gaiak dira. Hein batean «transformazioaren porrot»-ean arreta jartzen duen «Industria-politika berri» baten laguntzarekin, pentsatzekoa da eskualdeko gobernuak ETE-ei eta berauek kokatuta dauden udal-erriei lagundu diezaiekeela.

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1. INTRODUCTION

The Netherlands is pre-eminently a service economy. However, outside the Randstad – the country’s main urban agglomeration with cities like Amsterdam and Rotterdam – there is still a lot of manufacturing activity. Especially in the east and south of the Netherlands, the production industry is alive and kicking (Peters, 2017). For instance, the provinces of Gelderland, Overijssel, Noord-Brabant and the northern part of the province of Limburg are typical ‘manufacturing regions’. The companies producing goods are not always well-known to the big public. At the same time, they are often part of the national, European or world top in a certain market niche. Take a random Dutch breakfast table on which we often can find products to which companies from towns in the Achterhoek – a peripheral region at the Dutch-German border and part of the province of Gelderland – contributed. The buns may be baked on a production line that was fabricated in Terborg (Kaak Group). There is a big change that the orange juice is packed in a 100% recyclable

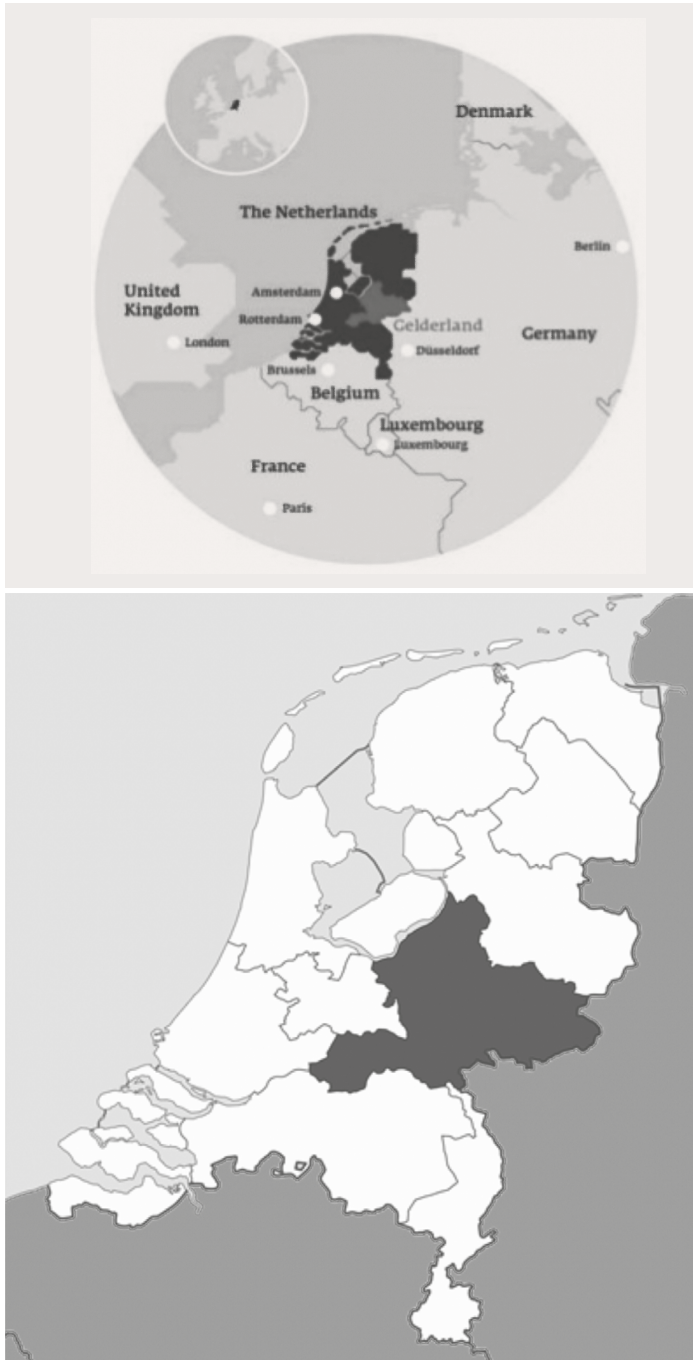
PET bottle from Lichtenvoorde (Morssinkhof Rymoplast), while the string of the bag in the tea amglass is probably from Doetinchem (rope factory Helmes-Wellink).

Following the German business economist Hermann Simon, such manufacturing companies are regularly referred to as ‘hidden champions’ (Simon, 2009; Rammer & Spielkamp, 2015; Venohr *et al.*, 2015). To be sure, most Dutch companies dealt with in this article do not meet Simon’s ambitious definition with regard to company and market size, i.e. being either number one in the European market or part of the global top three. In Simon’s terms, the firms we address cannot claim to be ‘official’ hidden champions – they are lower in the hierarchy. Yet, the east and south of the Netherlands have many technologically high-quality manufacturing SMEs with a large international clientele. Even if they are not incontestable market leaders in Simon’s terms, they are among a small group of players operating on a narrow international niche market. In addition, they combine a strategy of specialisation with a high degree of innovativeness, while their business is often family-owned and managed (Schlepphorst *et al.*, 2016). From this perspective, they have characteristics that resemble those of the ‘real’ hidden champions. In other words, we define the firms in qualitative rather than quantitative terms, as we often see in the scarce research that has been done in this field (cf. Voudouris *et al.*, 2000; Yoon, 2013; Rammer & Spielkamp, 2015).

According to several studies on the German situation (Block & Spiegel, 2011; Audretsch & Lehmann, 2016; Berlemann & Jahn, 2016), firms with ‘hidden champions’-characteristics – in German often referred to with the broader term *Mittelstand* – are important drivers of innovation and economic development of the localities in which they are located. For example, based on an empirical analysis of German regions, Berlemann and Jahn (2016, p. 1829) conclude that ‘...regions with a high share of *Mittelstand* firms are found to generate more patent applications than comparable regions with less owner-managed SMEs’. For their local surroundings, these international players form a kind of silent power, because they take care of economic growth, jobs, and innovation. The firms are usually not settled at a certain spot by accident. This is especially true for family firms: their history goes often back decades, sometimes centuries. Because of their roots, the industrial firms are often strongly embedded in their regional context and have built up strong local social networks (Block & Spiegel, 2011; Kemeny *et al.*, 2015); for example, they collaborate with regional suppliers and educational institutions or sponsor the local soccer team.

In this article we focus on the Dutch province of Gelderland as a relevant context to explore the characteristics of international market leaders and their importance for the area in which they are based. With approximately 2 million residents Gelderland is the largest province of the Netherlands, situated in the country’s eastern part, bordering with Germany (see Figure 1). *What makes the manufacturing companies in this part of the country so special and what regional impact do they have? What obstacles do they generally face? What could help them? What can government parties possibly do to support them?*

Figure 1. **GELDERLAND IN RELATION TO NORTH-WESTERN EUROPE**



Source: «How to anchor thematic cluster in urban ecosystems», Presentation at the 19th TCI Global Conference 'Global Changes' in Eindhoven, the Netherlands, 8-10 November 2016 by Michiel Scheffer, Vice Governor of the Province of Gelderland, the Netherlands.

These are issues that the present article addresses on the basis of a regional case study. The article is qualitative, essayistic and anecdotal in nature and therefore contains anything but definitive answers. Through a glimpse into company practice in the province of Gelderland, we hope to find relevant business characteristics, crucial issues and action points for policy. The aim is to give an impression of this branch of the regional economy based on a qualitative analysis of the manufacturing industry. In addition to the general literature on firms with 'hidden champions'-features, we base this article on analyses, reports and papers about Gelderland's manufacturing industry. Next to the desk research, the article reports on empirical findings generated by means of an interview round that was held between 2016 and 2017 among 15 manufacturing SMEs based in Gelderland (see Appendix 1).

2. MANUFACTURING WITH A MISSION

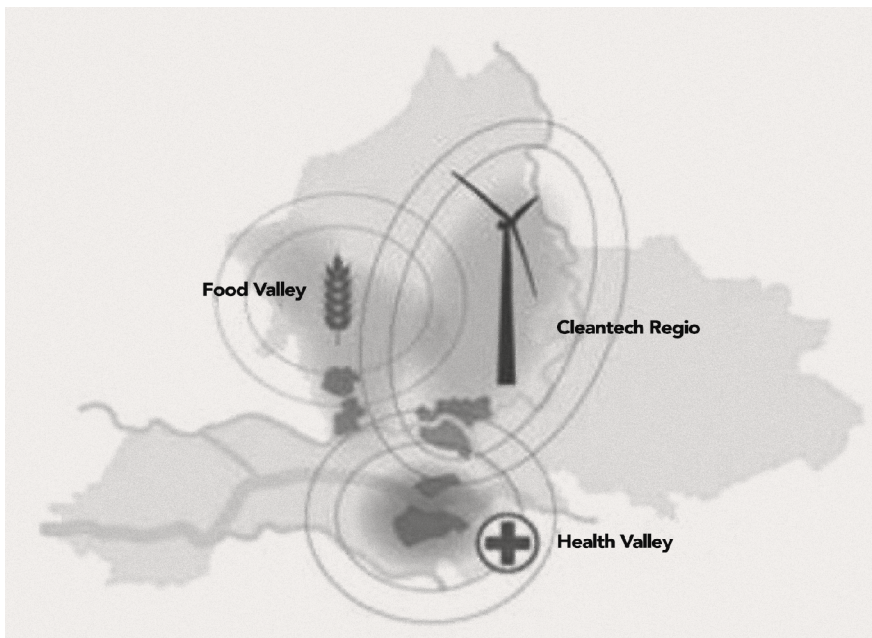
In the Netherlands, manufacturing is more important than is often assumed. The share of industrial employment between 2012 and 2017 was around 10% and the share of manufacturing in GDP around 12%, according to figures of Statistics Netherlands (CBS Statline, 2017). However, in the public debate, there is sometimes the impression that manufacturing activity in an 'expensive' West-European country like the Netherlands can be better outsourced to low-wage countries. That is a misrepresentation: the production industry is still the cork of the Dutch economy. In addition to the job engine, the industrial sector is an important 'Dutch business card' abroad: 58% of Dutch industrial sales are destined for export (Peters, 2017). The indirect effects of manufacturing are also of great importance. Innovations in this sector – whether it is information, sensor or biotechnology – find their way into agriculture and services. Moreover, many service companies (e.g. transport companies, consultancy and communication agencies) depend on orders from the production sector. After the economic crisis since 2008 and the uncertainties this entailed, the Dutch industry and industrial employment are doing well again.

In short, manufacturing in the Netherlands stands for jobs, added value, and innovation. The new Dutch cabinet – in office since 2017 – is clearly aware of this. In the coalition agreement 2017-2021, the Dutch manufacturing industry is seen as an ally in climate adaptation and energy transition. Rightly so, because as a major consumer of resources, there are plenty of opportunities in the industry for sustainability, clean technology and the circular economy. The new government opts for 'innovation with a mission' and pursues an industrial policy with a focus on the 'major societal challenges' of our time, such as energy transition, agriculture, water and food, as well as technologies of the future (VVD, CDA, D66 & ChristenUnie, 2017). Within the Netherlands, the province of Gelderland is a prime example of this 'innovation with a mission'. Whether it concerns top research in the field of health, energy and food, one will soon end up in this province with its well-developed production and knowledge infrastructure. Even though Gelderland has a strong base in these

fields, long term investments in the business climate remain necessary in view of the fierce international competition that regions are exposed to (Atzema *et al.*, 2017).

Dominant clusters of manufacturing SMEs in Gelderland aimed at solving ‘major societal challenges’ can be found in the field of food, health and energy (clean technology) (see Figure 2). In Food Valley and the North of Veluwe, for example, we find companies in international agriculture and horticulture, such as De Heus Animal Nutrition (Ede), ABZ Diervoeding (Nijkerk) and Ridder Drive Systems (Harderwijk). Research at Wageningen University is leading and has produced many innovative spin-off companies. In the Achterhoek and Arnhem-Nijmegen (the latter being the main urban agglomeration of the province), there is a lot of knowledge in the field of energy and water: Nijhuis Water Technology (Doetinchem), Fairbanks Nijhuis (Winterswijk) and Eijkelkamp Soil & Water (Giesbeek) are active worldwide. And manufacturing companies focused on health are not only located in Arnhem and Nijmegen, but also in Rivierenland (a region including ‘the Betuwe’, well-known for its fruit production), such as Wassenburg Medical (Dodewaard) and ArjoHuntleigh (Tiel). Despite the focus on food, health and energy, we conclude that the Gelderland industry is very heterogeneous and diverse in character. Most entrepreneurs have little interest to participate in an artificially made ‘cluster’ as identified by governments; they follow their passion, know the market and innovate with their staff.

Figure 2. CONCENTRATION OF KNOWLEDGE & ACTIVITY



Source: «How to anchor thematic cluster in urban ecosystems», Presentation at the 19th TCI Global Conference ‘Global Changes’ in Eindhoven, the Netherlands, 8-10 November 2016 by Michiel Scheffer, Vice Governor of the Province of Gelderland, the Netherlands.

Against this background, it is not surprising that the Gelderland manufacturing industry considers sustainability to be of paramount importance. Take the modern paper mills around Apeldoorn: they are among the most environmentally friendly companies in their industry worldwide. Entrepreneurs from Gelderland do not surf with the latest trends in the business sector but build on their years of tradition. They have an eye for their environment, their staff and the human dimension. Perhaps that has something to do with the small-scale geography and the varied landscape of Gelderland. The province is a territory that consists of a diversity of places within which the inhabitants organize their daily life. The province does not have big cities (with 170,000 inhabitants, Nijmegen is the largest city in a province with slightly more than 2 million inhabitants), while the countryside is never far away. Sustainability, responsible company behavior and doing something back for the community are part of it. In the Veluwe, the protestant faith may play a role, in a rural region like the Achterhoek, the so-called ‘neighbor’s help’. And in some cities, like Zutphen and Doesburg, the network and trade mentality from the Hanseatic period may still have an influence in the way people are working and doing business. Whatever the case, Gelderland companies do not just make something – they make it with a mission.

3. MANUFACTURING SMES IN GELDERLAND

Let us look at some relevant facts and figures now. The manufacturing sector in Gelderland consists of about 8,000 companies that together account for around 100,000 jobs, representing some 11% of the regional employment. The firms represent an added value of 8.234 million euros, which amounts to 13% of the Gelderland GDP (PWE-Gelderland, 2016). Over the past decades, this share has steadily declined, but it has remained stable over the past five years and has even grown slightly. For example, in 2016, a third of the Gelderland job growth came from the industry (PWE-Gelderland, 2016). This trend is in line with the general rule that manufacturing is a sector showing resilience and dynamism.

The Gelderland manufacturing industry has a high-quality character and generates great spillover effects: thanks to supply and delivery relationships, the production companies provide 0.9 jobs elsewhere in the province. The food industry, metal production and machinery are the most important sectors (Dankbaar *et al.*, 2014). Together they form 44% of the manufacturing jobs in Gelderland. The food industry and machine production, together with the textile industry, are also the fastest growing industries in terms of employment creation (PWE-Gelderland, 2016). Looking at the added value, the food industry, technology industry and metal production are the largest sectors. Together, they account for 60% of industrial added value. Moreover, a large academic study showed that even during the recent crisis the added value of Gelderland’s technological manufacturing industry increased by almost 1.5% per year (Atzema *et al.*, 2017).

To be sure, the strength of Gelderland manufacturing stands or falls with the companies that are part of it: most of them are SMEs and not well-known to the general public. As a rule, one can say that some firms are at the forefront (the ‘front runners’), while others are more trend-following (the ‘followers’) or have difficulty in keeping up with new sectoral developments (the ‘laggards’) (cf. Rogers, 1983). In this article, we focus primarily on the leaders and followers, not only because they form the majority of the Gelderland manufacturing industry, but also because this group has an exemplary function for the firms lagging behind. Of the 100 most successful Dutch manufacturing companies with a turnover of fewer than 500 million euros, according to business magazine *Management Team*, no less than 18 are located in Gelderland (Peters, 2017). The list consists of companies with the highest scores on four criteria over the past five years, i.e. firm performance in terms of turnover, revenue growth, profit growth and return on investment. Looking at the 18 firms in more detail, it is striking how diverse they are. For instance, the companies produce printing presses (MSP Systems in Arnhem), interiors for luxury yachts (Heesen Yachts in Winterswijk) or pigments to color plastic materials (Holland Colors in Apeldoorn).

There is a good reason that the Gelderland manufacturing industry is so diverse: many companies are so specialized, that they have little real competitors (cf. Vermeylen, 2014). They are champions in their branch and thanks to that narrow focus, customers from far and wide know where to find them (Kamp, 2017). Some random examples from Gelderland: there are firms that have focused on shock absorbers for racing vehicles (Reiger Suspension in Hengelo), customized contact lenses (Procornea in Eerbeek) and mobile weighing systems for hand pallet trucks, warehouse trucks and forklift trucks (RAVAS in Zaltbommel). For these companies the motto ‘who chooses, will be chosen’ certainly applies and pays off. The management of these SMEs, in which the founder and his or her family often participate, knows how to convey the passion for the company to the employees. Staff turnover is therefore low. The firms do not make a quick profit but focus on the long term. They often have loyal customers, with whom they maintain close contacts. Many companies innovate together with their customers, sometimes even at the client’s location itself, thus benefitting from proximity effects (Torre & Rallet, 2005; Coe & Young, 2015). For example, Alewijnse from Nijmegen, which provides electrical systems for shipbuilding, has taken this so-called ‘follow-your-customer principle’ literally: since 1992, the company has a branch in Romania thanks to a customer that comes from there (Peters, 2016).

Dankbaar *et al.* (2014) distinguish four types of manufacturing companies within Gelderland’s industry. It is a useful classification, because it shows how diverse the competencies and challenges of the manufacturing SMEs are:

- *Material workers/processors.* Companies from this group focus on transforming materials, such as metal or plastic. An example is 247TailorSteel from the village of Varsseveld, a company that can quickly cut steel and pipes to size. Through the online assistant SOPHIA (Sophisticated Intelligent Analy-

zer), customers can pass on their personalized orders 24 hours a day, 7 days a week, without human intervention. For such firms, efficiency, far-reaching automation and ‘servitization’ (the shift from production to service provision to the customer) are becoming increasingly important.

- *Process specialists.* These are companies that excel in efficient design and control of production processes. Illustrative is the paper and packaging industry with companies such as Royal Van der Most in Heerde (producing 6 million envelopes a day) and Solidpack in Loenen. Falling margins and strict environmental requirements force these companies to increase their scale and invest in continuous innovation. These companies often lead the way in terms of sustainability, energy saving and circular economy.
- *Assemblers.* These companies make composite products from components that they largely purchased elsewhere. They are always faced with the question of whether they have parts made by themselves, nearby, in Europe or even further away, in low-wage countries. Thanks to robotisation and automation, it becomes profitable again to recover part of the production, a trend known as ‘reshoring’. Take cycle manufacturer Gazelle in Dieren that no longer outsources the production of bicycle frames to China, but to Portugal.
- *Integrators.* In qualitative terms, these firms come very close to the characteristics of the small group of ‘hidden champions’ that Simon (2009) identified. As a rule, integrators opt for focus, specialization and innovation and do a lot in-house (vertical integration), because then they know for certain that things are going well. They know the customer like no other and do not define their market niche in terms of ‘products’, but of ‘solutions’. For example, industrial circular saw producer Kinkelder from Zevenaar delivers worldwide ‘metal solutions’ rather than ‘circular saws’. Also some of the firms mentioned before in this article are typical ‘integrators’, like Kaak Group (industrial bakery equipment technology), Ridder Drive Systems (electromechanical driving systems for agriculture and horticulture), MSP Systems (printing presses) and RAVAS (mobile weighing systems for trucks). The downside of the hyperspecialization strategy of these firms is that it is hard for integrators to just go into new markets or products. This makes the companies dependent and vulnerable.

4. CHALLENGES FOR MANUFACTURING SMES IN GELDERLAND

The manufacturing SMEs in Gelderland may be regionally anchored, they also have to deal with challenges. This applies not only to the front-runners, but equally to the followers and those who stay behind. The markets in which companies operate are changing fast, so that entrepreneurs must be constantly on their guard and always have to think a few steps ahead. To be sure, this dynamic context applies for

all manufacturing companies. For example, there is a development that is referred to as ‘the fourth industrial revolution’ or ‘smart industry’ (Dankbaar, 2015; Sol, 2016; Schwab, 2017). After power, electricity and automation, digitization now forms the driving force behind Western industrial development, providing new ways of communicating and working. Devices that are connected with each other via the web (‘the Internet of Things’), robots that assemble components and 3D printers that make custom-made tools are increasingly important.

Smart production is particularly relevant for companies that have to respond quickly to market demands (Van Agtmael & Bakker, 2016). Thanks to smart industry solutions, mass customization is possible. Instead of bulk production, there is room for production in small quantities and adapted to specific customer requirements. For example, wheelbarrow producer Altrad Fort from the town of Tiel no longer produces only green wheelbarrows, but also wheelbarrows in other colors. However, for many companies the costs of future-oriented production methods such as robotics, 3D printing and the Internet of Things are still too high to invest in haphazardly. Moreover, smart industry has a large impact on the workplace: it requires programming and digital skills from employees as well as social skills. Smart production asks for teamwork, knowledge sharing and creativity. Employees should be open to innovation and have the will to constantly learn.

In addition to the smart industry challenges that more or less apply for all manufacturing companies in the Western world, there are some specific bottlenecks in Gelderland. Volberda and Heij (2017) note that companies in the eastern Netherlands score above average in terms of the degree of digitization. But when it comes to social innovation, SMEs in this part of the country belong to the middle. For instance, ‘self-organization’ – the alternative organization of innovation activities on the work floor – is still relatively limited in the case of Gelderland’s business community. Co-creation with knowledge suppliers outside the firm can also be improved. This is worrying because social innovation is an important source of competitiveness. Volberda and Heij advise companies therefore to invest in creative skills of their employees on the one hand and ‘open innovation’ on the other. In short, the social side of smart industry deserves attention in Gelderland.

In addition, some production companies in Gelderland are faced with bottlenecks that stand in the way of further development. If governments want to help, they must have a good view of what is happening in the sector, as Dankbaar *et al.* (2014) already stated some years ago. To find out what Gelderland manufacturing companies are concerned about, we have analysed interviews from the media (articles retrieved in professional magazines and newspapers) with representatives of the companies concerned and in addition to this, in 2016 and 2017, we held an interview round among 15 companies throughout the region. Based on the secondary analysis and the company tour a clear picture emerges. In what follows, we provide an overview of the most important challenges for manufacturing SMEs in Gelderland.

1) *Shortage of technical staff*

The growing need for qualified technical staff is a major issue for manufacturing companies at all levels. Often the focus is on higher education graduates, but people with intermediate vocational education are certainly so important. Manufacturing SMEs usually have more work than people. Not only do relatively few young Dutch people choose technology, in the coming years many baby boomers will also retire at companies – and that while the order portfolios of the companies increase. It is true that technology campaigns have an effect, but especially for pre-university students. In the Netherlands, only 23% of the students from higher general secondary schools choose a technical follow-up program (43% of the pre-university students) (Krijnsen, 2017). Moreover, many companies need well-trained and experienced technicians now. However, there is an image problem around manufacturing, even though working in a factory implies nowadays having a job with ‘a good salary, overtime that is paid 125% and working in an environment that is clean and not noisy’, as the manager from a manufacturing firm in Rivierenland puts it. People with a technical higher vocational and higher professional education degree in mechanical engineering and electrical engineering are wanted. Also for software developers, process engineers and service engineers, there are plenty of job opportunities.

2) *Mismatch between supply and demand*

If Gelderland companies already come into contact with young graduates, then the obtained diploma is not always a success guarantee. The program often does not match the required competencies. Or in the words of an entrepreneur from the Achterhoek: ‘Then suddenly it turns out that the young people have had lessons from a book from the nineties, while the industry has changed completely in the meantime’. Some manufacturing SMEs respond with a sound internal training. Take AFP from Apeldoorn, a world player in the production of high-quality plastic film, which largely educates its employees itself, both in production and in R&D. The positive side-effect of education in the workplace is that the bond with the company is increased. Other companies are looking for collaboration with knowledge providers within Gelderland. For example, vibratory filler manufacturer Radine from Barneveld has a lot of contact with local educational institutes. At Industry park Kleefse Waard in Arnhem there is a triple helix-arrangement (an alliance between parties from regional business, government and education) to prepare the installation technicians of the future. Nevertheless, the mismatch between supply and demand remains a frequently mentioned problem. On the one hand, educational curricula cannot simply be changed and it is difficult to motivate teachers of intermediate vocational education to do so. On the other hand, manufacturing SMEs are demanding due to the nature of their business: they are so specialized that they are always looking for the proverbial ‘sheep with five legs’.

3) *Spatial bottlenecks at the business location*

Many manufacturing companies in Gelderland are doing so well that they have growth plans. To materialize their growth potential, they literally need space, i.e. space to expand the existing production facilities. The problem is that this is not always possible: the local zoning plan has to be changed, the parties involved do not cooperate or local residents are bothering. Entrepreneurs often have little understanding for this – especially local government is often criticized. ‘We are providing work, why are they acting so difficult?’, is a common complaint. Apart from the lack of opportunities to expand, there are other bottlenecks at the business location. Digital accessibility is regularly mentioned as well. It is hard to imagine, but there are still high-quality Gelderland manufacturing SMEs that do not have optical fiber internet. We see this mainly in the countryside, but sometimes also in locations where you would not expect it. Brink BV in Harskamp makes molds and advanced automation systems for the packaging industry (e.g. machines for the production of yoghurt cups), but still lacks fast internet. The same applies to Van Drenth Buighout in Culemborg, specialist in the field of woodworking and furniture production. The companies are now considering installing optical fiber themselves.

4) *High investment costs*

Some of the Gelderland manufacturing SMEs still have doubts about the use of smart industry in the production process. They know that in the long run they will probably not be able to ignore robots and 3D printers – investments in the ‘fourth industrial revolution’ have to be made at some point. But when do they have to start? And what consequences does this smart technology have for the company? How do they get the staff on the work floor to accept the change? ‘We will have no choice when, in a while, multiple older employees retire and we are unable to find new employees’, says an entrepreneur about this defensively. In addition to the initial hesitation, the substantial investment costs in new machines, digital equipment and the necessary skills also play a role. Many banks are reluctant to finance plans despite the revival of the economy, even though they are well-founded. Certain family businesses, apart from the bank where they have been doing business for years, usually do not go beyond the well-known circle of ‘friends, family and fools’ (Peters, 2016). Nevertheless, there are numerous alternative sources of finance, such as participation and development companies and informal investors. Peer-to-peer lending, in which investors invest in companies by lending them money, is also an option. But those possibilities are not always known by entrepreneurs. Also the opportunities of facility sharing and field labs (think of an advanced 3D printer, which several companies from the region can use) are not yet fully exploited (Yoo, 2017).

5) *Increase of the risks*

A disadvantage of smart industry is that companies become more vulnerable to cybercrime. By linking production with the Internet of Things, a firm also runs a greater risk of being ‘held hostage’ by internet criminals. Several Gelderlander manufacturing companies indicate that they have suffered from ransomware: their internal computer network was shut down by hackers and only functioned again after payment of ransom. ‘Then you notice how vulnerable we are as a company’, according to an interviewed entrepreneur. For a firm that can mean a large cost item. In addition to money, it costs a company time, stress and – if the captured digital data comes to the streets – damage to the image. But not only the digital world is causing an increase in risks in the manufacturing industry. Safety in the workplace is also considered a challenge by manufacturing companies. Reducing business cases is high on their priority list. Many companies also say they are concerned about the liability risk (the chance of claims from customers, because a delivery does not fully meet the requirements). In the interview round in Gelderland, ‘safety’ and ‘liability’ have in any case been mentioned by entrepreneurs from manufacturing SMEs several times.

5. WHAT COULD HELP MANUFACTURING SMES?

As a matter of fact, Gelderland manufacturing companies have serious challenges to deal with. Some themes, such as the risks of cybercrime, lie primarily with the business community itself, while addressing other issues (for example bottlenecks at the business location) obviously requires the contribution from other parties. Governments, educational institutions or other stakeholders in the region can offer a helping hand here. Before the question comes up about what the government could do, it is important to point out the most promising actions. They can be summarized in the keywords ‘recruiting’, ‘learning’, ‘sharing’ and ‘networking’. They are explained below.

1) *Recruiting: talent wanted!*

Manufacturing SMEs in Gelderland are excitedly waiting for technical staff. Entrepreneurs must make every effort to find the right people and to bind them to their company. Technology company Nedap from Groenlo, for example, is at popular Dutch music festivals like ‘Lowlands’ and the ‘Zwarte Cross’ to get in touch with young talent, while also sponsoring university business days. The companies Kranendonk (manufacturer of robotic arms), Defenture (builder of military vehicles) and Itho Daalderop (specialist in the field of indoor climate systems) from Tiel collaborate with higher and local secondary schools to interest students in technology and production. With excursions, guest lectures and internships, the companies show young people what it means to work in a modern factory. The recruitment does not only have to focus on young people. Side entrants from a completely different direction, even non-technical, are also an

interesting target group. Because it must be possible to teach an unemployed caretaker or secretary how to operate a robot. Dankbaar and Mosterd (2017) put it in *Het Financieele Dagblad* like this: ‘There is a shortage of technically trained staff, but no shortage of technical talent!’.

2) *Learning: social innovation*

The smart technology that goes with the ‘fourth industrial revolution’ requires specific skills, for both new and existing employees. To learn those skills, companies increasingly train their staff in-house. For example, at industrial circular saw producer Kinkelder (Zevenaar), a teacher schools and trains employees on location. And because high-tech is increasingly accompanied by human touch, such as teamwork and creativity, it also involves knowledge of processes (for example Lean and QRM methods) and other aspects of social innovation. Interesting in this respect are the so-called ‘Innovation Hubs’ in Gelderland, a project in which companies and education institutions have joined forces. These hubs are ‘learning circles’ of groups of students who research innovation questions from the regional business community. The participating firms learn from the look from the outside, while the youngsters get a look in the business. Kitchen manufacturer Bribus, printing company Enveloprint, metal mesh weavers Dinxperlo and glue manufacturer SABA, for instance, collaborate in the hub ‘Inno-Dinx’. Manufacturing companies do well not only to see the workplace as a production space, but also as a learning environment. In a work context, employees learn more and faster than in a classroom.

3) *Sharing: getting started together*

The Innovation Hubs indicate how valuable knowledge sharing and collaboration can be in the Gelderland manufacturing industry. In the field of smart production, there are many more opportunities for synergy. Some manufacturing SMEs are still struggling with the question of how and when they should work with smart industry. Why reinvent the wheel yourself, while colleagues around the corner are already busy with it? Although every firm has specific challenges in terms of content, numerous process-related questions are cross-company. These issues can be explored together, for example in a field lab in which entrepreneurs and educational institutions from nearby collectively learn and experiment. The smart bending factory in Varsseveld is an example of such a ‘pilot plant’: steel companies, training institutes and other regional stakeholders jointly explore the future of metalworking here. It may also be useful around other themes to get together. There is, however, the impression that interfirm cooperation differs within Gelderland. In the sub-region Achterhoek for example, joint action is more obvious than in the Food Valley, where many companies seem to see each other more as a competitor than as a colleague.

4) *Networking: beyond the company walls*

Dankbaar *et al.* (2014) advise to focus on further networking in the Gelderland manufacturing industry: where contacts do not come about automatically, they must be actively encouraged. In this context, the province of Gelderland organizes roundtable discussions between entrepreneurs and policy officials. Such sessions can indeed lead to knowledge exchange, mutual understanding and trust, just as networks between companies within and outside the region are a breeding ground for innovation and internationalization. The advice to focus on networks is even more relevant than a few years ago. Manufacturing SMEs from Gelderland are traditionally used to operate independently for the benefit of customers who are sometimes settled at the other end of the world. But the solution of their problems comes increasingly from outside the company walls: the professional recruitment of personnel, social innovation and experimenting with smart industry requires joint action, just like expanding the business location or taking action cybercrime. Linking the Gelderland industry with other relevant parties within and outside the region is crucial.

6. TOWARDS A 'NEW INDUSTRIAL POLICY'

Does the government, as guardian of the general interest, have a task in the four actions that help the Gelderland industry? And if so, what could they do? This brings us to the field of industrial policy, whether or not at regional level. For many, the term 'industrial policy' is synonymous with a series of failures, such as state aid to Dutch shipbuilding and strategies to make yet another Silicon Valley out of the blue. Over the years it has become clear that a policy of picking winners (subsidizing successful companies) does not work, just like backing losers (supporting loss-making companies) (Hospers, 2001). The influence of government on the manufacturing industry is limited and can only be modest.

At the same time, we know that government intervention can indeed lift a region to a higher level. In the Dutch Brainport region, triple helix-cooperation between government, education and entrepreneurs has ensured that Eindhoven has grown from a gray company town into an innovation hotspot. The long-term policy in Baden-Württemberg focused on industry and innovation, the so-called *Standortpolitik*, has also borne fruit. In fact, experts even consider the 'location politics' of the federal state as one of the secrets of the German economy (Audretsch & Lehmann, 2016). But still, here, the government adheres to market developments. Only where the market cannot solve these problems itself ('market failure') or where the regional innovation system does not function optimally ('system failure') there is room for corrective or supplementary policy, according to the classical view.

Interestingly, in recent years researchers have increasingly argued for a more active government role in the field of industrial development. The reason for this is the

major societal challenges facing our world, such as climate change and food security. We cannot expect from firms that they bring about the transformations alone – the complexity of the tasks is too great for that. With this ‘transformation failure’, the government comes into the picture as a supporter and a booster (Frenken & Hekkert, 2017). Examples of problems arising from the grand societal challenges are unfamiliarity with the tasks, lack of learning ability, lack of a guiding vision and lack of urgency. Applied to the manufacturing industry, for example, the government can try to prepare companies for the fourth industrial revolution. And as an independent party that has an eye for the long term, the state can sketch perspectives, define frameworks and lay out lines. For instance, Mazzucato (2013) shows that an ‘entrepreneurial government’ can ensure that industry and innovation development can go in the desired direction (e.g. around themes like sustainability). It brings economists such as Janssen et al. (2017) to propose a ‘new industrial policy’.

To explain this new industrial policy, Janssen *et al.* (2017) use the ‘Scrabble metaphor’. Economic innovation, according to Hidalgo and Hausmann (2009), is comparable to a game of Scrabble. Players are countries or regions that compete for profit, in this case, economic growth. The ‘letters’ that companies have in the game stand for their competencies and the ‘words’ to be laid for new products and services. The more letters the players have, the more new words can be formed. And the more unique the available letters, the higher the potential ‘word value’ and the greater the chance of winning the game. In this way, industrial policy should focus on increasing the ‘vocabulary’ (read: competencies) of companies. Furthermore, the policy should train entrepreneurs in the skills they need to achieve a higher ‘word value’ (read: innovations). In other words, industrial policy must challenge the market to become better Scrabble players. The aim of the policy is to combine the knowledge and skills of companies from different sectors in such a way that the chance of socially relevant innovations is increased. In sum, there is a good reason for government to support manufacturing SMEs in one way or another.

7. ROLE OF THE REGIONAL GOVERNMENT

When it comes to the development of the manufacturing industry – as in the case of Gelderland – the regional government is pre-eminently the party for shaping the ‘new industrial policy’ we discussed above. Unlike the EU and central government, local authorities are best informed of the particularities of a certain place. The trump card of regional government with regard to a municipality is that it operates in a supra-local way. In theory, therefore, this party is able to provide promising connections. What could a regional government (in the Dutch administrative system: the provincial government or simply ‘province’) do in a more general sense? In industrial development at least four useful roles can be identified: the province can create preconditions (facilitate), bring parties together (connect), drive innovations (invest) and take promotional measures (promote).

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Facilitation involves the creation of preconditions under which manufacturing SMEs can develop optimally. The term ‘business climate’ is crucial for this: the region must remain attractive as a business location, in the field of economy, work and living. This does not only concern the primary conditions companies often insist on, such as favorable physical and digital accessibility, modern work locations and a government that thinks along with entrepreneurs who want to expand their business. Due to the ‘war on talent’ between regions, also ‘secondary employment conditions’ gain in importance. Potential employees are increasingly looking at the living environment (Florida, 2005). When a region connects with their wishes, then they want to live there and possibly also work. With its green environment and an eye for the human dimension, there are opportunities for Gelderland here. But also good educational, cultural and hospitality facilities in the region are important. Of course, the provincial government can not just take care of this. However, it is important to note that a policy aimed at regional industrial development is not limited to the economy alone (Raspe *et al.*, 2017). Making connections with other regional dossiers, such as living conditions, culture and landscape, is therefore obvious.

In addition to facilitating, connecting is an important role for the province. Because of their specific business and full order book, manufacturing SMEs are often in their own bubble. Although the companies are embedded in their local environment, they often lack the time to explore opportunities nearby, for example in the field of knowledge development, supply and outsourcing. Linking companies around a new technology (such as 3D printing) or otherwise is promising, especially since radical renewal often comes from unrelated but specialized knowledge. Jansen *et al.* (2017) therefore argue for a policy of ‘cross-specialization’: ‘This is not just a question of brokering, but requires an interactive process in which apparently unrelated companies discover how the combination of their abilities can lead to fundamental renewal’ (own translation from Dutch). In short: companies and other actors who do not know each other can create promising Schumpeterian ‘new combinations’ (Hospers, 2001). The regional government, in this case the province of Gelderland, could create this interaction in (temporary) platforms in which parties from various sectors come together around a breakthrough technology or grand societal challenge.

The regional government can also co-invest in the future of the manufacturing industry. Such a guiding role can be justified from the idea of ‘transformation failure’: the industry is in such a process of revolution that the government cannot simply leave it to the companies themselves (Frenken & Hekkert, 2017). In this case, a more active, even directional government role makes sense. It is important to pay attention to factors that are not necessarily associated with manufacturing itself. For smart industry is not just about technology and production, but also about soft skills, such as being open to innovation, self-organization and other creative skills. For example, the government can, together with regional education, set up a course

or training on ‘skills for the 21st century’ where manufacturing companies can send their employees to. Investing in the set-up and organization of physical spaces within the region where companies can experiment with educational institutions in the field of smart industry is also possible. These ‘pilot factories’ are intended as a laboratory for the ‘fourth industrial revolution’. Financial participation from government in such research, training and production facilities can be justified.

Finally, the regional government can play a role in the branding of the manufacturing industry. It is not about giving publicity to individual companies, but about emphasizing shared business characteristics, such as the combination of local roots and global markets. For example, branding of the Gelderland region as a manufacturing province is not a luxury, because the local manufacturing SMEs regard the shortage of technical staff as the key problem. That is why the regional government is doing well to explore how branding, storytelling and other promotional measures can improve the image of the province of Gelderland – or its sub-regions – as a business location for companies and talents who want to ‘innovate with a mission’. The profiling of industrial activity within Gelderland itself is certainly so important. For how can a young person from a Gelderland provincial town become enthusiastic about a career at a firm around the corner if he does not even know it exists? Paradoxically, the manufacturing SMEs in Gelderland are well-known to their global customers, but now it is time that they profile themselves locally.

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APPENDIX 1

Manufacturing SMEs in Gelderland that were consulted and interviewed in 2016 and 2017 (company name, location, business activity)

- Altrad Fort** (Tiel) – wheelbarrows and construction equipment
- Avantes** (Apeldoorn) – fiber optic spectroscopy
- AWL-Techniek** (Harderwijk) – joining technology (interview by Piet Renooy, Regioplan)
- Brink BV** (Harskamp) – moulds and automation
- Coldenhove Papier** (Eerbeek) – paper production
- Interface** (Scherpenzeel) – commercial modular carpet tiles
- Jansen Poultry Equipment** (Barneveld) – poultry housing systems
- Kaak Groep** (Terborg) – industrial bakery equipment technology
- Kinkelder** (Zevenaar) – industrial circular saws
- Koninklijke Gazelle** (Dieren) – bicycles and e-bikes
- Metaalmorfose** (Hattem) – specialized metal products
- Rosti Mepal** (Lochem) – plastic consumer products
- Stooff Interior Projects** (Eibergen) – furniture production
- Synthon** (Nijmegen) – high-quality pharmaceuticals
- Van Drenth Buighout** (Culemborg) – furniture production