Evolving roles and dynamic capabilities of an innovation agency: the Dutch *Rijksnijverheidsdienst*, 1910–1940

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**ABSTRACT**

Contemporary literature on intermediary organisations does not cover the history of these organisations in the early twentieth century or how their roles evolved. To understand the evolution of roles, this paper extends the application of dynamic capabilities theory from firms to intermediary organisations. It does this by studying a Dutch government innovation agency between 1910 and 1940 with dynamic capabilities in mediation and knowledge development. These capabilities are illustrated by nine examples that reveal how the agency’s consultants modified and extended their resource base in order to continue supporting small and medium-sized enterprises while coping with considerable challenges and changes. Thereby, this paper shows that the dynamic capabilities theory can explain how intermediary organisations can adapt their roles.

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**Introduction**

Innovation studies show that gaps in market and innovation systems are bridged by intermediary organisations (Howells 2006; Klerkx and Leeuwis 2009). Examples of gaps that firms experience are barriers to knowledge (Kirkels and Duysters 2010), lack of advisers or lack of relationships with access to knowledge sources (McEvily and Zaheer 1999). Firms and knowledge suppliers experience difficulties in closing these gaps themselves, because their goals and perspectives are incongruent (Dalziel 2010). Thus, intermediary organisations enable innovation in firms by performing roles in brokering and knowledge transfer (Howells 2006). Often, these intermediaries are publicly financed, because the perceived lack of short-term results prevents firms from hiring private consultants (Nauwelaers and Wintjes 2002). While all firms may find it difficult to create the necessary connections due to market and innovation system failures (Sapsed, Grantham, and Defillippi 2007), small and medium-sized enterprises (SMEs) face additional challenges, as they are more limited in their resources and scanning abilities than large firms (Kirkels and Duysters 2010).

Nowadays, a considerable part of Dutch businesses still consists of SMEs, however, SMEs dominated the economy in the late nineteenth century. Then, relatively late in comparison with neighbouring countries, these SMEs were confronted with industrialisation (Lintsen 2005). Civic organisations with members of the elite and upper middle classes, later joined by confessional parties and organisations, expressed concerns about the impact of industrialisation on SMEs. These organisations took various initiatives to support SMEs and one of these resulted in the establishment of a government agency for technical information in 1910: the *Rijksnijverheidsdienst* (RND, Technical Information Agency). The publicly financed RND was the first Dutch intermediary organisation in the industrial sector and is the topic of this paper.
Our main goal, however, was to analyse the evolution of its roles between 1910 and 1940 as a result of challenges and changing circumstances. We illustrate that RND's dynamic capabilities in mediation and knowledge development explain how it could evolve its roles. By 1940, its roles were different from the initial design, because over time RND had adapted to several external changes. However, its reaction to external opportunities and threats is not the most remarkable aspect. The analysis also shows a distinct feature of an intermediary organisation. While the newly established organisation started out with the roles its founders had in mind, as soon as the organisation became operational, it realised the need to formulate and change its roles, not necessarily in keeping with its founders' aims and ideals.

This paper consists of seven sections. First, a section on intermediary organisations, roles and the historical background and theory. Second, a section about the analytical approach based on dynamic capabilities. The third section explains the methodology. This is followed by an analysis of RND's activities, then sections describing the establishment of RND and the evolution of its roles. Finally, a section with conclusions.

**Background: definition and research focus**

Our definition of intermediary organisations is based on a review of contemporary studies on intermediary organisations. As researchers from a wide variety of disciplines have studied intermediary organisations, there is no consensus on what an intermediary organisation is, nor is there agreement about the name, as a long list of synonyms shows (e.g. broker, bridging organisation, innovation intermediary) (Dalziel 2010; Howells 2006). Therefore it is necessary to articulate the selected definition.

Firstly, this paper focuses on intermediary organisations which support innovation of firms as one of their explicit objectives. Therefore, it does not study parties which support innovation incidentally, like suppliers who may supply knowledge to improve product quality. Secondly, this paper studies roles in knowledge circulation. For that reason it will not examine activities relating to the coordination of markets or prices, which may be defined as innovation as it ensures the survival of firms (Dalziel 2010). Summarising, this leads to the following definition: ‘an intermediary organisation enables innovation in firms as one of its explicit objectives by connecting, translating and facilitating flows of knowledge’.

Contemporary studies of intermediary organisations also informed our research on the evolution of roles. This shows that the research is limited to organisations in the last 25 to 30 years (Howells 2006). Most researchers analysed intermediaries at a specific moment, for example by studying staff competencies (Hakanson, Caessens, and Macaulay 2011) and performance measurements (Blondel 1995; Coehoorn 1995). Some studies noted that intermediary organisations adapt their approach to cater for variations in sector, region and period (Hassink 1997; Kolodny et al. 2001; Roxas, Pioli, and Sorrentino 2011), which also led to the conclusion that there is no one-size-fits-all solution (Nauwelaers and Wintjes 2002). So, intermediary organisations seem to function best when they adapt to their environment, but how this happens and how this is influenced has not been investigated yet. Moreover, the time dimension is lacking. Researchers observed that intermediary organisations had changed in response to challenges and opportunities (Winch and Courtney 2007). However, they have not conducted research on how an intermediary organisation adapts to changes in its environment over several decades.

Lastly, the debate in SME policy studies (Hassink 1997) is about how innovation intermediary organisations for SMEs can be designed and structured more effectively. This raises the question of how effective original design rules are after a specific period of time. Furthermore, innovation intermediaries also change because of the organisation’s own preferences. When it is established, an intermediary’s structure will reflect the goals, ideas and ideals of its initiators. Once the intermediary organisation is in place and starts to function, it becomes an actor that reinterprets, changes and optimises its roles.
This paper reviews roles from the intermediary organisation perspective. A role is defined as consisting of function and position, where function refers to the useful thing that an organisation does or intends to do, and position refers to where an organisation is in relation to others (Sinclair 2003). The contemporary literature review and a multiple-case study of three SME sectors provide four roles in knowledge circulation (Table 1) (Tjong Tjin Tai 2015). Thereby, the literature extends an early view of intermediary activities that focused only on knowledge transfer (Winch and Courtney 2007). Lastly, Meulen, Nedeva, and Braun (2005) suggest that performance and change in intermediary organisations depend on the relationships they mediate and the changes in these relationships. Therefore, this paper studies the evolution of roles by studying changes in functions and relationships.

The subject of this paper is also rooted in historical research. The proponents of RND were found amongst those who embodied and propagated the modernisation of the Netherlands. Misa, Brey, and Feenberg (2003) show that in America and Europe ‘The tie between modern technology and social progress was much in the minds of “modernists” in the early twentieth century.’ Schot, Lintsen, and Rip (2010) illustrate how for the Netherlands from 1890 onwards, various proponents of modernisation articulated the ‘demands of the modern era’ and promoted the use of specific technologies. However, this did not imply that they always agreed on how it was to be done. By stressing this idea of contested modernisation, the authors provoked ‘discussion of alternative paths to modernisation’. Our actor driven approach will be in line with that discussion. The establishment and development of RND highlight the differences in opinion on how SMEs should cope with industrialisation. The unfolding of the contested modernisation process is inextricably bound with the specific national context. Schot, Lintsen, and Rip (2010) stress ‘the specific role of Dutch governments and their reliance on intermediary actors that helped to manage the relationships between public and private spheres’. New acquisition methods and diffusion of knowledge developed during the second wave of industrialisation in the late nineteenth century. While large industrial firms established research laboratories, it took much longer for the Dutch government to adopt an active role in fostering a public knowledge infrastructure for SMEs (Davids, Lintsen, and van Rooij 2013). The Netherlands was a liberal economy in which the government was not expected to intervene (Gerwen and de Goey 2008). These two interrelated features of the Dutch context – government involvement and their reliance on intermediary actors – also played a role in RND’s establishment and development. We will illustrate how these influenced RND’s roles from 1910 until 1940. This research period enables insight in the effect of two major external events that impacted Dutch businesses: World War I and the economic crisis, which both led to greater government intervention (Sluyterman 2005).

### Analytical approach

While historical and intermediary organisation studies guided our definition and research focus, our analysis is based on insights from dynamic capabilities studies. This perspective gives us an insight

| Types         | Roles                                                                 | Activities                                                                                                                                   |
|---------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| Knowledge     | Providing knowledge                                                  | Conducting and supporting knowledge provision activities for firms:                                                                        |
| transfer      | - knowledge flows to the intended firm(s)                            |   - personal advice to firm(s), training, demonstrations, study trips and exhibitions, publications, etc.                                   |
|               | Influencing                                                          | Conducting and supporting promotion activities for firms and sectors; articulating innovation needs                                        |
|               | - knowledge flows from firm(s)                                       | Translating and adapting knowledge; testing and evaluating technology; developing technology                                                   |
| Knowledge     | Generating knowledge                                                 | Defining specifications and norms for firms; accreditation; tests and quality controls                                                     |
| development   | - transforming knowledge to make it suitable for local firm(s)        |                                                                                                                                              |
|               | Standardisation                                                      |                                                                                                                                              |
|               | - generating and translating knowledge and aligning this with firms and other stakeholders |                                                                                                                                              |

**Table 1.** Roles of intermediary organisations (Dalziel 2010; Howells 2006; Winch and Courtney 2007).
into the dynamics by focusing on how organisations evolve or can be changed over time and what advantages are achieved or sustained. Teece, Pisano and Shuen (1997) were the first to stress the importance of dynamic capabilities in coping with external circumstances. According to the authors, the ability to integrate, build and reconfigure internal and external competences is essential for responding to rapidly changing environments. By altering the resource base, dynamic capabilities open new strategic alternatives or paths for the organisation.

After several years, a group of researchers decided to define this concept more precisely while using the accumulated insights. This led to the definition of dynamic capabilities as ‘the capacity of an organisation to purposefully create, extend, or modify its resource base’ (Helfat et al. 2007). The term capacity in the definition implies that a dynamic capability is repeatable, as it consists of patterned and somewhat practiced activity. The definition further incorporates the search, selection and learning aspects of dynamic capabilities. The resource base includes tangible, intangible and human assets as well as capabilities which the organisation owns, controls or has access to on a preferential basis. The authors consider capabilities to be the resources that an organisation can draw upon to accomplish its aims. A capability involves the integration of tangible assets, knowledge and skills in order to perform a task. However, an essential factor for capabilities is people, because capabilities incorporate knowledge and skills of individuals and teams.

This paper is a contribution to empirical dynamic capabilities studies. So far, dynamic capabilities studies tend to be abstract and focus on defining the core concepts, resulting in only a few empirical studies, for example Ludwig and Pemberton’s study (2011) of the Russian steel industry. Moreover, these studies mostly focused on firms. By studying an intermediary organisation, this paper investigates how well this approach works in another type of organisation.

**Methodology**

Research for this paper started with a literature review and archival research (Appendix 1). The collected data consisted of annual reports (Appendix 2), minutes of meetings, design notes, public discussions, letters, articles and so on.

The research methodology consisted of two analyses. Firstly, we conducted a quantitative analysis of RND’s core activity, advice to SMEs. Next, we undertook a qualitative analysis of nine cases of challenges and external changes that RND had to cope with, the effects on RND’s resource base and corresponding changes in roles and relationships. For that purpose, we defined two dynamic capabilities: mediation and knowledge development (see also Table 4). We selected the cases by reviewing the available literature and archival documents, resulting in an analysis that covered the period from RND’s establishment up till 1940.

**Analysis of RND’s advisory activities**

From 1910, RND was a small agency whose core activity consisted of responding to advice requests from firms, the majority of which were SMEs (Eekels, Christiaans, and Kaasschieter 1985; Lente 1990). These requests and responses were in written format and often supported by a personal visit by the RND consultant to the firm to ensure a good understanding of the situation. The number of responses increased from an unknown amount in the first years, to about 400 per year in 1915 to almost 1400 per year by 1939 (Figure 1). The topics ranged from electrification and mechanisation, supplier addresses, bookkeeping, new laws and regulations. In addition, RND also conducted various activities for governmental bodies. As there were about 390,000 Dutch SMEs (Centraal Bureau voor de Statistiek 1935–1937), this justifies the conclusion that RND could only be a token agency.1

Available data on the period between 1920 and 1940 shows that the majority of the advice requests originated from three sectors: metal, textile and laundry, and food (Table 2). The interest from the metal sector was further enhanced by RND’s decision to specialise in metal production from 1937.2
Further analysis indicates the four most popular areas of advice: production equipment, suppliers, processes and ingredients and energy up till 1935 (Table 3). Additionally, the type of advice requests followed technical developments and economic trends. In the late 1920s there was a need for advice in business economics, especially to save labour costs, whereas during the economic depression in the 1930s many SMEs requested advice about sales and markets.

Establishing RND

The establishment of the RND had its origin in two proposals. In 1900, the civic organisation Vereeni-

ging tot bevordering van de Fabrieks- en Handwerksnijverheid (VFHN, Association to Promote Industry and Crafts) concluded that there was a need for a neutral, independent agency that provided firms with technical advice. It would broker between firms and professors at Delft Technical University or other experts. Information requests were expected to include technical issues and supplier addresses. The initiative, however, received also critical reactions about the need and the feasibility of the agency. Some Delft Technical University professors claimed they were already consulted regularly. Public reactions came from two engineers, who saw the suggested agency as unfair competition and not feasible.

After the establishment of the Nederlandsche Middenstandsbond (Dutch Association for SMEs) in 1902, SMEs became involved. In 1906, the Middenstandsbond approached the Maatschappij van Nijverheid (MvN, Society of Industry) to establish a joint committee proposing an exhibition of modern technology for SMEs (Ingenool 1927, 52). In the meantime, the VFHN had merged into the MvN in 1903. The joint committee broadened its goals and the plan for a technical agency resurfaced.

The committee presented its proposal for an agency in 1909, which turned out to be an extension of the original VFHN initiative inspired by an Austrian government institute for SMEs. The activities of the proposed Dutch agency were positioned as education for SMEs, who needed independent and impartial advice about new machinery. The agency would have five consultants with a technical background. Each region would have their own facilities, where they would stimulate exhibitions, give lectures and organise training. The government would have to finance the high estimated costs – 50,000 guilders a year – with the advantage that the consultants would have a neutral position.

The MvN approved the proposal but made two stipulations. The consultants should have an academic degree and maintain relationships with the MvN and other industry stimulating associations.
The new cabinet, supportive of SMEs, approved the new proposal. According to the government, the agency was to transfer knowledge to firms, especially to SMEs. It would collaborate with the few existing schools and laboratories for the trades. However, to ensure the approval of Parliament members who were critical of financing agencies, the budget was only 10,000 guilders, which meant that only one consultant could be appointed. Finally, the first RND consultant, Floor C. Kist, a 31-year-old mechanical engineer, began on 15 August 1910. He reported to the chief civil servant of the Ministry of Economic Affairs, Department of Trade and Industry.

Summarising, RND’s organisational design and resource base depended on its proponents. The VFHN proposed the transfer of technological knowledge, whereas the Middenstandsbond provided additional activities for stimulating SMEs. Lastly, the Parliament members’ reluctance to spend money on supporting businesses resulted in an agency that started off with one consultant.

Evolving roles of RND

Once RND was in operation, its roles changed in response to challenges and changing circumstances. This section describes nine examples of these changes.

Extension

Three years after RND was established, the government extended this organisation. The first consultant was apparently able to fulfil the demand by conducting a study for SME policy, responding to advice requests, creating a database with supplier and machinery information, and helping SMEs in crisis, like blacksmiths. In 1913, the government appointed two new consultants (Eekels, Christiaans, and Kaasschieter 1985). From then on, each consultant worked in his own region. Furthermore, RND was extended with a laboratory to demonstrate equipment and to support consultants in collecting information and addresses. The laboratory was to be built on the Delft Technical University campus to stimulate good working relationships with the lecturers.

World War I

As a result of the outbreak of World War I, RND changed and extended its activities. As SMEs found it difficult to continue their operations, RND responded by advising SMEs how to replace and conserve raw materials. Furthermore, as the government had taken control of distribution, SMEs needed representation of their needs within these new distribution offices and governmental committees. However, not all the sectors had well-functioning national trade associations. RND responded by building relationships with these new offices and committees, either by representing SME interests, or by becoming a committee member.

Table 2. Origins of RND advice requests, 1920-1936 (ARND)².

| Sector                          | 1920–1924 | 1925–1928 | 1930–1934 | 1935–1936 |
|--------------------------------|-----------|-----------|-----------|-----------|
| Wood, cork, straw sectors      | 382       | 262       | 279       | 234       |
| Metal sector                   | 944       | 732       | 1221      | 621       |
| Textile, laundry sector        | 680       | 667       | 703       | 241       |
| Food sector                    | 528       | 420       | 464       | 145       |
| Other                          | 714       | 908       | 1342      | 376       |
| Other organisations²           | 1310      | 804       | 869       | 409       |
| Total                          | 4558      | 3793      | 4878      | 2026      |

²For 1929 and 1937 to 1939, no detailed data was found. Column totals do not equal those in Table 3, due to inconsistencies in reporting.
³Ceramics, glass, lime, stone, chemical, leather, rubber, paper, board, printing, gas and electricity, other or unknown.
⁴Governmental bodies, consultancies, associations, traders.
Thus, World War I impacted RND’s scope of advice and led to its new role representing SME interests.

Working with civic organisations

By collaborating with civic organisations as MvN requested, RND was able to partly compensate for its lack of resources. For example, when consultant Begemann observed that Amersfoort’s local industry needed to grow, he planned to establish an MvN department in this town. In other cases, RND consultants were board members or advisers for civic organisation initiatives. In 1915, a group of well-to-do and noble citizens established the Vereeniging Nederlandsch Fabrikaat (VNF, Association ‘Made in the Netherlands’), to promote products that were manufactured in the Netherlands as replacement for products imported up till World War I. RND was involved in the establishment of the VNF and then audited firms that wanted to qualify for the VNF hallmark. Another initiative was the Bureau voor Uitvinders (BvU, Agency for Inventors), which was established in 1917 by the MvN and a wealthy manufacturer to financially support inventors’ requests for patents. Consultant Steketee was on the BvU board and the RND laboratory reviewed the inventions. However, the RND consultants were initially wary, as they did not want to be managed by civic organisations. When consultant Steketee had begun working for RND at the end of 1913, he did not yet want to give presentations for MvN departments. First, he wanted to have his work scope better defined, as he suspected the MvN in Groningen had designs on managing the RND consultants.

Thus, collaboration with civic organisations resulted in a useful extension of RND’s resource base.

The RND laboratory and Delft Technical University

When RND wanted to initiate new laboratory activities to respond to new SME needs, they first had to convince the Delft Technical University professors on the advisory board. This board had been established to ensure good working relationships. Its members were three mechanical engineering professors who were expected to review requests and decide how to deal with requests that the consultants could not answer.

The discussions between RND and the advisory board began in late 1915. As a result of the war, firms had approached RND for assistance in using generator gas for heating purposes. Consequently the consultants proposed to organise a demonstration and more tests. As they did not receive a response from the professors, the consultants felt that their proposal was not taken seriously. Furthermore, they questioned whether the board had to be in charge of the laboratory. Finally, a meeting was arranged in March 1916, when RND convinced the board of the feasibility of its proposal and the need to extend the laboratory’s activities with testing. Firstly, it appeared that the professors were unaware of the range of applications and the need for further tests to ensure this method was suitable for implementation in firms. Secondly, the board had to be convinced of the laboratory’s capability to conduct tests. Finally, when consultant Steketee mentioned examples of requests he had received over the past few years from metal works, printing offices and tin
manufacturers, the professors were convinced. The RND lab organised demonstrations at the end of 1917, after some delays because of the war. After that, conflicts were a thing of the past because the board was disbanded.26

Thus, in order to respond to SME requests, RND took the initiative to extend their laboratory activities, thereby also amending the original role of the board as RND laboratory supervisor.

Establishing ONRI, the Dutch association for consulting engineers

When starting its activities, RND faced two challenges. Firstly, to ensure that firms would have access to reliable private engineering consultants who would further develop RND’s general advice.27 This profession was new and not yet regulated, so RND could not refer to a professional association. Secondly, to forge good relationships with engineers, who considered RND as unnecessary and also as unfair competition.28 These challenges resulted in RND’s initiative to establish an association for consulting engineers.

At first, RND tried to arrange cooperation with the two MvN associations which gave their members advice on how to use steam boilers economically, prevent smoke and on general technical matters.29 However, RND and the associations could not agree on how to organise this cooperation, so RND decided to give two engineers the task of establishing an association for consulting engineers.30 It would set standards for independent consulting engineers, its members would be approved by RND and association members and RND would also agree their scope of work: RND consultants would only give outline technical advice, which consulting engineers would then develop in more detail.31 Consequently, the Vereeniging ‘Orde van Nederlandsche Raadgevende Ingenieurs’ (ONRI, Dutch Association for Consulting Engineers) was established on 4 January 1917.32

Summarising, to ensure the standard of private consultants and to build good relationships with consulting engineers, RND initiated the establishment of the ONRI and agreed to limitations in the scope of RND’s activities.

Technical assistants

What Kist, the first RND consultant, noticed right from the start, was that many SMEs needed very basic support as they lacked proper training. He advised the appointment of technical assistants who were experienced craftsmen with up-to-date vocational training.33 It took until 1917 before the first technical assistant was appointed, for blacksmiths.34 This was a success, so assistants in other sectors followed: for wagonmakers, clog makers, plumbers and fitters.35 These assistants were placed in those sectors which had the highest need or which lacked vocational schools.36

RND decided that in order to be effective, these assistants would communicate with the craftsmen in an informal way, by meeting in their workshops for personal advice and to demonstrate advice on-the-job. As these craftsmen were not used to having outsiders in their firms, RND worked with local trade associations to be introduced. Once the assistants had shown their practical value on the workshop floor, the craftsmen trusted them and asked many questions.37

The technical assistants also conducted several knowledge development activities.38 To improve product quality, they initiated a trademark stamp for Dutch clogs and were jury members at trade competitions. To support business improvements, they standardised cost calculation methods for blacksmiths and wagonmakers, made product drawings and developed standard workshop drawings. To stimulate sector learning, they published examples of good cost calculations and organised time studies. Thus we see that the original idea of transferring the latest findings in science and technology had not been helpful for many SMEs. RND changed its approach and cooperated with trade associations to successfully transfer and develop knowledge via technical assistants.
The sector approach

Originally, the *Middenstandsbond* wanted RND to also organise courses, exhibitions, demonstrations and to support sectors in their modernisation as in Austria. However, as RND’s resources were limited, this was not possible. Then, in the early 1920s, RND met with non-religious and Catholic trade associations in the laundry sector. The meeting resulted in a successful series of lectures, articles and services for the sector, based on existing RND capabilities. Consultant Steketee conducted a comparative cost study that resulted in a benchmark for laundry exploitation costs, which laundry firms could use to improve their business. His colleagues developed advice to improve laundry machines and technology.39

RND’s expertise was then presented at lectures and published in the associations’ magazines, which increased the number of advice requests from laundries, from 48 in 1922, to 94 in 1923 and 122 in 1924.40 To provide these, RND also cooperated with other intermediaries. After that, the laundry associations asked the consultants to design a course based on their knowledge. The success was a breakthrough for RND, as until then, it had felt limited in its ability to help SMEs.

Then, RND wanted to replicate the laundry approach in other sectors, as the sector approach was proactive, visible and less shallow than responding to various industry requests. As a result, in its 1923 annual report, RND wrote ‘our aim is to support sectors where there is a lack of skill and methods are obsolete or suffer from threatening economic circumstances’. Examples of such sectors were woodworkers, plumbers and pipefitters, small beer breweries and bicycle and motorcycle repairmen.

However, most of its attempts to replicate this approach in other sectors failed, because RND lacked the staff and knowledge and because some sectors were hesitant to involve external support.41 For example, the cabinetmakers sector was divided into manufacturing plants and small workshops, so it was difficult having only one assistant. From 1930, RND tried to help foundries, but suggestions to finance an assistant were treated with suspicion and were only agreed when the sector was severely hit by the economic crisis.

RND’s new knowledge development activities for the laundry sector were very successful. However, replication of this approach to other sectors appeared to depend on the internal relationships in a sector.

Working with new institutes

In the 1930s, the government adapted its policy to meet the challenges of the economic crisis. This led to new industrial policies and governmental institutes in technology development with the result that RND had to reposition itself.

One consequence was that RND had to hand over its scope of work to new institutes, which also resulted in new collaborations. This is what happened when the *Economisch Instituut voor den Middenstand* (EIM, Economic Institute for the Trades) was established in 1930, to conduct economic statistical research for SME sectors. First, RND’s cost studies and benchmarks for laundries and blacksmiths had to be handed over to the EIM.42 After that, RND supported the EIM by making its relationships with SMEs available to this new institute. Together, they initiated efficiency studies in foundries and time and motion studies in laundries.43

Another consequence was that RND had to reposition itself in the field of intermediary organisations. For example, the government established provincial economic-technical institutes from 1931, to which RND responded by changing its location. RND co-located on a part-time basis in the provincial institutes. Furthermore, during meetings with these institutes, RND positioned itself as the knowledgeable representative of SME experiences.44

To summarise, RND responded to changes in its institutional environment by collaborating with the new institutes and by taking on the role of representing SME interests to these institutes.
Machinery credit

When RND consultant Kist began in 1910, he recognised that SMEs were also in need of low-barrier credit facilities to buy new machinery. The market did not provide these, nor did the government, but this changed as a result of the more active government policies in the 1930s.

From 1939, SMEs could apply for Werktuigencrediet (Machinery credit), which resulted in a new role for RND. After SMEs applied for a loan to buy machinery, the RND consultant would visit the firm for an appraisal. He reviewed the firm’s situation and prospects, assessed the owner’s personality and technical and business skills, the firm’s organisation and business results, and the impact of the new machinery on the business. Then he submitted his advice to the committee, after which the loan application would be reviewed at a committee meeting. RND consultants regularly attended these meetings to clarify their reports. Although these reports meant more work for RND consultants, they saw these activities as an opportunity to form long-term relationships with SMEs.

The change in government policy had therefore resulted in a new role for RND as a technical assessor of credit applications.

Discussion and conclusions

Before and after its establishment, RND and its roles as innovation agency evolved. Whereas the founders expected RND to transfer knowledge to SMEs, RND’s position as a government agency made the consultants also support large firms, other organisations and governmental bodies. Furthermore, the consultants created, modified and extended their capabilities through interacting with their external environment. This resulted in RND consultants fulfilling other roles as well, like representing SME needs to others and various roles in generating knowledge and standardisation. RND responded to technology developments, war, economic crises and changes in government policy. Besides these, the consultants were also confronted with other situations and challenges that its founders had not taken into account, like the importance of good relationships with consulting engineers, the actual needs of craftsmen and lack of resources. The examples also show that the consultants defended their expertise and if necessary challenged others, like in the case of the RND laboratory versus Delft Technical University professors.

All in all, the examples illustrate how RND’s dynamic capabilities in ‘mediation’ and ‘knowledge development’ resulted in role changes (Table 4). Mediation was the dynamic capability that enabled the consultants to search, select and learn about SME needs (Helfat et al. 2007). Knowledge development was the dynamic capability that enabled them to support their other capabilities: they started testing technologies for SMEs and they developed knowledge for the sector approach. The original capability of ‘transfer of technology knowledge’ was modified and extended several times.

Table 4. Summary of RND’s dynamic capabilities and impact.

| Dynamic capability                      | Mediation for knowledge transfer                      | Knowledge development                      |
|----------------------------------------|------------------------------------------------------|-------------------------------------------|
| Transfer of technology knowledge (1900)| Cooperation with civic organisations (1909)          | Testing technologies (1913)               |
| Education and technical advice (1909)  | Represent SMEs (1914)                                | Appraise SMEs (VNF) (1915)                |
| Demonstration technologies (1913)      | Cooperation with new institutes (1930)               |                                           |
| Outline technical advice only (1917)   |                                                     | Technical assessment (machinery credit)   |
| Basic support to SMEs (1917)           |                                                     | (1939)                                    |
| Sector approach (1921)                 |                                                     |                                           |
| Cooperation with new institutes (1930) |                                                     |                                           |
Likewise, the three other capabilities (cooperation with civic organisations, testing technologies, appraising SMEs) underwent changes. The examples show that new resources were hired to take up new activities, like technical assistance to craftsmen or running the laboratory.

It is typical that six of the nine examples originate from RND’s first 10 years of existence. More examples do exist in the period between 1920 and 1930, but these are variations of earlier examples, such as new government policy. This does raise the question whether dynamic capabilities matter more when an intermediary organisation starts, or whether this observation is related to fact that after 1930, active government intervention in the innovation infrastructure restricted the consultants’ scope to modify and extend its capabilities.

The latter points to a difference in the dynamic capabilities of intermediary organisation and firms. As an intermediary, RND’s roles and dynamic capabilities were interlinked with RND’s relationships. The case of RND illustrates how changes in founders and new government policies influenced the establishment of RND, its envisaged and actual capabilities and successive changes. In contrast, entrepreneurs define capabilities themselves in response to market opportunities. Thus, further theory development in dynamic capabilities for intermediary organisations needs to take into account the typical influence of governments and financial supporters, and especially the effect of *laissez-faire* versus active governments.

RND’s experiences in an industrialising country have resulted in several recommendations for contemporary innovation agencies. For example, we show that an innovation agency needs to be neutral and can avoid being perceived as unfair competition by private or existing parties. Furthermore, an innovation agency must be able to act in a flexible way, so that it can focus on working in sectors where associations show an interest in innovation. Alternatively, an innovation agency can try and stimulate an interest in innovation. Lastly, an innovation agency will be more effective if it is part of a greater innovation policy, consisting of education, credit facilities, a technology and a knowledge infrastructure. Such a knowledge infrastructure hardly existed when RND started.

Currently, governments in industrialised countries privatise innovation agencies because of pressure on public funding and the abundance of knowledge and training institutes and private consultancies. This trend will inevitably impact these organisations. Therefore, it is recommended to repeat the study in this paper for contemporary innovation agencies. This will provide more insight into the ensuing changes and to what extent these are similar to RND’s evolving roles and dynamic capabilities nearly a hundred years ago.

Notes
1. SMEs: firms with less than 51 employees.
2. ARND 1937.
3. Minutes of meeting, March and September 1900, HG-0245-01, inv.no.6.
4. Memorandum ‘Establishment of a technical information agency’ (HG-0245-01, inv.no.162).
5. See note 3.
6. 1902. *Tijdschrift der Nederlandsche Maatschappij ter bevordering van Nijverheid*, 84–87; Notulen hoofdbestuur VFHN, 11-11-1901 (HG-0245-01, inv.no.6); *De Ingenieur* 17, no.3: 40.
7. 1909. *Tijdschrift der Maatschappij van Nijverheid*, 345–349.
8. See note 6.
9. See note 7, 499.
10. 1909. Staatsbegrooting 1910. 2.X.2. Bijl.A. MvT, 16, and 2.X.9-10. Bijl.A, 24–25.
11. See note 9.
12. KB no.37, 20-07-1910 (NA-2.06.001, inv.no.5615).
13. 1912. Staatsbegrooting 1913. 2.X.10-11. Bijl.A, 26–28.
14. Correspondence land acquisition (NA-2.06.001, inv.no.10911).
15. ARND ≤1920.
16. Minutes of meeting, 15-06-1915 (NA-2.06.001, inv.no.F4528).
17. VNF archive (NA-2.19.042.07).
18. ARND ≥1921.
19. Letter BvU, 30-09-1916, Letter RND laboratory, 11-04-1917 (BHIC-169, inv.no.106).
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Appendix 1. Archives

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NA 2.06.001, Ministry of Economic Affairs: Trade and Industry
NA 2.06.083, RND, 1945–1963 and laboratory, 1913–1962
NA 2.19.042.07, VNF, Association ‘Made in the Netherlands’, 1915–1973
Historical Centre Overijssel (HCO), 350, RND, Zwolle, 1914–1959
Historical Information Centre Brabant (BHC), 169, RND, Tilburg, 1913–1965
Municipal Archives, The Hague (HG), 0245–01, VFHN, Association to Promote Industry and Crafts

Appendix 2. Annual reports

Rijksvoorlichtingsdienst ten behoeve van de Nijverheid. Verslagen van de werkzaamheden. Den Haag (RND Annual Reports, ARND)