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‘WHERE THE ACTION IS’. THE INTRODUCTION AND ACCEPTATION OF
INFRASTRUCTURAL INNOVATIONS IN DUTCH CITIES 1850-1950.

Introduction

In the Netherlands industrialization started in the second half of the nineteenth century. Industrialization in the first place was an urban phenomenon which manifested itself mainly in existing towns and cities: Amsterdam, Rotterdam, The Hague, Utrecht, Groningen, Haarlem, Leiden, Dordrecht, Maastricht, Delft, Schiedam, Deventer etcetera. Only in a few cases new industrial centres emerged, like textile cities Enschede and Tilburg, and in the beginning of the twentieth century Philips city Eindhoven. So the urban hierarchy in the Netherlands did not change much under the influence of industrialization.¹ The top of the Dutch hierarchy consisted of three cities with more or less complementary functions: Amsterdam was the financial centre and the centre for colonial trade, Rotterdam was the centre for the transit trade with Germany and the United Kingdom, while The Hague was the political centre. All the three cities got additional industrial functions, especially in the fields of shipbuilding and other metal industries.

Under the top there was a number of second rank cities in the west of the country, among which Dordrecht, Delft and Haarlem, which had a limited service area, became important industrial centres. In the north the cities of Groningen, and to a lesser extent Leeuwarden, combined their position as regional capital with additional industrial functions: Groningen in printing, metal (bicycles), food (sugar, coffee, tobacco), and ready made clothing, Leeuwarden in dairy food. In the south Maastricht also had that double position but other regional/provincial capitals in the (north)east and south: Assen, Zwolle, Arnhem, Bois le Duc, and Middelburg did not manage to collect much industrial functions. But in all cases industrialization was an enormous

¹ P. Kooij, ‘Urbanization. What’s in a name, in: H. Schmal (ed.) *Patterns of European urbanization* (London 1981) 33-59.

stimulus for urbanization. In 1800 24.5% of the Dutch population lived in cities with 20.000 inhabitants and over. In 1900 this percentage had been increased until 39.3%.²

This process of urbanization was accompanied by the introduction of new infrastructural facilities like gas factories, power stations and tramways. But also of new newspapers, cinema's and restaurants. And one may expect that innovations like cigarettes, bicycles, cars, and ready made clothing were introduced in the top of the urban hierarchy and from there diffused to lower places, like Hägerstrand already put forward in his diffusion theory.³ Besides this space bound theory of innovation, there are also time bound ones, which distinguish successive stages, like the theories of Rodgers and Lazer and Bell.⁴ The stages are:

1. Invention
2. Introduction (first consumption by innovators)
3. Acceptation (by early adopters)
4. Adoption (product turns from new into familiar)
5. Assimilation (product has become indispensable)

In this contribution I will analyse the introduction of a set of innovations in a space-time perspective, to find out if the urban hierarchy indeed played a distinctive role in the spread of innovations. The products chosen are: the bicycle, the motor car, gas and electricity, the department store, and the cinema. All these innovations, and many more are collected in the pioneering study by Han Baudet on 100 years of innovation in the Netherlands.⁵ I was involved in that project. All the products selected here, refer to (urban) infrastructure, the economic as well as the social and cultural. The car, for instance, was used in trade and transport but also was a vehicle of conspicuous consumption, while the bicycle was used to go to ones work but also for recreation. Only the cinema more exclusively belonged to the cultural domain.

The diffusion of the bicycle

² P. Kooij, 'Stad en platteland', in: F.L. van Holthoorn, *De Nederlandse samenleving sinds 1815* (Assen/Maastricht 1985) 93-119, table 1.

³ Torsten Hägerstrand, *Innovation diffusion as a spatial process* (Chicago 1967).

⁴ Everett M. Rogers, *Diffusion of innovation* (New York 1986); W. Lazer & W.E. Bell, 'The communication process and innovation', in: *Journal of Advertising Research* vol. 6 Sept. 1966.

⁵ H. Baudet, *Een vertrouwde wereld. 100 jaar innovatie in Nederland* (Amsterdam 1986).

The velocipede was introduced in the Netherlands in 1867 from London. The modern bicycle, the Rover, was imported in 1885, also from the United Kingdom. The early adopters used the velocipede as a substitute for a horse in a sport setting. There were a lot of bicycle races in urban parks, on lanes which until then were used by coaches. The Rover and similar bicycles, which were called 'safety', served different goals. They were used by members of the bourgeoisie for house-work movements and also to explore the living nature, which at that time became a hot item for city dwellers. In fact this stimulated two contradictory movements: from the suburbs to the city centre and from the city centre to the countryside.

Although the first bicycles were introduced in Amsterdam, the diffusion took place in another way. In some places local smiths were very successful in imitating the British examples. The first Dutch bicycle factory was founded in 1869 in Deventer by Hendrik Burgers, other successful factories were located in Dieren near Arnhem (Gazelle) and in Groningen (Fongers). Already in 1910 10% of the Dutch population owned a bicycle, in 1939 this percentage already was 43%.

Thanks to the fact there was a tax on bicycles, it should be possible to trace its diffusion in a spatial setting.⁶ Until now, however, no one has performed any research on this subject, but we have a survey of the first bicycle clubs in the Netherlands. These clubs were founded by (male) members of the elite and can be seen as a pendant of other sport clubs, for instance in the fields of cricket and football.⁷ The first one was founded in 1871 in Deventer, which was indeed the pioneering city for bicycles. In 1872 clubs were founded in Apeldoorn, which was situated very near Deventer, and Rotterdam. In 1875 a club was founded in Leeuwarden, the capital of the province of Friesland, and in 1880 a second one in Apeldoorn, followed a year later by Zutphen, which was also near Apeldoorn and Deventer. Then things went fast: in 1882 clubs were founded in Zwolle, The Hague and Haarlem, in 1883 in Arnhem, Wageningen, and Breda, in 1884 in Amsterdam, Leiden, Baarn, Utrecht, Nijmegen, Amersfoort and Rotterdam.

As we can see, all clubs were founded in cities, only Baarn could be defined as a village but in fact it was a satellite town of Amsterdam. The early adopters seem to

⁶ Since 1898 a tax on bicycles was incorporated in the so called personal tax. In 1924 a separate bicycle tax was promulgated. Ferdinand H.M. Grapperhaus, *Over de loden last van het koperen fietsplaatje. De Nederlandse rijwielbelasting 1924-1941* (Deventer 2005).

⁷ J.M. Fuchs & W.J. Simons, *Voort in 't zadel, kameraden. Honderd jaar fietsen in Nederland* (Amsterdam 1971) 40.

have lived not in the big cities, where the bicycle was introduced, but in cities in the east of the country, near the factory of Burgers and, since 1892, of Gazelle. The presence of these factories was a big stimulus. In Groningen a club was founded soon after the founding of the bicycle factory of Fongers in 1884. The story of Fongers also illustrates the specific diffusion pattern of the bicycle. From Groningen the company opened branches in the top in the urban hierarchy, Amsterdam, Rotterdam and The Hague, in the provincial capitals Utrecht, Arnhem and Middelburg, and student city Leiden.⁸ All branches had a cycle school in which especially women could learn to cycle elegantly before going out on the streets. Very soon women also were admitted to the clubs. With a few exceptions, the first cycle tracks also were constructed outside the big cities along highways, especially provincial roads. A stimulus was given by the General Dutch Cyclists Association, founded in 1883.

In the Netherlands the bicycle passed very fast the five stages of the model on the acceptance of innovations. Let us see now if the car did the same.

The diffusion of the motor car

Thanks to the existence of a car tax and a system of registration numbers, it is possible to reconstruct the diffusion of the car from its introduction in the Netherlands in 1896. In that year two cars were sold, the first to a photographer in The Hague and the second to a notary in Wieringerwerf⁹, so it was town and countryside from the beginning. In his recent PhD thesis, Peter-Eloy Staal reconstructed the spatial pattern of this diffusion.¹⁰ Since the registration numbers in the beginning showed a provincial differentiation (A=Groningen, B=Friesland, D=Drenthe) it was very easy to reconstruct the provincial patterns. All provinces showed the same S-curve, a slow start in the beginning of the twentieth century, an acceleration in the thirties, stagnation around the Second World War, again acceleration in the fifties, and a boom since the sixties which slowed down a little bit in the nineties.

Staal takes the conclusions of Hägerstrand as a starting point. Hägerstrand analysed the introduction of the car in Sweden. He found out that initially there was a high car consumption in the big cities and in places which had a function of import

⁸ Fuchs & Simons, *Voort in 't zadel*, 21

⁹ Baudet, *Vertrouwde wereld*, 77.

¹⁰ Peter-Eloy Staal, *Automobilisme in Nederland. Een geschiedenis van gebruik, misbruik en nut* (Zutphen 2003) 43-55.

centres. But in the long run a positive correlation between car consumption and low population density will manifest itself. This was indeed the case, but not Amsterdam, the largest city counted the highest number of cars, it was The Hague which until 1913 had the largest car density. This had to do with the function of The Hague as political capital of the Netherlands. In this stage in which cars were very expensive, most embassies bought this status symbol, as well as members of the Dutch national elite which clustered along the royal court. And the court itself, in spite of the possession of a golden couch, also was an important consumer of cars, especially the Dutch made, very expensive 'Spyker'.¹¹

It is remarkable that the highest number of cars per inhabitants could be found in the provinces of Utrecht and Gelderland. In the first province the city of Utrecht, the fourth city of the country was situated, but in Gelderland one of the most important importers of cars had his company. Here the same effect as in the case of bicycles was manifest. The Hägerstrand thesis of initial surplus in the cities was confirmed, but it was only after 1976 that rural areas showed the relatively largest presence of cars. Interesting is that municipalities which were situated near the big cities, like Haarlemmermeer near Amsterdam, since that time showed the highest density of cars. This also is in accordance with the findings of Hägerstrand who points at quick assimilation in the service area of large cities.

The introduction of gas and electricity

After some experiments with gas production in some factories and also some efforts to sell gas in transportable containers, the first real coal gas factory was founded in 1827 in Rotterdam by the Imperial Continental Gas Association, which from its headquarter in London founded gas factories in a number of big European cities like Antwerp, Brussels, Berlin and Vienna. In fact Amsterdam already got a factory in 1826 but in this case gas was made from rape oil. The Imperial Continental Gas Association managed to buy a small factory and in 1834 got a concession to produce

¹¹ H.A.M. van Asten, 'De Spyker van de weg gereden', *Economisch- en Sociaal-historisch Jaarboek* 33 (1970) 67-119.

coal gas.¹² In 1836 the Imperial Continental opened a third factory, in Haarlem, at that time the sixth city of the Netherlands.

The Imperial Continental also tried to get a concession in the Hague, but this one was given, in 1844 to A van Oven who was associated with the firm of E.E. Goldsmid in Paris. The factory was opened in 1845. In the meantime Utrecht and Arnhem got their gas factories, founded by John Bryan who had a firm in Newcastle.¹³ Bryan also got a concession to exploit a gas factory in Leeuwarden but he sold this licence to Goldsmid in 1845. Leeuwarden was followed in 1848 by Zwolle and Leiden. In Leiden the Municipal Council decided to build a municipal gas factory. This also happened in Groningen in 1854.

As table 1 shows the diffusion of gas factories more or less followed the lines of the urban hierarchy, the largest cities first, followed by some regional capitals and booming residential and industrial centres. Groningen, and to a lesser extent Maastricht and Nijmegen seem to be exceptions. In these cities, however, many initiatives were hampered by the central government who did not give permission to introduce this dangerous innovation in these fortified cities. In Maastricht the local industrialist Petrus Regout only got a limited concession because the Crown did not want that a situation was created in which the enemy by blocking the coal supply or turning a tap could deprive a whole city from its energy.

In those large cities gas was a immediate success. And therefore smaller places almost all followed. Between 1856 and 1870 81 gas factories were founded, most by private entrepreneurs. In the largest cities the Municipal Councils tried to take over these profit generating factories. The early adopters were keepers of luxury shops (clothes, wine, chocolate), owners of hotels and restaurants, the municipalities itself (public lightning and public buildings), and middle sized factories and workshops where gas machines were used (bread, tobacco, coffee and tea). Individual consumption by private persons started very slowly. Around 1880 members of the elite started to substitute their oil lamps by gas lamps. The lower strata followed after 1900.¹⁴ But by that time electricity proved to be a successful alternative.

¹² P. Kooij, 'De gasvoorziening in Nederland rond 1880, *Gas, maandblad van de stichting tijdschrift openbare gasvoorziening* 100 (1980) 266-278.

¹³ They were exploited by W. de Heus, who owned a copper mill in Utrecht.

¹⁴ Kooij, 'Gasvoorziening', 277.

As a contrast with the introduction of gas, the introduction of electricity shows a rather whimsical pattern. The first power station was founded in 1886 in Kinderdijk, a village near Rotterdam. The plan was initiated by Willem Smit, a producer of electronic articles. In the same year Nijmegen opened a municipal power station, only

Table 1. The largest Dutch cities and innovations

City	inhabitants 31-12-1900	start gas	start electr.	first cinema	number cinema's opened before 1920
Amsterdam	520.602	1826	1892	1903	62
Rotterdam	332.185	1827	1895	1903	33
The Hague	212.211	1845	1889	1906	36
Utrecht	104.194	1842	1905	1908	14
Groningen	67.563	1854	1902	1908	9
Haarlem	65.189	1836	1902	1908	8
Arnhem	57.498	1844	1907	1908	6
Leiden	54.421	1848	1907	1908	10
Nijmegen	44.043	1850	1886	1908	7
Tilburg	41.518	1853	1911	1909	8
Dordrecht	38.804	1852	1910	1910	4
Maastricht	34.182	1849		1910	7
Leeuwarden	33.009	1845	1912	1910	2
Delft	31.787	1855	1910	1912	4
's-Hertogenbosch	31.128	1854	to be com- pleted	1911	3
Zwolle	30.848	1848		1912	4
Apeldoorn	26.738	1863		1917	1
Schiedam	26.716	1857		1912	2
Deventer	26.224	1858		1911	4
Breda	26.156	1858		1910	4

Sources: See notes 12, 16, 24.

for public lightning. In 1889 Siemens und Halske opened a power station in the Hague with a limited scope. Amsterdam got a private power station in 1892. In 1895 Rotterdam got a municipal power station.¹⁵ In the same year Borne, where the electrotechnical firm of Hofstede Crull & Willink (later Heemaf) was located got its electricity supply.

Then things went faster, in 1898 power stations were opened in Elst, Baarn, Terborg, Beek-Ubbergen, in 1899 in Boxtel, Hilversum, Naarden, Bloemendaal, Abcoude, Maarssen, and in 1900 in Driebergen, Hengelo, Valkenburg and Watergraafsmeer. With the exception of the industrial towns Hengelo, and to a certain degree Hilversum, these all were rather small places. Most of them were commuting centres near Amsterdam and Utrecht, where well to do people lived who wanted that new provision, also because some of these villages did not have a gas factory.

¹⁵ Before 1900 only two municipal power stations were opened, in Nijmegen and Rotterdam.

Moreover electricity was easy transportable which enabled neighbouring municipalities to combine a power plant. Moreover most provinces took over the electricity supply to cover the whole area.

It was the presence of the gas factories which caused the relatively late adoption of electricity in the large Dutch cities under the top of the urban hierarchy. Most Municipal Councils just had taken over the gas factories from private owners or had made huge investments to build a gas factory of their own. Given that situation they did not want the creation of a serious competitor. As a result Groningen and Haarlem only got their power station in 1902, and Utrecht, Arnhem, Leiden and other big cities even later (table 1).

But in spite of that, electricity was an immediate success. It enabled the mechanization of small workshops by electro-motors and in the houses and shops it was preferred above gas because it did not cause heat and it was easy to handle.¹⁶ Public lighting by gas also was considered inferior to lighting by electricity because every lamppost had to be lighted separately. In spite of the late adoption in the larger cities, assimilation followed very quickly. Soon after 1900 all larger cities organized electricity exhibitions by which they announced themselves as electric cities.

The start of the department stores

Most chains of big shops in the nineteenth century were created by labour migrants from Westphalia. Clemens & August Brenninkmeijer (C&A), Johannes Peek & Heinrich Cloppenburg, Anton Kreymborg, Willem Vroom & Anton Dreesmann all came from that area, with the exception of Willem Vroom, who originated from Veendam, a small town east of the city of Groningen. C&A and Peek and Cloppenburg and Kreymborg founded shops in ready made clothing, but Vroom and Dreesmann founded the first very successful Dutch chain of department stores.¹⁷

Amsterdam, the capital with its opinion leaders in culture and fashion was the ultimate goal of these entrepreneurs. The labour immigrants from Westphalia had a hard core of so called Tüötten (hawker) like Brenninkmeijer, Lampe and Voss who all originated from four villages in Oberlingen. Sinkel, and Bahlmann who came from

¹⁶ P. Kooij, 'De eerste verbruikers van electriciteit in de gemeente Groningen, 1895-1912', *Economisch- en Sociaal-Historisch Jaarboek* 35 (1972) 274-302.

¹⁷ H. Ph. Hondelink, 'Vroom en Dreesmann, de oprichters en hun onderneming 1887-1912', *Jaarboek voor de geschiedenis van bedrijf en techniek* 9 (1992) 159-185.

other parts in Westphalia, settled in the Netherlands in the first half of the nineteenth century. Miellet calls their shops the predecessors of the modern chain store.¹⁸ They started in Amsterdam with small shops and from there they founded branches in other cities. Sinkel, who had a very extended assortment, founded branches in Leeuwarden and Leiden, which closed soon, and Rotterdam and Utrecht. He avoided luxury city The Hague, maybe because his shops in the first place were low budget ones. Bahlmann, who started his career in the Sinkel store, had ten shops, among them two big ones in Amsterdam and one in Arnhem.

The Brenninkmeijers who belonged to the second wave, which settled in the second half of the nineteenth century, acted more cautious. They started in Sneek, in the province of Frisia, from there they founded a store in Leeuwarden, the Frisian capital and then moved to Amsterdam. From there they started in 1911 their expansion all over Europe, beginning in Berlin. Peek & Cloppenburg directly moved to Amsterdam and from there founded branches in for instance Rotterdam and Groningen. Kreymborg did the same.¹⁹ The spread of their branches is not very well documented, but fortunately, thanks to Philip Hondelink, we know exactly the pattern of the expansion of the Vroom & Dreesmann company.²⁰

Anton Dreesmann and Willem Vroom met in Amsterdam where they were apprentices. They became brothers in law. In 1878 they opened their first textiles shop in Amsterdam. Between 1878 and 1892 six other shops in Amsterdam followed. These were existing shops, which were taken over. Some of these had more variety in their assortment, like shoes and furniture and this caused a slow change from drapery to department store. In 1892 a first branch in Rotterdam was opened, next year followed by one in The Hague.²¹ Now the top of the urban hierarchy was covered. One would expect a next branch in Utrecht, but this city had to wait until 1898. In the meantime branches were opened in Nijmegen (1895), Arnhem (1896) and Haarlem (1896). Tilburg and 's-Hertogenbosch followed in 1899, and Breda in 1900. The next branches came in Leeuwarden (1902), Middelburg (1902) and Leiden in 1903.

¹⁸ R. Miellet, 'Westfaalse ondernemers en de opkomst van het Nederlandse grootwinkelbedrijf tot circa 1920', *Jaarboek voor de geschiedenis van bedrijf en techniek* 2 (1986) 135-158.

¹⁹ They were imitated by the Groningen brothers Gerzon, who got their training in Germany and started a fashion stores chain in Amsterdam.

²⁰ See the appendix in his unpublished master thesis 'Vroom en Dreesmann. De oprichters en hun onderneming (University of Groningen, Department of History, 1989).

²¹ A second shop was opened in Rotterdam in 1898 and in The Hague in 1903.

With the opening of the Leiden store all the 10 largest cities in the Netherlands had their V&D, as well as Middelburg, a provincial capital, and Alkmaar (1896) and Dordrecht (1901) which got franchise stores. The only big city without store was Groningen. There an older brother of Willem Vroom, Caspar, had his own store and Willem wanted no competition with his family.

Family was very important for these immigrants and most stores were conducted by members of the two families. All stores had their own limited liability company. In the beginning of the twentieth century these companies started to establish branches of their own. 's-Hertogenbosch, for instance, opened branches in Eindhoven and Helmond, while Nijmegen did the same in Venlo and Tiel. So also the third level of the Dutch urban hierarchy was covered. The pattern of the spread of the department stores of Vroom and Dreesmann reflects the pattern of the Dutch urban hierarchy very well. Of course there is the exception of Groningen and there is a slight over representation of the south, which the roman catholic Westfalians liked more than the protestant north. Also cities with a relatively large number of inhabitants, but a small and contested service area, like Delft and Maastricht, were the last large cities to get a V&D branch, in 1904 and 1907 respectively.

Besides Vroom and Dreesmann, there was one other chain of department stores in the nineteenth century: De Bijenkorf. In the nineteenth century, however, this was a fast growing shop in Amsterdam. The big transformation started in 1912 when an enormous store was opened in the centre of Amsterdam, in front of the royal palace. It was only in 1926 that the Bijenkorf became a chain with the opening of a branch in The Hague, designed by the famous architect Piet Kramer and in 1930 in Rotterdam, designed by Willem Dudok.²² Only far after the second world war, some cities of the second rank got their Bijenkorf.

The adoption of the cinema

Dutch cinema started in the eighteen-nineties. At that time some entrepreneurs, like Christiaan Slicker and Carmine Riozzi, exploited travelling cinema's.²³ These exuberant palaces most of the time were placed at urban fairs and sometimes also in

²² Roger Miellet, Marieke Voorn, *Winkelen in weelde. Warenhuizen in West-Europa 1860-2000* (Zutphen 2001).

²³ Karel Dibbets & Frank van der Maden (eds.) *Geschiedenis van de Nederlandse film en bioscoop tot 1914* (Weesp 1986).

villages. Electricity was generated by locomobiles. In the beginning of the twentieth century the first fixed cinema's emerged, the first one was probably Flora in Amsterdam in 1903. There was a high correlation with the introduction of electricity.

As table 1 shows the diffusion of the cinema took place along the lines of the urban hierarchy. All large cities got a cinema at their turn. Only Apeldoorn seems to have been an exception. The reason is that this was an atypical municipality which combined a large area with an overrepresentation of high income people, who partly were attracted by the royal family who lived here a part of the year at Palace 't Loo. As we will see below, this was not the target group of the cinema owners. Smaller industrial towns like Dordrecht and Delft therefore accepted earlier.

The spatial diffusion of the Dutch cinema has been reconstructed by Karel Dibbets. He filled his website with a large chronology of the introduction of cinema's per city and village, which offers us a very appropriate database.²⁴ This database shows some interesting characteristics of the introduction of the fixed cinema. Until 1910 they all were founded in large cities. Some of them closed almost immediately but others remained for decades. Besides the cities mentioned in table 1 these also were Enschede (1908), Venlo (1907) and Vlissingen (1910), and Gouda (1910). These all were industrial cities with a large labour population. This suggests that the cinema had remained entertainment for the lower strata, as it was at the fairs.

This is confirmed by the list of other places where the cinema was introduced between 1910 and 1915: Alkmaar, Almelo, Amersfoort, Bergen op Zoom, Boxtel, Bussum, Delfzijl, Eindhoven, Emmen, Heerlen, Helmond, Hilversum, Hoogezand, Hoorn, Meppel, Roosendaal, 's Heerenberg, Sittard, Stadskanaal, Tiel, Veendam, Waalwijk.²⁵ This is a combination of places in the sub-top of the urban hierarchy (Alkmaar, Amersfoort, Bergen op Zoom, Hoorn) with industrial centres (Boxtel, Eindhoven, Helmond, Hilversum, Roosendaal, Waalwijk) naval centres (Den Helder, Delfzijl, Meppel) and places in typical industrial zones: the Groningen/Drenthe peat area (Emmen, Hoogezand, Veendam, Stadskanaal) and the Limburg coal area (Heerlen). Especially in the areas last mentioned, many low status people were concentrated. It was only in the nineteen-thirties that the cinema became acceptable for the bourgeoisie.

²⁴ See <http://www.xs4all.nl/~kd/index.html>

²⁵ Only the places where is no doubt about location or date of opening of the cinema's are taken into account.

Conclusion

The examples mentioned above, in most cases show a rather firm correlation between the structure of the Dutch urban hierarchy and the introduction of infrastructural innovations. This is not surprising. In fact the number of inhabitants of cities is related to urban functions and among these functions the service functions and the size of the service area are important elements. Service functions which already existed for ages were joined by new ones in the economic, social and cultural domain. Therefore some deviations from the general pattern, which manifested themselves during the introduction and diffusion of the innovations mentioned above, are in fact of much more interest. They show how the image of these innovations, their properties and characteristics, are of great interest for the way adoption and assimilation take place. The level in the social structure where the early adopters of a specific innovation are situated, is an important catalyst in this context.