The Japanisation of the Dutch Railways

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Abstract This paper presents the last two decades of exchanges between Japan and the Netherlands in the railway sector, under the generous help of professor Saito. The paper gives an overview of the publications and concrete implemented lessons that have resulted from these exchanges. A major part of the paper reports on extensive explorative interviews held with top and senior representatives of the Dutch railway sector who visited Japan during the last two decades. The paper reports on their perceptions of the Japanese lessons and gives an outlook on what they expect for the coming years. The paper closes with general conclusions about this learning process.

Key words Railway management; continuous improvement; international learning; Dutch railways; Japanese railways

JEL classification L30, L92, O33

March 15, 2011 accepted
INTRODUCTION

Starting a conversation on the lessons from Japanese railway practices with representatives of the Dutch railways is nowadays bound to result in a fascinating, enthusiastic and very engaged discussion. This is a considerable difference with the situation only ten or twenty years ago when most Dutch railway officials would have heard of the Japanese bullet train and of the pushers in overcrowded trains in Tokyo, but few would have been able to tell what could be learned from the Japanese railways to improve the performances of the Dutch railways. Many specialists remained sceptical for many years (“Japan is a different culture”) even when more detailed performance facts and possible lessons from Japan started to be presented to railway specialists (such as by NS Reizigers, 1997; or van de Velde, 2002). Nowadays, on the contrary, a ‘Japanese fever’ can be felt at the head offices of the Dutch railway sector. Many—perhaps even most—have become aware of the existence of a substantial potential from improvement that could come from a deeper understanding of ‘the Japanese lessons’. This wider acknowledgement results from the increasing numbers of study trips to Japan that have been organised for a widening group of railway professional in recent years, covering lower layers of the railway hierarchy. This allowed the Japanese lessons to trickle down the hierarchy of the Dutch railway sector and to get a wider support base throughout the railway profession. As a result, while exchanges between Japan and the Netherlands started already more than ten years ago, concrete examples of implementation of measures inspired by these exchanges are now growing rapidly.

What exchanges have taken place between Japan and the Netherlands in the railway sector during the past decades, what are the ‘Japanese railway lessons’ learned, how are they perceived by the railway sector and has much already been implemented? This paper tries to shed some light on these issues. It first gives an overview of the Dutch railway context, highlighting the elements that were conducive to an opening for new solutions. It then provides an inventory of the
exchanges that have taken place and the resulting publications. A major part of the paper is then devoted to a reporting on extensive explorative interviews held with top and senior representatives of the Dutch railway sector who visited Japan during the last decade. That section summarises the Japanese railway lessons as currently perceived by the interviewees and provides an outlook on what they expect for the coming years. The paper closes with some general conclusions about this learning process.

The inventory of exchanges and reporting on the lessons learned illustrate the effect of the extensive support that the author of this paper and the Dutch railway sector have received during the last two decades from professor Takahiko Saito (Kinki University, Osaka). This paper is written in honour and on the occasion of professor Saito's retirement.

**CONTEXT**

The Dutch railways, together with the Swiss railways, have for quite a long time been seen as the best performers on the European railway scene, as can be read in various international econometric or benchmarking studies. While enviable, such position also has the disadvantage that it can lead to some level of unconscious complacency ("We are the best anyhow") that would not necessarily be directly perceived as such by the actors in the sector.

While remaining good by international standards, some of the performances of the sector have indeed declined in the years that followed the separation between infrastructure management and train operations dictated by the European Commission. The years 2000 and 2001 witnessed, e.g., a sharp decline in customer satisfaction and train punctuality (see Figure 1). Performances have since been restored, while service quantity (frequencies) were also increased, but society as a whole, through the media and the expression of growing political concerns in particular, remained very critical about the railways' performances.

This was compounded last two winters by unusually heavy snowfall by Dutch standards that brought the railways twice to a grinding halt lasting several days.
The bad luck of a fire at a major traffic control centre in 2010 brought the train system once more to a stop which exacerbated the public's discontent, despite the professional and swift way in which the railway restored normal operations. A major complaint was related to the lack of adequate information to the passengers during the disruptions. These events undoubtedly contributed to an increased awareness amongst railway professionals that something needs to be done to increase the resilience and robustness of the railway, especially as ridership is still growing and frequency increases are being contemplated, increasing the need for reliability.

The ministry's policy is focussed on the growth of train usage and on facilitating the introduction in 2020 of a basic frequency of 6 intercity trains and 6 local trains per hour in the busiest part of the country (the so-called 'High Frequency Rail' programme, which is part of the 'Japanese lessons' as we will see further) and on an increased space for freight traffic on the tracks. A very substantial investment budget is available to facilitate this in the coming years (4, 5 billion euro), together with an increased maintenance budget (500 million euro on top of the yearly 800 million paid by the State). Despite this, a relative decline in political readiness to supply the railways with unconditioned and large amounts of money can be observed. This stance is related to the critical position on the performances of the Dutch infrastructure manager (ProRail)(1), even though studies

![Customer satisfaction and punctuality NS](Source: NS)

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(1) The Dutch railway sector is organized in one state-owned train operator (NS) and one state-owned infrastructure manager (ProRail). Regional branch lines are increased.
show that these are in line or better than European standards (Ministerie van Verkeer en Waterstaat, 2008, p. 26). As we will see, this shorter supply of public money constitutes another element fostering a change in approach.

In this context, the Japanese railway example and its remarkable performance levels came at the right time to provide the Dutch railway sector with an improved performance level to strive for and a new benchmark to learn from. As can be seen from Figure 2, Japanese railways exhibit better punctuality performances, here exemplified by showing the systematically higher monthly punctuality of JR Kyushu compared to NS (the Japanese operator JR Kyushu operates in an area of Japan that is similar in size and density to the Netherlands). Yet, by European standards, the performances of NS are remarkably good. Figure 3 shows the average (2001-2004) 5-minute punctuality data for various countries compared to the average level of capacity utilisation (measured in thousands of train-km per track-km in 2003) in those countries. Although dated, tentative

Figure 2 Monthly punctuality of NS and JR Kyushu compared (1997-2010) (Source: NS)  

\(^2\) The definition of punctuality for NS within this figure is “in time within 5 minutes of scheduled arrival time, as measured at 33 nodal points”. The data series for JR Kyushu is based upon the number of trains and minutes of delay (as measured by JR Kyushu) and has been recalculated by NS to be comparable to NS data. (Data source: NS)
and based on averages, this figure can nevertheless be used to illustrate the high performance position of the average Japanese railways versus that of most European railways, the Swiss and Dutch railways being located in between these extremes, but closer to their Japanese counterparts.

HISTORY OF EXCHANGES

The last two decades have cumulated a number of exchanges of knowledge and experience between the Japanese and the Dutch railway sector. Professor Takahiko Saito’s (Kinki University, Osaka) contribution during all these years was incessant. It also stimulated and complemented my own interest for the performances of the Japanese railways that started when I first visited Japan in 1988. That visit had left me fascinated by the high performances of the sector in terms of railway services, customer orientation and also by the way in which private Japanese railways develop their environment (stations, retail, real estate in conjunction with transport services), favouring the development of a railway-minded society.

It was during my visit to Japan in 1993 that I first met professor Saito. I had been charged by the Dutch public transport reform committee (Brokx Committee)
to report on the regulation of Asian public transport systems (Hong-Kong, Singapore and Japan) in the margin of a study tour organised by my students to that region. During that visit, professor Saito taught me about the interesting aspects of the Japanese bus and rail regulation (van de Velde and Westeneng, 1993). Shortly after that Professor Saito stayed at Erasmus University Rotterdam (the Netherlands) from September 1994 to August 1995. While working too at the Erasmus University and later, I had the privilege of collaborating with professor Saito on many occasions to prepare lectures for railway specialists in the Netherlands and later also to organise study tours to Japan for senior executives of the Dutch railway sector. Professor Saito always provided us useful examples and interesting contacts to learn from, constantly helping to realise a fruitful exchange between Japanese and Dutch railway practices and ultimately generating the current ‘Japanese fever’.

The Dutch railways visited Japan in 1997 with as main aim to learn from the operations of the Japanese railways, in particular from the complementarity between high-speed trains and regular train services. This was in the context of the future opening of high-speed services in the Netherlands. The report of this visit (NS Reizigers, 1997) captures the essence of the Japanese lesson in only a few words as it is titled “Simply Perfect by Perfect Simplicity”. The main points of interest were: strong focus on the passenger needs and its transport, focus on safety and punctuality, simple fares, simple timetable and operational planning, attractive stations (retail), perfect information of the passengers, high punctuality through a high reliability of the infrastructure, of the rolling stock and of the personnel, and perfect operations. Recommendations were, amongst others, to increase the focus on the transport business, to have a clearer steering of the operational staff, to improve the information to passengers, to review timetable planning method (planning buffers) to increase the role of the train driver in reaching punctuality by allowing him to more precisely compare its actions to the planning and react to this, and to increase the reliability of infrastructure and rolling stock by spending more on preventive maintenance. Much of this may seem obvious for Japanese specialist readers.
From 1998 onwards, many lectures on various aspects of the Japanese railways were given to various specialised audiences. In September 1998, I invited professor Saito to give a lecture to various railway officials and ministry representatives on the rail and real estate synergy as developed by the Japanese railways (Saito, 1997). Later more publications appeared on the synergy between rail and real estate in Japan (van de Velde, 1999; van de Velde and Offermans, 2002; Offermans and van de Velde, 2004; Röntgen and van de Velde, 2007), we gave lectures to the real-estate department of NS and provided some input for their strategy development on the basis of concrete Japanese examples, such as Hankyu and Tokyu Corporations (van de Velde and Rontgen, 2008).

In September 1998 professor Saito and I joined a study tour to Japan organised by NS and including various senior representatives of the ministries of transport, economics affairs and finance. As a result of this trip and the knowledge gathered in Japan with the help of professor Saito, the Dutch association of engineers (KIVI) invited me in August 1999 to give a lecture on high track capacity utilisation in Japan comparing it to the Dutch situation, and asking to explain how the Japanese railways manage to realise twice as high a train frequency on a comparable infrastructure to what is usual in the Netherlands. This presentation was followed by a long series of lectures on the same topic for Dutch railway consultants, the infrastructure manager, NS, the ministry of transport, master classes, etc. This information and the resulting awareness across railway specialists about the existence of the Japanese benchmark constituted later on one of the many inputs to the so-called ‘Use and Construct’ (‘Benutten en Bouwen’) collaborative programme organised by the Dutch railway sector and the ministry of transport to stimulate performance improvements. This programme initiated a new thinking about a more intensive usage of the rail infrastructure in the Netherlands. This two-year programme concluded that key factors were located in a faster succession of trains, a reduction of speed differences between trains and more opportunities for overtaking (passing tracks), together with an improved reliability and modifications to the signalling system, and mentioned that this was current practice in Japan (NS et al., 2003, p. 12).
A main input in this programme was the study tour that we organised with professor Saito in 2002 upon request of the board of the “Use and Construct” programme. This, as well as the subsequent study tours, was organised with the extensive help of the Dutch Embassy in Japan. The trip gathered eleven senior representatives of all parts of the railway sector and focussed on capacity utilisation issues. We discussed with many Japanese railway companies both in the Tokyo and Osaka areas and visited numerous locations were specific practices could be observed in practice. The findings of the trips were collected in a 115 pages report titles “Japanese Horizon” (van de Velde, 2002). The report observed a track utilisation in Japan that is twice as high as in the Netherlands on the busiest tracks. It formulated a number of paths for improvement for the Netherlands: developing a more tailor-made infrastructure (more signals and passing tracks); using more homogenisation of train speeds, but only when required; improving the reliability of infrastructures, rolling stock and personnel; allocating the rolling stock more closely to single routes; using simple means to manage punctuality (the watch of the driver in Japan) and working in seconds rather than in minutes and making sure to have maximum communication within and between the components of the railway sector. The report also concluded that crucial aspects to the functioning of the Japanese railway system are the notion that it works as ‘one’ company or process, choosing for the customer as ultimate driver (お客様は神様です), stimulating the personnel to move in this direction and paying much attention to knowledge management and professionalism by letting people ‘flow’ through the company, with behind this the conviction that things can always be improved (改善). In this respect, the report stressed that things should not be copied one-to-one, but that it is necessary to understand the processes that generate the improvements observed in Japan order to learn. The report concluded that following these lessons would generate a higher punctuality and capacity utilisation by 2010. These and other observations on the regulation of the Japanese railways as well as conclusions on what could be learned from it were later published in the professional press in the Netherlands (van de Velde and Maartens, 2003; van de Velde, 2005a). Interestingly, perhaps, I was also asked to
give a lecture in Japan to a group of transport specialists as they wondered why all these Dutch railwaymen were so interested in those details of Japanese railway practices that seemed so obvious and not so interesting or special to them.

In the meantime another trip had been organised in 2000 on the occasion of the anniversary of 400 years of relations between Japan and the Netherlands. It combined several occasions. JR Kyushu had organised with NS a transcontinental railway cruise from the Netherlands to Nagasaki and the Dutch minister of transport visited a transport research symposium in Nagasaki organised by ITPS (Tokyo) and TRAIL Delft University of Technology (van de Velde, 2000b). The JR Kyushu—NS cooperation was also closely related to an exchange of experiences that both companies had started under the leadership of the chairman of JR Kyushu at the time, who had himself learned from Dutch railway practices while staying in the Netherlands many years before. JR Kyushu's board visited NS in May 1999. This cooperation also involved several benchmarking initiatives between both companies (Hatch, 2000). These exchanges between both companies are described and analysed in a chapter written jointly with professor Saito (van de Velde and Saito, 2000), while a paper in the Japan Railway & Transport Review (van de Velde, 2000a) described the Dutch and Japanese railway reforms and exchanges in more general terms.

The growing interest for Japan in the railway sector generated several other initiatives of visits to Japan, such as a visit by a representative of the infrastructure management company to Japan in the end of 1999 and later in 2001, focussing on benchmarking infrastructure costs and maintenance. The results of these visits and of earlier presentations that the infrastructure management company invited me to make were collected in an internal publication of the infrastructure manager (van de Velde and Swier, 2001). Later a visit to Japan was organised by NedTrain, the train maintenance company of NS to learn from Japanese rolling-stock (preventive) maintenance, while other less senior representatives of the railway sector visited Kintetsu to dig deeper into what could be learned from the Japanese approach to train operations and track maintenance. Another trip to Japan for a few senior directors of NS was organised in 2003 with our help and
The study tour to Japan that we organised in April 2005 for NS, ProRail and the ministry of transport, with the strong support of professor Saito and the Dutch Embassy in Tokyo, had a different interest. It focussed on the commercial lessons that could be learned in Japan: station development, station design, passenger information, customer flows in stations, chip card payment systems, although the opportunity was taken to have a repeated look at interesting examples of high capacity utilisation. The trip report included concrete lists of lessons that would be considered for further implementation after returning to the Netherlands (van de Velde, 2005b). The trip resulted in a series of regular meetings amongst the participants, which fostered and monitored progress in the realisation of the lessons learned. In 2008, the ‘Japanese lessons’ even received a fixed place in our teaching for the Master of Business in Rail Systems at Delft University’s professional teaching.

By 2009, the ‘Use and Construct’ programme had generated a new common programme of action for the sector. This so-called ‘Programme High-Frequency Train’ (‘Programma Hoogfrequent Spoor’ or PHS in Dutch) aims at introducing a basic frequency of 6 intercity trains and 6 local trains per hour in the busiest part of the country, compared to currently 4 and 4 on most routes in that area. In April 2009, we organised a study tour to Japan with the help of professor Saito
and the Embassy to learn from Japanese examples that could facilitate the realisation of the PHS programme (Figure 4). As for the previous trips, we selected specific field trips and company visits that would enable the Dutch delegation to understand the theory and see very concrete and highly relevant examples for PHS. The report summarised the findings along the following items: infrastructure redesign and simplification (block shortening and reduction of the number of switches), improved infrastructure maintenance ('zero defect'), improved rolling stock design (adequate door numbers to passenger flows), improved rolling stock maintenance ('zero defect'), increased focus on punctuality in personnel management, considerable reduction and simplification of the traffic control process with a reduction of disruptions and a simplified infrastructure, increased infrastructure capacity, simpler timetable planning, another approach to margins in planning and operations, and a more second-wise operational approach (van de Velde, 2009).

2010 saw an increase of the pace of learning with the stationing of one of ProRail's specialists (Mr. Klaas Hofstra) in Japan for a period of one year. Interestingly, Mr. Hofstra's department at ProRail, called 'performance analysis bureau', can probably be seen as a Japanese lesson in itself, as it is involved with actions that are typical of the Japanese approach of checking and learning from performance analysis in order to improve future performances (plan-do-check-act cycles). This period was very fruitful in letting the "Japanese lessons" trickle down the hierarchy of ProRail and NS. Several visits to Japan were organised by Mr. Hofstra during this period, involving this time also less senior people in the hierarchy of NS and ProRail. This had the advantage of enlarging the knowledge and support base for what could be learned from Japan. Professor Saito again provided support for several of these trips. The findings of Mr. Hofstra while in Japan were regularly communicated to the whole of the personnel of ProRail via regular columns posted on ProRail's intranet. These regulars columns (Hofstra, 2010) presented one aspect of the Japanese railways at a time, such as the change of driver when a Japanese train passes from one company's infrastructure to the other, the placing of signals along a track, a new railway line to Narita...
airport, and many other examples. Each column was accompanied with simple, clear explanations, photo material and graphics such as timetable diagrams or track layout diagrams. The staff from Mr. Hofstra’s department now actively participates in spreading knowledge on the Japanese approach further in conferences. They summarise it by mentioning the simplicity of the Japanese approach and the fact that it is implementable in the Netherlands if the railway sector accepts to see the advantages of infrastructure simplicity: more signals, but only in the driving direction, less switches and consequently the possibility to increase the low speeds around the stations, resulting in shorter travelling times and higher capacity at much lower costs than the more traditional Dutch approach that would have involved over-specified infrastructures (Weeda et al., 2010).

**LESSONS FROM JAPAN**

The lessons inventoried in the exchanges and reports presented in the previous section have had a substantial impact on the perception of the Japanese example by the sector. 14 years after the first trip and report on the Japanese lessons we can even observe that several lessons have started to be implemented, and there are more to come in the opinion of senior representatives of the Dutch railway sector. To illustrate this, we held an explorative survey at the beginning of 2011 amongst top and senior representatives of the Dutch railway sector who visited Japan during ten study tours organised during the last decade. The following sections should help to shed more light on the perception that the sector currently has of the nature of the Japanese lessons and the extent to which they are or will be implemented in the near or more distant future.

**The survey**

The interviewees included representatives of NS, ProRail and the ministry of transport; a few of them currently working in other functions or organisations. 24 officials could be interviewed out of the 32 officials who were invited to participate, a few of them had been to Japan on more than one occasion. We were over-
whelmed by the enthusiast reactions of the interviewees at the idea of collaborating to this paper in the honour of professor Saito.

The interviews were conducted following a structured list of question but had an explorative character. The main questions of the interviews were:

* What were the three main eye-openers that you observed during your visit to the Japanese railway sector (irrespective of whether you considered these to be implementable in the Netherlands)?

* What were the three main lessons that you drew from the study tour in which you participated, and for which you considered that they could be implemented in the Netherlands?

* For each of these three main lessons: To what aim would it contribute? Is the implementation of the lesson currently on the agenda? To what extent has it already been implemented? In how much time do you think that results from the implementation of the lesson will become visible? How many barriers hinder(ed) the implementation of the lesson? Do you believe that some of the lessons should get more/less attention than is currently the case?

The interviewees were also asked to indicate to what extent they agreed with six statements submitted to them and two open questions were asked related to the essence of the Japanese lessons for the Dutch railway sector, and to the main barriers hampering the drawing of lessons from Japan.

Extensive interview reports were made, but the results of the interviews are processed anonymously in this paper.

The answers to the questions on the three eye-openers and three main lessons were rated by giving three points to the item that the interviewee considered as most important, two point for the next one and one point for the third element mentioned. It is important to note that this rating method does not deliver absolute numbers enabling a precise comparison of the importance of each item. Being a summation of ordinal variables, the resulting rating only provides a rough
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The two next sections review first the eye-openers mentioned by the interviewees and then their perception of the main lessons.

Eye-openers

The focus on high frequencies, high capacity utilisation and high punctuality was a point that equally struck the participants to the various study tours (22 points in Table 1). The fact that most sources of disturbances are removed from the operations of the Japanese railways is clearly seen as the other most impressive eye-opener (21 points) observed during the various study tours, as disturbances causing dispunctuality form a much more important problem in the Netherlands. As we will see later, many of the Japanese lessons identified are related to this point: simplicity, reliability and robustness. The next eye-opener (precision, professionalism and pride of the personnel) is closely related too. Especially the pride and seriousness of the personnel was seen as very impressive (18 points). The focus on profitability taken by the Japanese railway and the integration with real-estate development and retail at stations attracted attention and was thought to be inspiring for the Dutch railways (15 points), indeed many occasions were used during the trips to visit and use the facilities developed by the railway. The relative absence compared to the Netherlands of a dominance of large plans (aimed at solving all problems but that are often bound to be expensive or out-dated before even being implemented) and, instead, the continuous focus on a multitude of small steps that—in the long run—contribute perhaps even more than large plans to improvement (13 points) is the next eye-opener in the rating. From a more operational point of view, the participant to the study
tours were repeatedly impressed by the absence of stress in the production compare to the situation in the Netherlands at traffic control centres (10 points), the continuous control and overview that the personnel has over the operations and—consequently—the absence of a need for the management of extensive adjustments to the operations during production (train en crew rescheduling, train re-routing and platform re-allocation, etc.) The other eye-openers mentioned were: the strong focus on the customer, ‘simplicity’ in general, integration between train operations and infrastructure, safety above all, but using pragmatic solutions, and a more corridor-like train operations but also through operations on each other’s networks.

Table 1  Eye openers and main relevant lessons mentioned by the interviewees

<table>
<thead>
<tr>
<th>Description (grouped in themes)</th>
<th>Rating eye-openers</th>
<th>Rating lessons for the Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is all about the customer</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Integration of transport, real-estate and retail and focus on profitability</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Integration between train operations and infrastructure</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>Less public money available</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Simplicity</td>
<td>9</td>
<td>31</td>
</tr>
<tr>
<td>Focus on high frequencies, high capacity utilisation (and high punctuality)</td>
<td>22</td>
<td>21</td>
</tr>
<tr>
<td>Many small improvements steps, Plan-Do-Check-Act and tailor-made solutions</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>A more corridor-like train operations but through operations on each other’s networks</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>All sources of disturbances are removed and more reliable trains and infrastructure</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>Precision, professionalism and pride of the personnel</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>No stress in production, continuous overview, no need for major adjustments during production</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Safety above all, but using pragmatic solutions</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>

Perception of main lessons

The second rating column in Table 1 relates to what the interviewees considered to be lessons that could be or already are implemented in the Netherlands.
As can be seen, there is for many of the themes a high level of correlation with the rating for the eye-openers. The main differences are located in the first four themes of the table. The following paragraphs review all items as clustered in Table 1, using the comments provided by the interviewees during the interviews to provide further interpretations.

**Customer focus:** This gets one of the lowest ratings despite the fact that the customer focus of the Japanese railways was clearly observed during the study tours and also mentioned as one of the main eye openers. The main reason that can probably explain this surprising discrepancy is that most interviewees tended to mention more concrete lessons during the interviews (see further in the table), closer to their daily professional occupation (infrastructure design and management, timetabling, operational control, etc.) Furthermore, most of them did make a link between the lessons they did mention and more general goals such as reliability, general attractiveness of the railway system and profitability, and—thus—ultimately customer focus. Yet, this seemingly more technical focus illustrates a striking difference with the attitude of many Japanese railway managers encountered during the study tours who, when asked to explain specific Japanese railway practices, tended to start every explanation by mentioning specific customer needs that the railways wanted to fulfil using that practice. Indeed, as one of the interviewees mentioned, the recent customer dissatisfaction and political interference in Dutch parliament due to deficient passenger travel information during the recent winter disruptions could contribute to the appearance of the sense of urgency needed to put passenger needs in a more central position in the near future.

**Integration of transport, real-estate and retail, and focus on profitability:** The discrepancy between the rating of this theme as eye-opener and as potential lesson illustrates the admiration for the performances of the Japanese railways on this topic and at the same time a certain level of resignation in accepting that this cannot be reached in the Netherlands for various reasons. It has to be said though that by European standards the Dutch railways do develop quite a high level of activities in real estate and station retail. The Dutch regulatory context in term of land-
use planning is however such that a pure Japanese approach does not immediately seem possible. Yet, as four interviewees mentioned, things are slowly moving in the right direction, such as the recently developed common vision by local authorities and railways on the development of housing along the Dordrecht-Rotterdam-The Hague-Leiden corridor, even though little has been realised until now. The interviewees do expect concrete results to be visible within 2 to 5 years and one interviewee hopes that the recent merger of the ministry of transport with the ministry of land-use planning will help stimulate this development.

Integration between train operations and infrastructure: This constitutes a main difference in institutional organisation between Japan and the Netherlands. Most interviewees do not mention reintegration as a realistic possibility for the near future, explaining its low position in the rating. However, a few of them mentioned clearly that the separation had gone too far and that it made decision-making more difficult even though this could or—rather—'needed' to be overcome by focusing on behaving as if being 'one company' (see also the section on 'statements' further in this paper). Interestingly, pro and contra separation arguments were presented by all groups of interviewees (NS, ProRail and public authority). A main concern was that the separation, although hindering, tends to be used too much as an excuse for not looking for cooperative solutions within the current setting. Indeed, it does seem that cooperation on optimising issues that cross the infrastructure-operations divide works reasonably well now. But real problems could appear in the (near?) future when real investments or costs will have to be made and that these will appear to be more on the one or the other side of the fence. For example, some cost reductions on the infrastructure's side ('simplification') are likely to require a much higher level of reliability of the rolling stock and personnel. Although the integral cost balance for the sector is likely to be positive (following the Japanese example), this is likely to increase the costs for one of the parties (the operators). This would indeed be no barrier in an integrated railway, but it may be one in the separated case.

Less public money available: The reduced of readiness of the public sector to unconditionally inject money in the railway is mentioned by several interviewees as
a crucial factor in the stimulation of creativity, leading to higher efficiency. They expect the fruits of this to become visible within a few years. Although not directly mentioned as a concrete Japanese lesson, this item was included here as it bears a lot of resemblance with what happened in the years around the reform of JNR to the JR companies in Japan (Matsuda, 2002). The shutting-off of the access to public funds was also mentioned there as a main source of renewal. Note also that the reduction of availability of public money in the Netherlands is not absolute yet as this government even announced an increase in public investments in the railway and a continuation of the investments according the PHS-programme while the new government's policy was much harsher for other sectors of the economy.

Simplicity: This is really seen as the number one lesson from Japan, and this was already the case in NS' first report on the Japanese railways (NS Reizigers, 1997). This theme groups a large number of items related to a simpler infrastructure layout at stations (less switches and conflict points), with - consequently - more simplicity in traffic control and the lack of a need for the large disturbance management organisation (as the one existing at NS/ProRail), a higher reliability of the infrastructure (less switch defects), possibilities for higher speeds around stations, etc. 13 out of 24 interviewees mention topics related to this theme, and 8 of them give it the first position in the rating of main lessons. Unsurprisingly, all agree that the theme is clearly on the railway sector's agenda even though almost all agree that the lessons have been implemented only to a very partial degree at the moment. The anxiousness for the loss of flexibility that a simpler infrastructure entails was certainly the main argument that was put forward against infrastructure simplification. The general opinion, however, is that many barriers have now been overcome. The interviewees also strongly disagree as to the period of time after which this lesson will have been clearly implemented, but many mention concrete cases and current plans which will lead to first results within the next years, such as the redesign of the infrastructure at Utrecht Central station.

Focus on high frequencies, high capacity utilisation (and high punctuality): Another
main lesson in the rating is the focus on changes that will allow a higher capacity of the tracks, enabling higher frequencies while being able to maintain punctuality. This topic is very closely linked to the ‘simplicity’ theme. 5 out of the 9 interviewees who selected this theme have given it their top lesson rating. The theme covers again a number of measures, all meant to allow a shorter distance between trains (‘kortvolgen’). The immediate Japanese example is the usage of shorter blocks in the signalling, with signals only on one side of the track contrary to Dutch current practices that focus more on flexibility, the building and usage of passing tracks at stations, having less switches enabling higher speeds in station approach (linked with simplicity), etc. Quite some effort is developed by the sector at the moment to show that more time and punctuality gains can be won with this approach than with a more traditional approach based on more infrastructure and general maximum speed increases, and that this results in lower costs too. The interviewees mostly agree that the topic is adequately on the agenda and that it will lead to results within only a few years.

*Many small improvements steps, Plan-Do-Check-Act and tailor-made solutions:* This lesson surprisingly occupies only a medium position in the rating, while the same Kaizen theme is recognised by all interviewees (see further in the section on statements) as one of the core aspects of the Japanese lessons. Moreover, interviewees repeatedly mentioned examples of small improvements that have started to appear, especially around infrastructure conflict point reconfigurations in bottleneck stations. As an interviewee stated, there should be an increased focus on details, to improve many smaller points while getting an increased consciousness for the large positive consequences of such smaller improvements. Another mentioned that there would be much to gain by having a clearer common vision of the direction to take (sectorial long-term vision) rather than developing large technical plans that are supposed to solve problems, and he perceived that Japan was doing much better in this respect.

*A more corridor-like train operations but through operations on each other’s networks:* This lesson received a low ranking, lower even that the corresponding eye-opener. The explanation for this can probably be found in the fact that the introduction of
the new railway timetable in 2007, which was more corridor-like than its predecessors, is seen to be a realisation of a Japanese lesson (see also the example list in the section on concrete implementations of Japanese examples). A worry that could be formulated about this lesson is that the Japanese example tends to be interpreted in too black-and-white a fashion as: "do not let trains run from one line to the other", mainly in an attempt to avoid the spreading of dispunctuality over the network. Reality in Japan is in fact more complex and tailor-made: while frequent local and semi-fast trains do on average keep more to one line than in the Dutch practice, it should be noted that less frequent longer-distance (intercity) trains in Japan do on the contrary often circulate from one line to the other, as is or was the case in the Netherlands. One of the interviewees sharply summarised the paradox saying that the punctuality level in Japan is so high (due to various measures) that railway companies can afford to organise such through circulation amongst their own lines and even those of other companies, while the increase in train frequency in the Netherlands over the past years, combined with a lack of punctuality, did not allow for this through circulation anymore, the future may then see the return of more through operations when the basics (see the other lessons on reliability, punctuality, etc) are improved.

**All sources of disturbances are removed and more reliable trains and infrastructure:**

This is the second main lesson rated. The theme covers again a range of items involving paying special attention to addressing all potential sources of disturbance to the planned services. The study tours revealed that this focus is ubiquitous in the Japanese approach, including infrastructures and rolling stock reliability (redundant technical systems to cover the event of a failure), staff management (the pointing and calling practice of staff pointing at signals and calling its status loud as additional safety measure (指差呼称)) and passenger management (actively managing the behaviour of passengers on the platforms by detailed indication and information on waiting areas for each train door), etc. A few interviewees indicated that much more priority should be given to these behavioural aspects in respect of passengers’ management. As to the finger-pointing practices, it appears from most reactions of the Dutch participants during the study tours that the im-
plementation of such practice in the Netherlands is considered as totally unrealistic, despite studies and evidence in Japan showing the very substantial level of mistake reductions engendered by this practice.

One main example of disturbance reduction is the Japanese railways management focus on the high reliability of the rolling stock and the infrastructure. Though good too, the Dutch rolling stock and infrastructure seem to have substantially higher failure rates compared to Japan. Addressing this issue requires a shift from curative to preventive measures, and much of the examples studied in Japan during the various study tours were indeed related to this. One concrete related example, even though not mentioned by the interviewees, is the current usage of an equivalent to 'Doctor Yellow' on the Dutch tracks. But much remains to be done and this requires more expenses to be made on maintenance, which is currently difficult to push through due to the financial constraints, as one interviewee mentions. 10 out of the 13 interviewees who mentioned items related to this theme considered that this theme should get more or much more attention. Several stated that a higher reliability of rolling-stock and personnel is an important condition for the success of what will soon be done on the infrastructure side in terms of simplification (see also the theme on the separation).

The interviews also identified a problem being that much of this will probably not be realisable before 5 years at the least. The lack of reliability of some parts of the rolling stock could e.g. be hard to improve, as its design creates too many limitations.

Precision, professionalism and pride of the personnel: This is the fourth main lesson stated, and equally ranked in the eye-openers. This cluster theme covers mainly the attitude of the railway personnel, which is perceived by the interviewees to be exemplary precise and dedicated in Japan. The picture of the Japanese train drivers regularly checking their watch and comparing by the second their difference with the timetable has deeply impressed all participants to the study tours. The quality-consciousness and pride of the personnel are other aspects that were found to be impressive. Many tend to mention the Japanese culture as an essential condition to realise this dedication, precision and pride. However, we have been able
to observe that this conviction tended to diminish with the increasing years of Japanese exchanges. Most interviewees confirmed this, stating that the difference between the Japanese and the Dutch culture should not be used as an excuse to do nothing. Many remarks made by several interviewees pointed to the fact that the railway management tended to be too 'afraid' of the reactions of the personnel, if confronted with changed—perhaps more Japanese—practices. Those mentioning this agreed that this should get much more management priority in the near future. At the same time all agreed that the barriers to change are very substantial and that change is unlikely before the longer run (5 years at the least).

Another topic mentioned and related to this theme is that of the knowledge management and degree of professionalism of the sector. Two Japanese practices where considered to be very impressive and effective: first that even senior Japanese managers had spent a very substantial time in operational duties (driver, conductor, etc) and second that management positions are rotated in Japan across the whole of a railway organisation to ensure a thorough knowledge of the many aspects of the railway business. Dutch senior managers have much less operational experience and certainly in a much less systematic way, while the 'circulation' of management throughout the organisation is severely hampered by the separation between NS and ProRail and the typical career path of a European manager. Compared to the Japanese management approach, the Dutch/European approach tends to be more focussed on the manager's career, changing companies on several occasions in his life. Consequently, and this was stated by one of the senior interviewees, the company is managed by people 'passing by' and there may be problems in guaranteeing sufficient knowledge build-up and personal commitment to improvement.

*No stress in production, continuous overview, no need for major adjustments during production:* This theme scores an average rating both in the list of lessons and eye-openers. The interviewees mainly mentioned items related to their admiration for the fact that Japanese train operational staff always had such good overview of the situation, and—behind this—that adequate means were provided to them to
have this overview. The high punctuality made this task even simpler of course. Examples given were the role played by the platform supervisor, which does not exist in the same sense in the Netherlands, or the fact that many station staff have a timetable diagram in their pocket, which was found to be very astonishing by the Dutch visitors, or the relative rest and lack of stress present at the Japanese traffic control centres compared to the Netherlands, and this despite the much heavier traffic in Japan. The four interviewees mentioning this item gave it a first or second rating, all complained that no concrete lesson had yet been implemented, mentioning that much more attention should be paid to staff information overview and stress-reduction in the operations in the Netherlands.

Safety above all, but using pragmatic solutions: Safety is widely recognised by the interviewees as a main focus of the management of Japanese railway companies. The interviewees mentioned safety as potential lesson essentially by putting forward the more pragmatic way in which the railway sector manages safety in Japan, and complaining about the sometimes exaggeratedly bureaucratic safety approaches that have developed in the Netherlands, especially after the separation of infrastructure from train operations. By removing with the separation the management level responsible for integral safety (both infrastructure and operations), a vacuum appeared that can and often is seen to engender exaggerate regulations by norms that are, in the words of one of the interviewees, completely out of proportion. They found very refreshing to observe Japanese practices illustrating that alternative approaches exist and are safe as well. The interviewees did not, however, expect much change in this respect in the Netherlands in the coming years, much to their regret.

Concrete implementation of Japanese lessons at the Dutch railways

The interviews were also used to collect the concrete cases that the interviewees had spontaneously mentioned as example of actual implementation of Japanese lessons at the Dutch railways. Table 2 gives the overview of those concrete examples, indicating the number of interviewees who have mentioned the corresponding example. Out of 24 interviewees, 19 of them mentioned concrete cases
### Table 2 Concrete implementation of Japanese lessons as perceived by the interviewees

<table>
<thead>
<tr>
<th>Concrete case, as spontaneously mentioned by the interviewees + short explanation of the example</th>
<th>Number of interviewees mentioning the example</th>
</tr>
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</table>
| Doorstroom Station Utrecht* (DSSU) (to be realised in the coming years)  
* Redesign of the track infrastructure of Utrecht Central station, moving towards a substantial simplification: reduction of the number of switches, more corridor-like approach, increase of the approach speed, copying the less complex layout of many Japanese stations. | 11 |
| Redesign of the infrastructural needs for Schiphol-Amsterdam-Almere-Lelystad (SAAL) (investment to be realised in the coming years)  
* Taking account of the Japanese lessons in a redesign of the infrastructural needs of the SAAL-corridor, e.g. allowing to increase train frequencies on a 2-track infrastructure and avoiding the needs for a full 4-track reconstruction by using shorter blocks, passing tracks, etc. following Japanese inspiration. | 6 |
| Various small, punctual infrastructure redesign examples (concrete cases during recent years)  
* Redesign of various capacity conflicts points across the country, such as at station Eindhoven, Arnhem, Zwolle, Schiphol, etc. (displacing a signal, adding a signal, (re)moving a switch, etc. by searching for small improvement steps at the local level, analysing daily performances) | 6 |
| High-Frequency Train investment programme (PHS) (investment programme for the coming years)  
* Programme of investments that aims at introducing a basic frequency of 6 intercity trains and 6 local trains per hour in the busiest part of the country (the SAAL project mentioned above is part of the PHS programme). | 5 |
| New timetable 2007 (implemented)  
* Simplification of the NS timetable, with a step towards a more corridor-like (Japanese) approach and a higher punctuality. This was the most major timetable change since 1970. | 3 |
| Modernisation of the braking tables (train safety regulation) (currently under review)  
* The official braking tables (theoretical braking distance for trains, as assumed in safety regulations, determining the principle of the minimum distance between signals) are outdated and do not correspond anymore to current train braking characteristics, that are substantially better than what the regulations assume. The old tables make improvements ‘Japanese style’ (shorter blocks) difficult to implement. | 3 |
| Operational Control Centre Rail (OCCR) (realised)  
* New centralised operational control centre for the railways, coordinating the resolution of incidents on the tracks, in which all parties co-operator (operators, infrastructure manager, track maintenance companies, etc.), partly influenced by the example of JR Kyushu’s Hakata central traffic control centre. | 3 |
| "A train every 10 minutes" experiments (ETMET) (2009–2010)  
* Two experiments, lasting several weeks on the Amsterdam-Utrecht-Eindhoven corridor, to test the feasibility of increasing the frequency of trains from 4 to 6 on the major corridors, and realising a situation where customers do not have to worry about the timetable for the next departure (Japanese quality). This test is part of the PHS programme. | 2 |
| Fixed train stopping places, indicated in the platform (after 2005)  
* Experiment held on the Zwolle-Emmen regional line, with fixed train composition and fixed stopping places on the platform, indicating to passengers where to board which class, etc., as customary on most Japanese railway stations. | 2 |
| Installation of redundant generators in trains when refurbishing at mid-life (planned)  
* Implementing the high-reliability Japanese example in the rolling-stock, on the occasion of a planned mid-life refurbishment | 1 |
and linked them to lessons from the Japanese exchanges.

Many of the examples relate to infrastructure redesign, fewer of them relate to planning and operational processes. As can be read in the table, many concrete lessons revolve around the PHS programme: DSSU, SAAL or ETMET (the experiment ‘a train every ten minutes’). The most important and first real large-scale implementation of several Japanese lessons will be the redesign of the track infrastructure of Utrecht Central station in the coming years (DSSU). This seems to confirm the relative lack of attention that is currently paid to lessons related to personnel management and operations—as seen elsewhere in this paper and mentioned by some of the interviewees — but which is probably crucial to improve reliability as achieved by the Japanese railways.

Statements

The interviewees were asked to state to what level they agreed or disagreed with six statements. The following figures indicate how many of the 20 interviewees who participated in this part of the interview answered in each of the categories.

As can be seen in Figure 5, all agreed that the Japanese Kaizen approach (continuous improvement) forms the core of the Japanese approach, although a large part of them believed that this is not the whole story.

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Figure 5
In line with this, a large majority agreed that the observed differences between the Dutch (lower) and Japanese (higher) performances are more related to a difference in company culture than to a fundamental difference between the countries’ cultures (Figure 6). However, eight of the interviewees also commented that company culture and country culture are closely related, indicating implicitly that much can be learned from Japan but that it might be unrealistic to reach the same high level.

A majority of the interviewees considered that the barrier formed by the Japanese language does not hamper substantially the learning (Figure 7). Many mentioned in their comments that this barrier had in fact been adequately solved by the openness of the Japanese counterparts, and in particular also by professor Saito, and by the reports that resulted from the various trips organised. Some mentioned, though, that maintaining contacts with Japan is substantially more complicated than what would be the case with other countries where English could more easily be used for short and continued e-mail exchanges.

Discussing further the extent to which the Japanese lessons can and will be implemented in the Netherlands, a large majority of interviewees agreed that even more lessons can be learned although a substantial minority believes that all lessons have already been charted. A large majority also believes that more lessons will actually be implemented in the Netherlands; even though a clear scepticism remains present as most only ‘mainly’ agree (Figure 8). Furthermore, several of
The language barrier between the Netherlands and Japan hampers substantially the drawing of lessons from the Japanese practice.

Figure 7

them commented that although many lessons had been drawn, the real challenge now is to really implement them.

Figure 8

The Japanese railway system is characterised by an absence of separation between infrastructure management and train operations, and this is a feature that is often put forward by many Japanese railway managers as essential to the conduct of an efficient railway. The next statement therefore asked the interviewees to react on the extent to which the existing separation between infrastructure and operations in the Netherlands does or does not constitute an obstacle to the imple-
mentation of Japanese lessons. Most agreed to say that the separation does not constitute an obstacle, although a substantial minority (one third) considered the opposite and only a small number considered that it constituted no problem at all (Figure 9).

It was interesting to observe that the comments to this statement were the most passionate and extensive of all. Those critical of the separation considered that a proper integration of infrastructure and operations as in Japan, or at least as in Switzerland, would be needed and that the creation of a holding above NS and ProRail, in line with some ideas currently circulating in the Netherlands, would not solve the problem as it would not really lead to a proper integration. Some viewed the separation as a huge barrier to efficiency improvements along the Japanese line. Others saw the separation as a cause of cost increases by hampering a proper balancing of investment decisions including all cost implications on both the vehicle and the track. Even some of those who did not see the separation as a barrier nevertheless mentioned that it made decision-making more difficult due to the existence of two power bases (NS and ProRail). Clearly, this topic is very contentious and the end of the discussion is not yet foreseeable.

CONCLUSIONS

The results of the interviews show how passionate the debate has become.
The Japanese lessons are clearly on the agenda of the railway sector. The chairman of ProRail even recently mentioned the Japanese example in the press and on television, presenting measures that the infrastructure management company aims at taking to improve the reliability of the railway system, such as a drastic reduction in the number of switches across the country. The example given to establish the link with Japan was the comparison of the number of switches in the stations of Tokyo (28) and Utrecht (280), while traffic is probably ten times larger in Tokyo.

ProRail is clearly in a ‘Japan’ mood. Even one of its 2011 New Year’s card was inspired by this as it featured a family eating sushi, circulating on a toy-train on the family’s table (notice the chopsticks, the ikebana and the stationmaster (えきちょう) poster on the wall).
More seriously perhaps, comparing the lessons as drawn in the first study tour reports and the lessons as drawn in the latter trips, one can observe that the general lesson themes have remained unchanged (simplicity, continuous improvement, customer focus, professionalism, etc.) but that a great number of more concrete, technical lessons have now also been drawn (blocks, signaling, switches, etc.). Furthermore, these have during the last two years been complemented by numerous internal calculations and even simulations aimed at proving the advantages of implementing those lessons. Some of these lessons - and this would have been unthinkable only a few years ago - are now even finding their way to concrete implementations in the track and signaling infrastructure.

Important challenges remain to be addressed. The personnel's side is one of them, the rolling stock is another, and not to forget the passengers and the adequate communication of appropriate communication to them. These require more time. Continued cooperation will also be required even when costs and gains do not end up on the same side of the fence.

More fundamentally, and as already stated in the 2002 study tour report, a true learning from the 'Japanese lessons' will only happen when the processes that generate the practices that we find so interesting in Japan will have been internalized within the Dutch railway organisations. This has more to do with a shift in management focus to generate a critical but constructive and continuous search for small improvements throughout the whole of the organisations. It has less to do with the copying of specific Japanese recipes in term of infrastructure layout, even though this is very important and certainly very useful for the time being. In other words, we have to hope that the current implementation of Japanese lessons will prove so successful that it will generate an autonomous and internalized search for continuous improvements that will then generate true 'Dutch lessons'. Happily, the first signs of this happening can be seen in the small infrastructure reconfiguration projects appearing across the country.

After almost twenty years, we now have the pleasure to see that all efforts have helped to generate a growing consciousness across the management of the Dutch railway sector of the huge potential for improvement that can be found in
the Japanese railway practices, and that a growing number of concrete measures are now being implemented. None of this would have been possible without the inspiring help of professor Saito, overcoming the cultural barrier, opening doors and repeatedly explaining the functioning of the Japanese railway system to yet another group of Dutch visitors.

REFERENCES


