Fluvius research chair in resilient supply chains (2010-2020). Research carried out by the vlerick business school centre of excellence in supply chain management

FLUVIUS RESEARCH CHAIR IN RESILIENT SUPPLY CHAINS (2010-2020)

RESEARCH CARRIED OUT BY THE VLERICK BUSINESS SCHOOL CENTRE OF EXCELLENCE IN SUPPLY CHAIN MANAGEMENT

Contents

Mission

Our mission is the use of rigorous supply chain management research methods and smart meter data analytics to efficiently manage energy supply and proactively shape energy demand for a resilient energy supply chain. Our core research tracks included:

- Impact of smart meters on the Eandis & Fluvius business model
- Supply Chain Management approach to provision of smart gas and electricity meters
- Design For Supply Chain in product development and employee training programs
- Design For Supply Chain in the smart meter project
- Creating value through new flow control mechanisms and data availability

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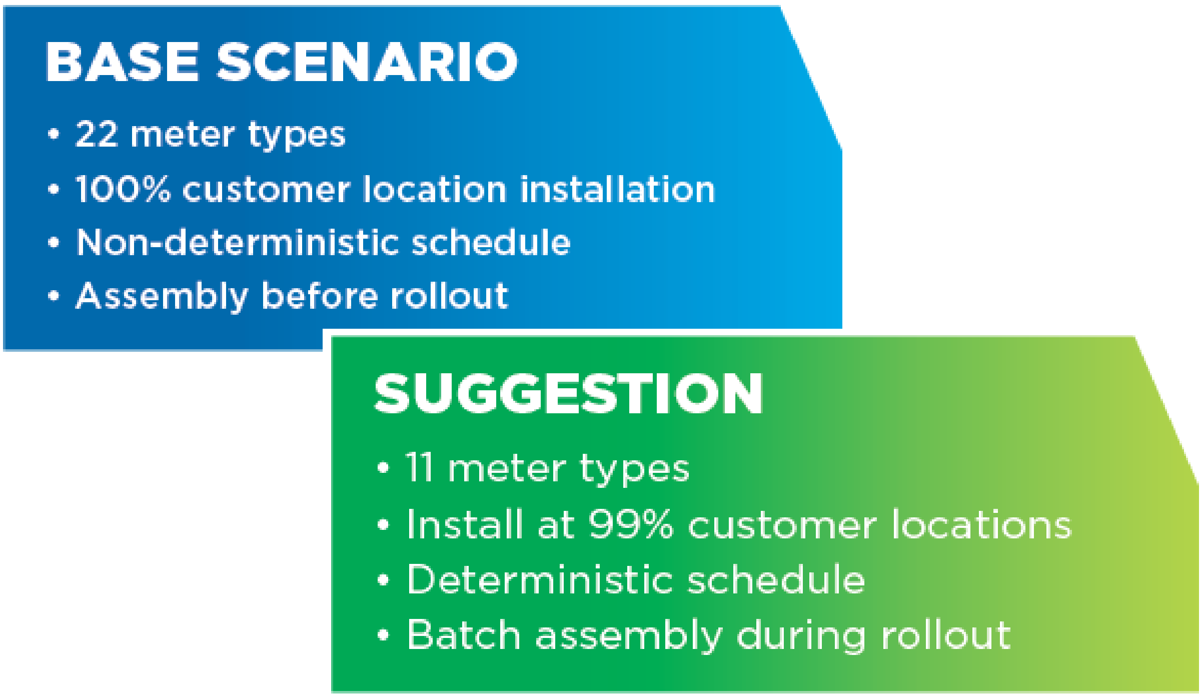
The impact of supply chain resilience on the business case for smart meter installation

SAMII, B., K. MEYERS, H. UMIT. (2014).
THE ELECTRICITY JOURNAL, 27 (1) 53-65.

The 20-20-20 target of the European Union's energy policy requires each EU member state to achieve by the year 2020: a 20% reduction in greenhouse gas emissions from 1990 levels, a 20% reduction in primary energy use through improved energy efficiency, and a 20% proportion of renewable energy sources out of total energy consumption. As such, Eandis took the initiative of a feasibility study for the smart meter project to find the most realistic cost-benefit assessment of the electricity smart meter rollout project, taking into consideration the principles of resilient supply chains. We identified vulnerabilities in five categories: process, control, demand, supply and environment. To tackle these, we suggested four distinct operational strategies: (1) the product standardization strategy helps benefit from economies of scale in purchasing costs, reduced cost of complexity, and potential future savings. (2) Installation cost unification to avoid anomalies in unit installation cost due to customers' unwillingness to have smart meters installed, (3) An exploration period was planned prior to the execution phase, when the technicians tour the installation sites and transmit the current electricity meter configurations and connections to the central database, (4) Purchasing postponement, whereby the smart meter components could be purchased separately in different time frames.

We proposed that a smart meter rollout project that provides a robust and resilient electricity supply chain should behave as follows:



Integrated Supply Chain Management (ISCM) at Eandis

SAMII, B. (2014)
THE CASE CENTRE CASE STUDY. REFERENCE NO. 614-024-1 (C) & 614-024-8 (N).

Because of market deregulation, the electricity distribution market opened up to competition and Eandis became more competitive. Eandis was faced with considerable challenges in reaching integrated goals, integrated responsibilities, and finally an integrated supply chain. This case was written to stimulate discussions about the criticality of Integrated Supply Chain Management (ISCM) in general, and its importance for an asset-based service oriented energy distributor in particular. The aim of this case was to open the discussion regarding new supply chain management approaches and improvements for the challenges that exist in Eandis' supply chain management operations.

In the teaching case, we summarised the existing operational challenges in five points. First, during the transition towards the use of more standardised products because of the more competitive market, it was essential for Eandis to obtain quality products, choose the right suppliers, QA the delivered products, and maintain the final quality of their product. However, a central system where failures, problems and complaints are collected was missing; hence, maintaining the service quality was facing a risk. Second, while collaboration in multifunctional teams happened quite regularly at Eandis, no clear rules and guidelines were put forward to improve the functionality of these teams. As a consequence, multifunctional teams sometimes risk becoming stagnant, where valuable time can be wasted due to lack of speed and decision power. Information and knowledge were decentralised and often not linked with the other divisions. In addition, it was not easy to retrieve information across divisions while the representation of the data is often not adapted to the needs of the end-user. Third, being a young and agile organisation, a large volume of information is shared in a rather informal way, and some parties do not easily get access to information. Consequently, working guidelines are not always correct and could become unreliable, and then the different infrastructure areas interpret the guidelines differently. Moreover, Purchasing and Logistics required input from different infrastructure areas for the planned maintenance and expansion of the network. They also required input from the strategy unit and other divisions about the start-up of new services, large projects, and atypical works.

To initiate the discussion for solutions in Eandis' Integrated Supply Chain Management, we discussed five challenges, as pictured.

Smart meter technology acceptance at Eandis

LI, L., SAMII, B. (2014).
THE CASE CENTRE CASE STUDY. REFERENCE NO. 614-083-1 (C) & 614-083-8 (N)

This teaching case looked at the challenges regarding customer behaviour that arose during the smart meter installation process, and provided some preliminary analysis under the UTAUT (Unified Theory of Acceptance and Use of Technology) framework, which is a widely used technology acceptance model. The objective of the case was to guide students through discussions on Eandis' future actions to increase smart meter technology acceptance. The case covered the following: (1) whether the installation of natural gas smart meters would lead to significant natural gas savings, compared to the certainty that smart meters would bring such benefits in electricity consumption (2) based on Eandis' previous market research in 2012, only 19% of the target candidates were active in saving energy, while the large consumer group of 81% (the so-called "laggards") was not, (3) due to the complexity in smart meter network planning, if some customers refused to participate in the installation process, the engineers had to re-calculate the optimal solution, which is difficult to do for a large network. The operational cost would be high if the plan is sub-optimal. A large portion of the customer refusals are possibly due to privacy concerns, and therefore a concrete analysis of customer behaviour is necessary: including customer perception of energy-savings and smart meter installation linked to socio-demographical information, and how to develop inter-customer communication to overcome privacy concerns and increase smart meter attractiveness.

In the preliminary analysis of the situation, we introduce the UTAUT framework to organise the further actions with a focus on increasing customer acceptance of smart meter technology. We map the challenges to the four UTAUT elements, which are Performance Expectancy, Effort Expectancy, Social Influence and Facilitating Conditions. Hence, the mapping was designed as follows:

- **Performance Expectancy**: How do my smart meter users perceive the potential benefits of the smart meter?
- **Effort Expectancy**: If customers reject the installation due to privacy concerns, how do we overcome those concerns?
- **Social Influence**: How do we increase the group that is actively saving energy?
- **Facilitating Conditions**: What else could we do to further support the use of smart meters?

In 2014, Eandis conducted a market research study that focused on customer perception of smart meter technology. The feedback included how customers regard smart meters in general, and which functionalities they perceive as positive. The teaching case initiated further discussions based on Eandis' preliminary actions within the UTAUT framework.

Optimal access point location and frequency assignment in smart grid communication networks

ÜMIT, H., GOFFIN, S., SAMII, B. (2014).

Smart metering is the state-of-the-art way of delivering energy that promises dramatic changes in grid management and consumption behavior. This new system is expected to bring more efficiency, security and reliability in utility distribution networks due to its transparent nature. With smart metering technology, it is possible to monitor the utility consumption on a real-time basis at the user end as well as the supplier end. Consumers benefit from the possibility to decrease their utility bills with respect to reasonable tariffs, whereas electricity and gas suppliers get an opportunity to minimize their production and distribution costs using the available consumption data. Hence, one of the main goals of smart metering is to minimize uncertainty and variability in energy demand by shaping consumer behavior.

In general, a "smart metering kit" is equipped with a high-tech metering device in addition to other components, such as the smart communication module, that allows the meter to communicate utility consumption data to the corresponding grid operator. Once the consumption of utility takes place, the consumption data can be bundled and sent through a concentrator/gateway, which can be a wired or wireless medium depending on the architecture of the data communication network. The gateways send the consumption data of consumers to a central database, where the data is processed for further analysis, such as pricing and production planning. The system also allows reverse communication in the network, in such a way that the grid operator may want to interfere a device at the user end for security purposes.

The benefits of smart metering does not come for free as they necessitate installation of new meters and other equipment on the existing grid. According to the intermediate report of Flemish regulator of gas and electricity (VREG), the full smart meter rollout in Flanders will cost around €1.5 billion. Investing in such a large scale and costly technology calls for careful search for cost-effective solutions with respect to the choice of equipment and rollout scenarios. Nevertheless, in general, the rollout scenarios consider a limited number of possibilities, often disregarding the opportunities of cost and risk minimization through optimization of resources and large scale systems. Therefore, considering a selection of hardware components, hence the implementation details in a rollout can only show the advantages and disadvantages of a limited number of scenarios for a limited period of time. In order to fully gauge and evaluate a range of possibilities in such an implementation, large scale optimization techniques prove to contribute promising cost reductions associated with minimized installation costs and maximized utility.

In this study, we investigated the design and planning of data communication networks for smart grids. We studied the state-of-the-art requirements and properties of the smart grid data communication network, and showed how these requirements can be tackled with optimization methods and an in depth discussion on the need to define new ones.

LI, L., SAMII, B. (2015).
THE CASE CENTRE CASE STUDY. REFERENCE 615-063-1 (C) & 615-063-8 (N)

In this teaching case and note, we described how Eandis was positioned with regards to the ISO 55000 certification, and how to assess and progress towards improved asset management practices. It is based on the BSI PAS 55 (2008) − a previous and widely applied standard for asset management − first published by the British Standards Institution (BSI) in 2004. PAS 55 has been widely adopted around the world with great success as a tool for integrating and improving business practices, raising performance and assuring greater consistency and transparency, and built around the Plan-Do-Check-Act cycle of continual improvement. ISO 55001 and 55002 are divided into the following elements:

(i) **Organizational context**. This requires the creation of a Strategic Asset Management Plan (SAMP), and determination of the criteria for asset management decision-making. A specialized Asset Management System (AMS) should be defined and created. The organization is also required to understand stakeholder needs.

(ii) **Leadership commitment**. Senior-level managers need to demonstrate firm commitment to the organization's asset management system and establish official organizational policies.

(iii) **Asset management planning**. Risks and opportunities should be addressed, and asset management objectives should be consistent and measurable for continuous monitoring.

(iv) **Resource support**. Sufficient resources should be provided to ensure the proper functioning of the AMS within the organization. The organization should create proper documentation during its asset management process, and the documentation should be kept under appropriate control.

(v) **Operation and change management**. This ensures that the processes are planned, implemented and controlled in an integrated way. Risks associated with planned changes should be evaluated.

(vi) **Continuous improvement**. Both corrective and preventive actions should be taken to proactively identify the failure in asset performance and management processes within the organization.

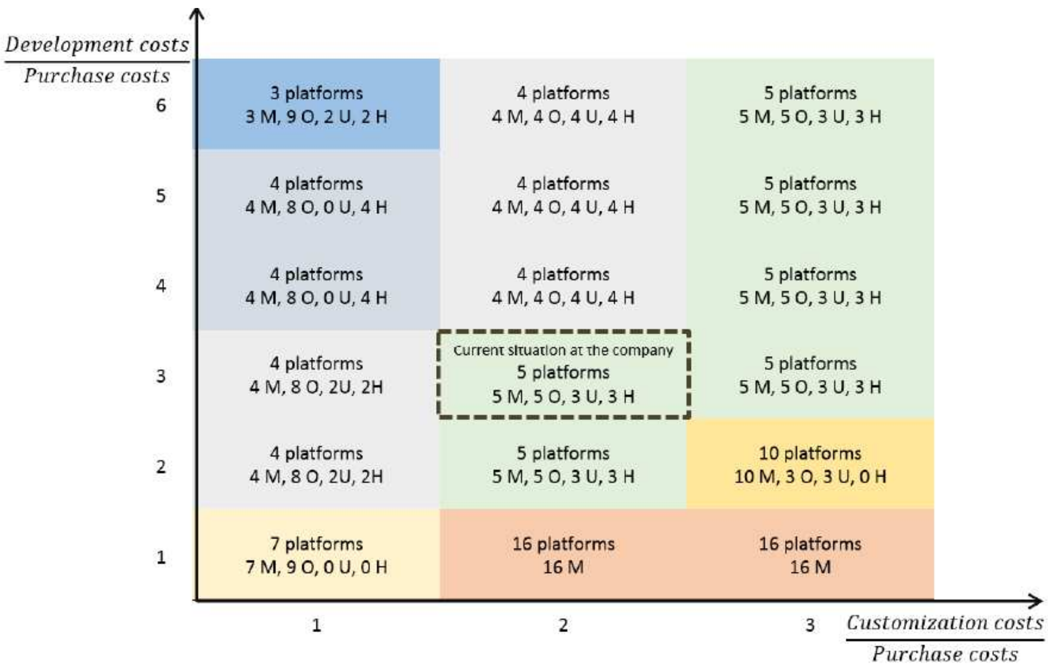
An efficient solution method to design the cost-minimizing platform portfolio

VAN DEN BROEKE, M., R. BOUTE, B. CARDOEN, B. SAMII (2017)
EUROPEAN JOURNAL OF OPERATIONS RESEARCH, 259 236-250.

Platforms support companies like Fluvius in effective performance, and here we presented an efficient solution method to support the design of an optimal, cost-minimizing platform portfolio. How should platform design look like in terms of design parameters? Should the platforms be under-designed, over-designed, matching or hybrid compared to the products derived from them? To offer a wide product variety to customers in a cost-efficient way, companies have introduced platforms as a base from which different products can be derived. We consider a product portfolio, consisting of a set of end products, where each product has a set of features, which can have different levels requested by the customers. In this work, we presented a model to support companies in designing the cost-minimizing platform portfolio, consisting of a set of platforms, from which these products can be derived.

Each platform has a set of technical design parameters, which can have different levels. The required parameter levels in the platform's design depend on the attribute needs of the products derived from the platform. Our model provides guidance to what extent the platforms should be under-designed, over-designed or the same with regard to the products (and its attribute levels) derived from them. The model quantifies the impact of these platform portfolio decisions on the relevant operational costs. Given the complexity of this problem for large-scale instances, we develop two fathoming rules to improve computational efficiency. These fathoming rules can be used in different solution algorithms. We illustrated their applicability in a branch-and-bound, simulated annealing and genetic algorithm, and we demonstrated the value of our model and solution method with a practical case of a high-tech screen manufacturing company, that wants to design the cost-minimizing platform portfolio from which their product portfolio can be derived.

Optimal platform portfolio decisions for complete market coverage



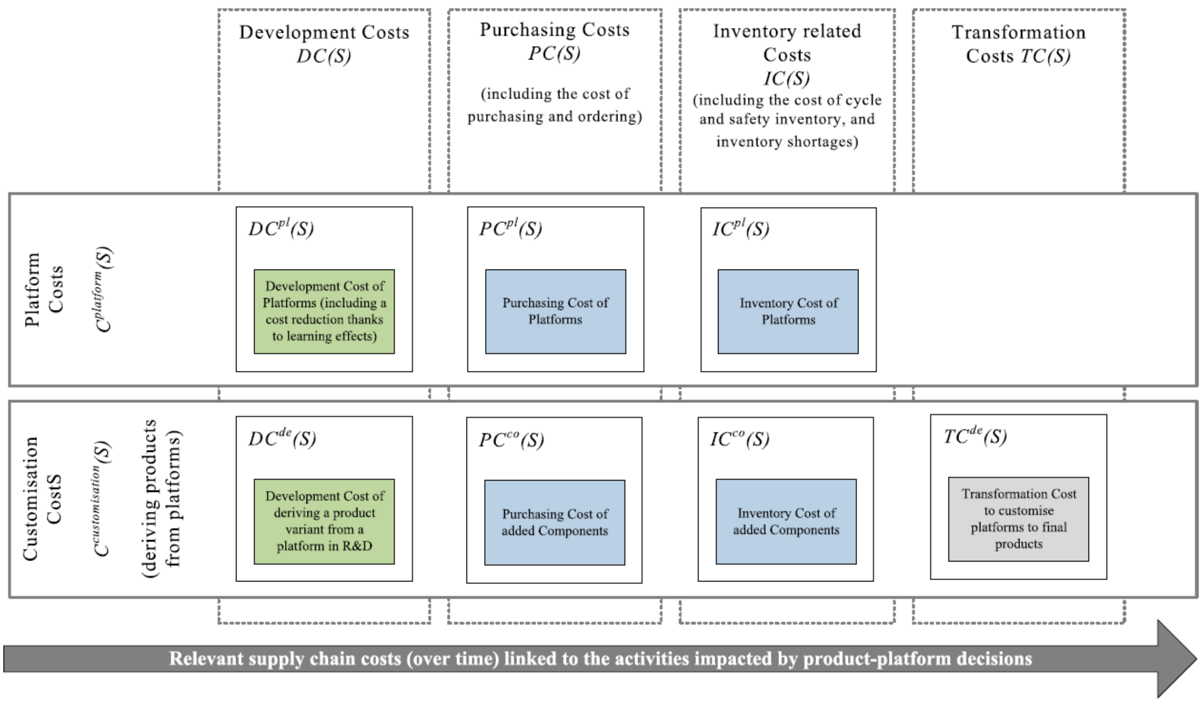
Evaluation of product-platform decisions based on total supply chain costs

VAN DEN BROEKE, M., R. BOUTE, B. SAMII. (2015).
INTERNATIONAL JOURNAL OF PRODUCTION RESEARCH, 53 (18) 5545-5563.

In today's hypercompetitive times, several industries have discovered product platforms as a way to offer a large product variety to their customers without increasing costs and time-to-market. Initially, platforms were primarily used in the automotive, aircraft and electronics industry, but today they have gained importance and proven their use in many other applications. Depending on the business context, platforms can be defined in different ways, ranging from a narrow physical product approach to a combination of common components, processes, knowledge, people and relationships.

Over the past decades, several companies have introduced product platforms in the design of their products in order to produce a large product variety in a cost-efficient way. However, for some companies, the introduction of platforms ended up being more costly than expected, leading them to reconsider their platform decisions. In this paper, we develop a model to support companies in determining (1) how many platforms to develop, (2) which platforms to develop and (3) which products to derive from which platforms. The model takes into account the impact of these product-platform decisions on a company's relevant supply chain activities and costs. The model shows how the optimal product-platform decisions depend on the trade-off between the costs of platforms versus the costs of customizing these platforms to final product variants. We proposed a simulated annealing algorithm to solve large problem instances within reasonable time.

Overview of the supply chain costs related to product-platform decisions

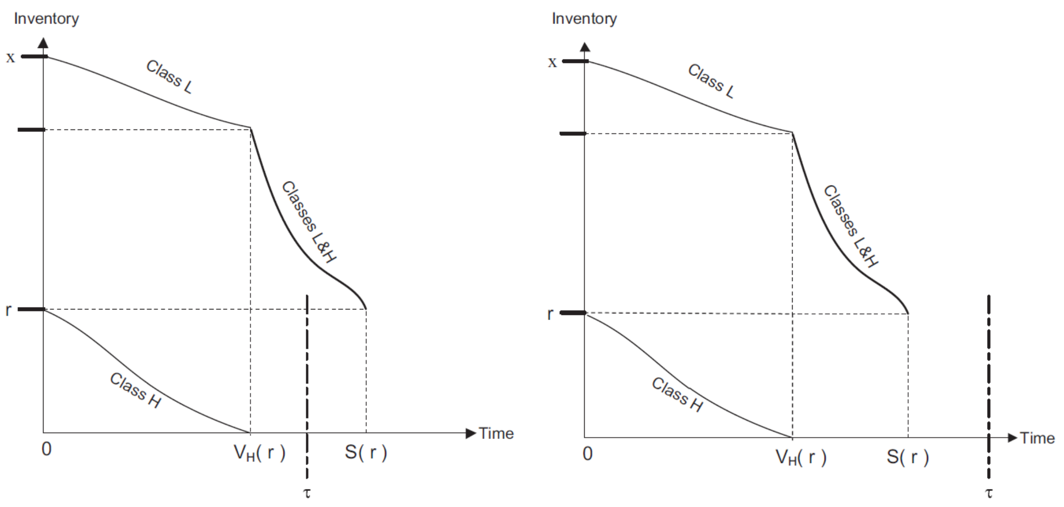


Impact of nested inventory allocation policies in a newsvendor setting

SAMII, B. (2016).
INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS, 181 247-256

Asset managers in infrastructure companies face an increasing number of highly perishable assets due to rapid technological developments. Inventory management of such assets (e.g. smart electricity meters) in large scale implementation projects is a daunting task. In some, cost benefit assessment of major European smart meter rollout projects purchasing cost of smart meter hardware and peripheral equipment such as communication and filtering can consume as much as half the project budget in these multi-billion euro investments. Due to involvement of many municipalities, procurement of smart meter devices often follows strictly regulated tender procedures stipulating fixed delivery dates and number of units. In addition to supply inflexibility, holding cost of perishable smart meters is high due to rapid technological advancements and fast obsolescence.

In this work, we modelled an inventory management setting in which the decision maker first uses a news vendor model to decide on the amount of ordered perishable inventory for a fixed consumption period, based on the best available forecast of demand at the time of ordering. After a relatively long lead time, the consumption period starts and she has to assign the received inventory to two priority customer classes given the-newly updated-rate of arrival of each class. The assignment of inventory requires two simultaneous decisions: 1) the reservation quantity for the high priority class and 2) the choice of inventory allocation mechanism to minimize the expected units short of the high priority class while minimizing the wasted inventory at the end of the fixed consumption period. We assume that some partial information about the bottom line impact of a shortage in high priority customer class compared to the other can be conjectured. For both inventory allocation mechanisms, we then calculate the monetary benefit for all feasible reserved quantities to identify the optimal reserved quantity. We derived closed form expressions for the expected number of units short in each demand class under SN and TN allocation mechanisms. We showcased the management of electricity smart meter inventory in a multi-year implementation project consisting of multiple fixed consumption periods. Numerical experiments and graphical interpretations feature the optimum allocation policy and the cost minimizing reserved quantity under such policy.



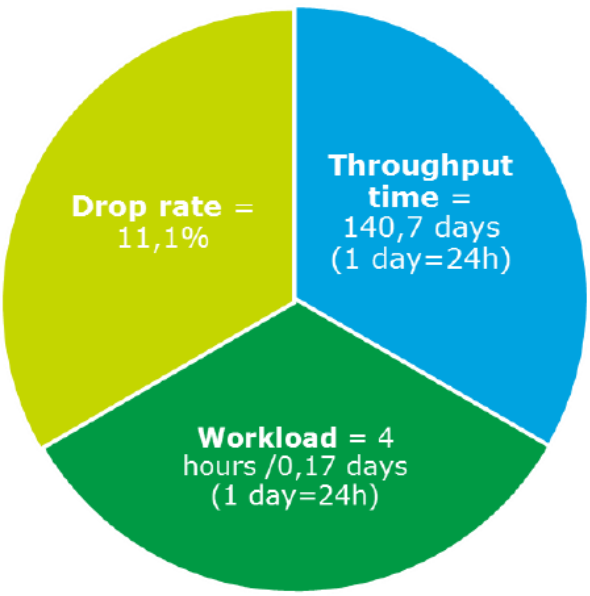
Evaluation of the smart meter installation process at Eandis: Simulation with SAS Simulation Studio

LI, L., SAMII, B. (2016).
INTERNAL REPORT

This simulation project was one of the deliverables within the Eandis 2015-2020 research chair, under the research track 'Estimation of parameters for the segmented rollout scenarios using simulation'. During this project, we re-evaluated the smart meter installation process at Eandis from an operations management point of view. Within the entire process there are bottlenecks and uncertainties, which created obstacles for the rollout phase in the future. Therefore, the aim of this study was to give both qualitative and quantitative managerial recommendations for process optimization, using the SAS Simulation Studio, which is a discrete-event modelling simulation tool. With SAS Simulation Studio and its relevant data analysis packages, the study consisted of the following aspects:

- Overall throughput time, which measures the total amount of time spent in completely finishing a work-order
- Workload, which is the actual working time across all the relevant processes (can be much shorter than throughput time)
- Drop rate, which counts the uncompleted work-orders among all planned work-orders, due to various reasons such as customer cancellation.

In order to identify process bottlenecks and improve installation efficiency, we performed sensitivity analyses by modifying certain critical parameters within the process, i.e. 'what-if' scenarios. The parameters are modified according to a well-assumed statistical model and therefore possibilities of improvement for business process can be figured out. We place our focus on Intake and Offering because they have the largest gap between throughput time and workload. These processes are mostly administrative tasks which involve customer's confirmation.



KPI assessment of the base scenario

In the base scenario, the dossier would be closed by Eandis employees if customers do not reply after 30 days. The gap between throughput and workload is significant, compared to the workload of 'closing dossier' for only 5 minutes. Therefore we pick this process as one of our analyzing points, in order to quantify the impact on the overall process in closing dossier later or earlier than 30 days.

We assumed a statistical model of Poisson distribution in determining 1) time needed to reply and 2) probability of reply within that time frame. We design the analysis scenarios based on these two parameters. Each time, we re-ran the simulation model, and the new KPIs are compared with the original as-is KPIs, as benchmarks.

The main managerial recommendations were summarized as follows:

Implementing an E-Intake scheme is beneficial for operations management. Only limited information such as customer personal info and address are identified. By using E-Intake, customers can fill out an online survey without interacting directly with the service team which decreases workload and provides opportunity to gather more comprehensive customer info such as expected price in offer, expected service time, expected time for a reminder letter, etc. This scheme could enable a higher intake quality and hence reduce process dropouts.

The timing of sending a reminder letter in Offering is a trade-off. Sending a reminder letter for confirming the offer earlier than 5 months will significantly shorten the overall throughput time, but on the other hand leads to non-negligible customer loss. This also could be improved by using E-Intake: customers' expectation of receiving a reminder letter has already been collected and therefore the service team could analyze customer expectation for the best follow-up methodology.

Although involving long throughput vs. small workload, Eandis does not need to close & delete a dossier too early if no response/confirmation. First, the percentage of those dossiers was quite small, compared to the number of overall work-orders; second, to avoid follow-up issues in case the customer would like to recreate them. However, if critical information in the dossier is not up-to-date anymore such as price in offer, these actions will have to be taken.

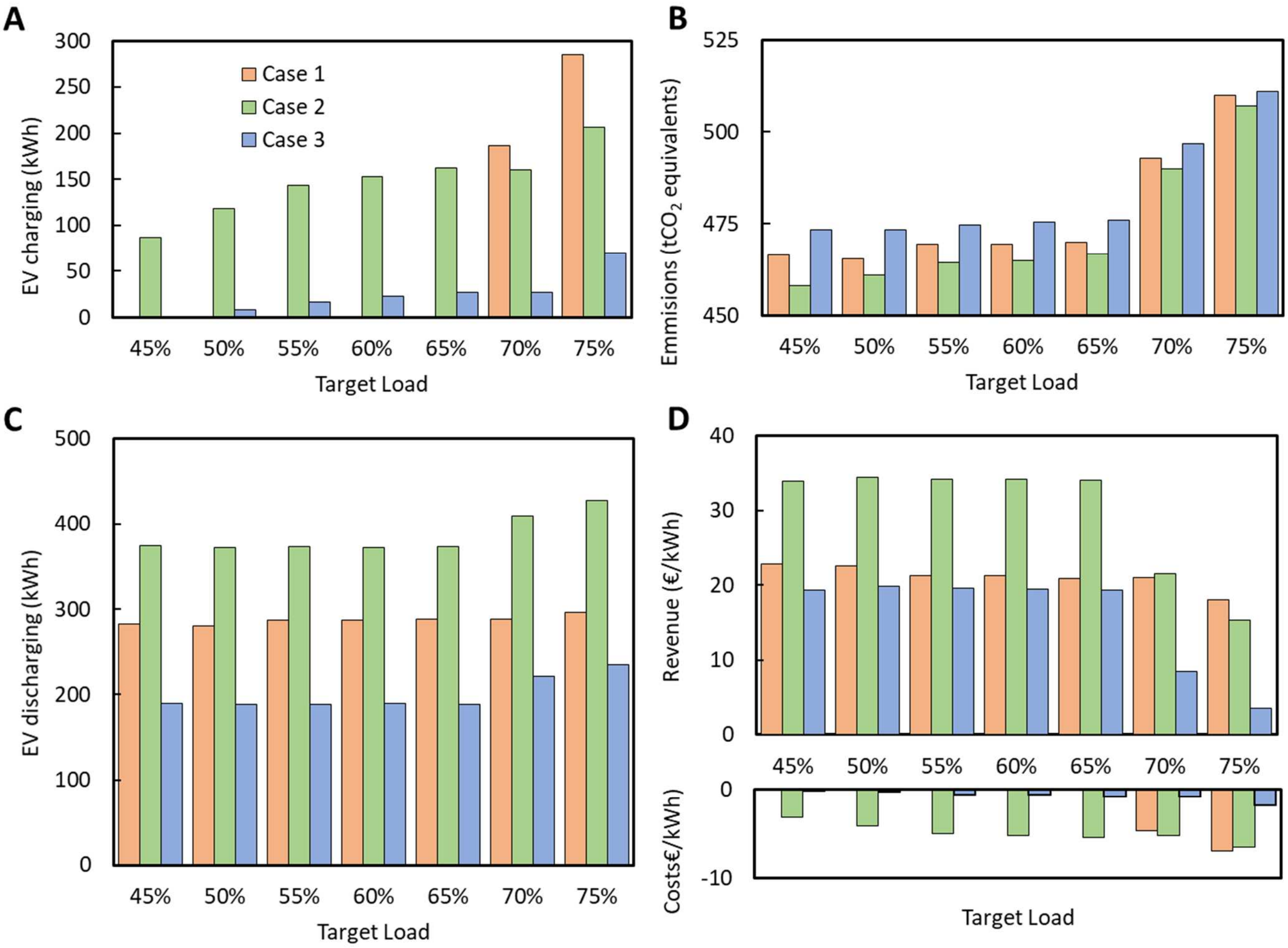
A triple objective approach to scheduling the bi-directional power transfer between electric vehicles and the power grid

VARGANOVA, O., SAMII, B. (2020)
UNDER REVIEW AT ENERGY POLICY

The unprecedented expansion of electric vehicles (EVs) is likely to transform the status quo of energy systems' operations. The International Energy Agency estimates that by 2030 the number of EVs could reach 130 million worldwide (or more than 250 million, according to different scenarios). Compared to the global car fleet of 5.1 million in 2018, the anticipated spike in EV use may exacerbate technical challenges in the power grids. The high number of EVs may contribute to the growing peak demand and lead to overloads at low- and medium-voltage levels, as well as overloads at the substation level of the high-voltage grid. Furthermore, the pressure exerted on the physical assets in the power distribution system may cause them to age rapidly, shortening their service life, and requiring large-scale infrastructure investments. To alleviate the technical drawbacks created by a greater quantity of EVs, the energy system can utilize EVs connected to the grid as distributed energy sources. Moreover, the ability of EVs to supply electricity into the grid – known as vehicle-to-grid (V2G) technology – can provide flexibility to improve the system's reliability.

In this study, we addressed the challenge of growing peak demand in the energy system by applying an integrated demand-side management approach towards EV integration into the power grids. This study provides an electric vehicle charge/discharge scheduling tool that treats electric vehicles as mobile electricity storage devices. Discharging vehicles at the peak consumption hours augments the capacity of the traditional base electricity supply. We utilized a three-objective optimization model that aims to extend the life of physical energy assets while reducing household consumption bills and carbon dioxide emissions from electricity generation.

Using smart electricity meter data, we first used hierarchical and k-means clustering to identify groups of households with similar energy consumption behavior. Household groups with low variability in consumption are targeted for bi-directional power transfer between the electric vehicles and the grid. In our numerical example, we identified feasible solutions using a Genetic Algorithm and examine grid utilization rates (or Target Loads) between 45% and 75% that provide an optimal scheduling of electric vehicles for Distribution System Operators (DSOs), electric vehicle owners, and environmental agencies.



The results of the multi-objective optimisation, **A**. Load levelling (charging); **B**. Peak shaving (discharging); **C**. Emissions; and **D**. Costs and revenue of EV users.

Case 1: charging during office hours and discharging during evening and night hours.

Case 2: discharging during office and evening hours and charging during night hours.

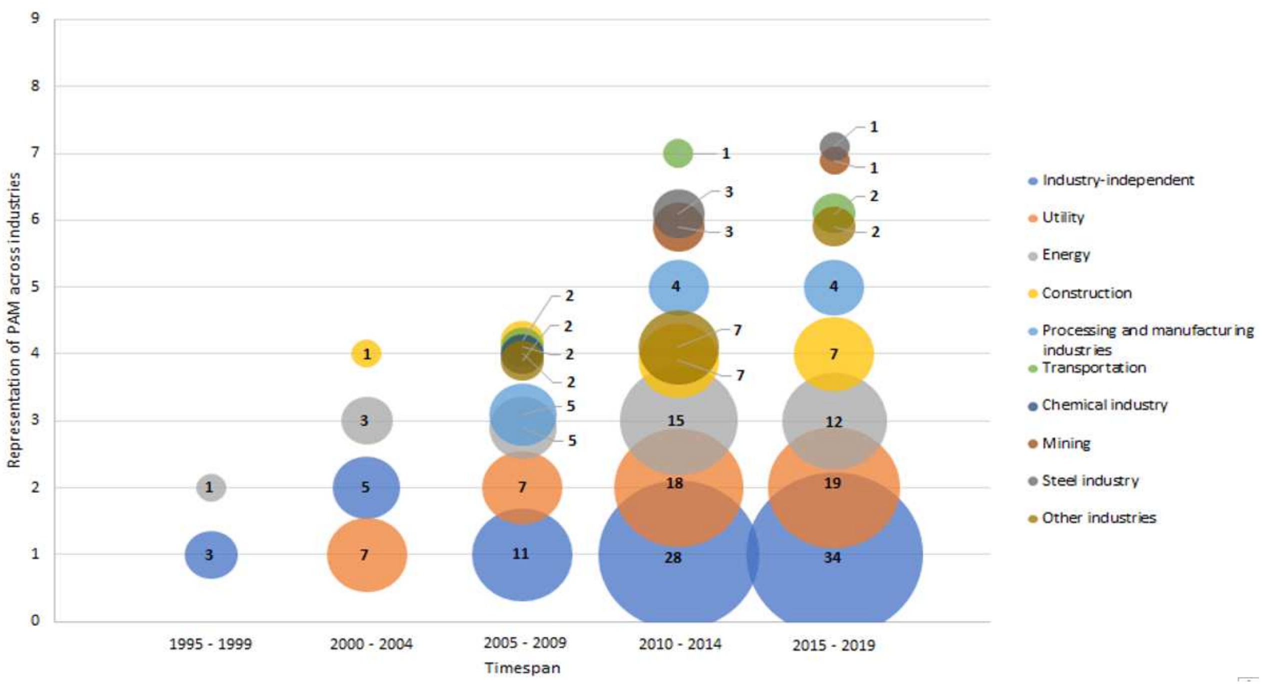
Case 3: discharging during office hours and charging during evening and night hours.

Evolution of research publications on physical asset management (1995 to 2019)

VARGANOVA, O., SAMII, B. (2020)
UNDER REVIEW AT THE INTERNATIONAL JOURNAL OF PRODUCTION ECONOMICS

Globalization and the advancement of technology has provided many new opportunities, as well as many new challenges, to asset-intensive enterprises such as utility and energy companies. Innovative products such as electricity smart meters built in low-cost manufacturing countries are sometimes more cost-effective to acquire and yet they become obsolete more quickly. This new reality, exacerbated by competitive pressure, also means many industries survive by heavily reducing costs while still meeting the ever-increasing customer demand. A trade-off between the conflicting objectives of higher capital and operational expenditure for better service required by the customers on the one hand, and higher return on investment demanded by the shareholders on the other hand, should have been achieved. In an enterprise, assets can be classified into financial, physical, human, information, and intangible. The focus of this study is tangible physical assets, such as plant, equipment, buildings, infrastructure, and natural resources. Physical Asset Management (PAM) can be defined as the systematic and structured process of planning, designing and controlling the physical assets during their lifecycle to support the delivery of goods and services. In some earlier references, PAM researchers have focused on maintenance management, whereas, in the past two decades, integrated strategic physical asset management has gained traction. In this approach, PAM has evolved into four stages, accounting for asset upkeep optimization (maintenance management), lifecycle view of the assets (asset lifecycle management), strategic integration of asset-related activities for data-driven decision-making (asset management systems), and industry-independent processes and guidelines (asset management standards). In this work, we provided a summary of the research in the field and a degree of representation of PAM in various asset-intensive industry sectors.

Evolution of literature in PAM across industrial sectors



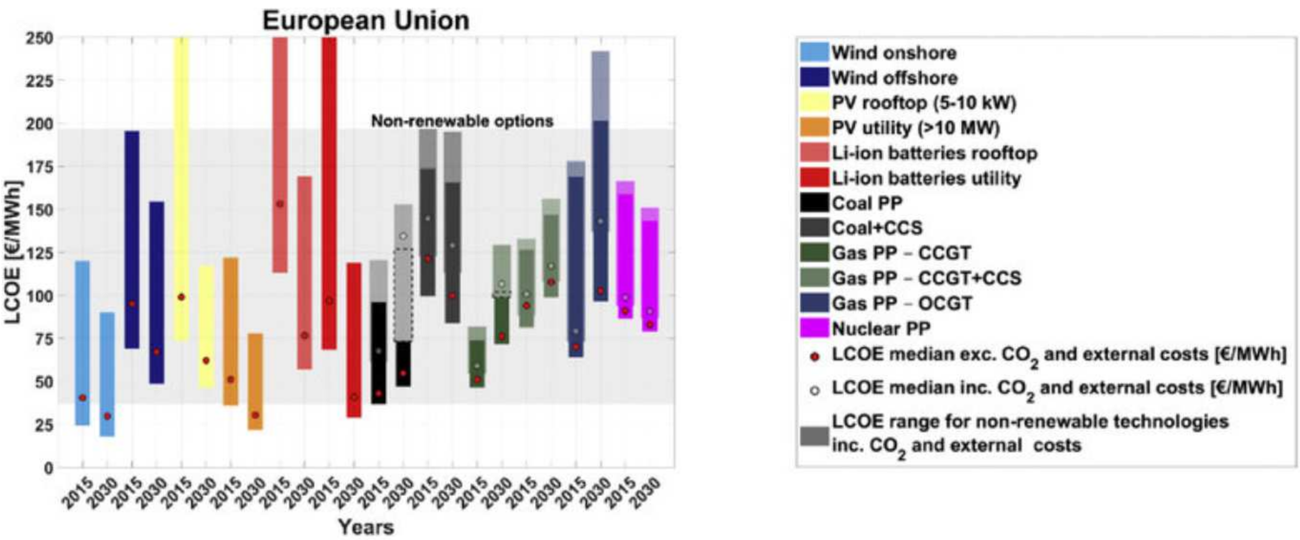
Fluvius looking forward: investigating the lifecycle of renewable energy technologies

ANDERSEN, S.J., SAMII, B. (2020)
CASE CENTRE TEACHING CASE REFERENCE (TBD.)

The turn of a wind turbine's blade is progressively finding its way into the rotation of the wheels on Belgian roads. In Belgium, it is predicted that 20% of cars will be electric by 2030, with a goal of 30% of that electricity coming from wind by the same year. At present, the lion's share of an electric car's drive comes from nuclear energy, but not for long. The energy sector is in the midst of a transition towards renewable energy, which has important implications for distribution system operators (DSO) like Fluvius. Renewable energy and sustainable technologies are on track to become the norm in the Belgian energy ecosystem, and on-shore wind and solar photo-voltaic (PV) power became less expensive than fossil-fuel based power without subsidies in 2019, and is expected to fall further according to the International Renewable Energy Agency (IRENA) – but how sustainable are the assets themselves? Renewable energy, by definition, is not dependent on finite fuels, but relies upon physical assets to be harvested sustainably, which raises the question of the sustainability of the technologies used to capture and convert renewable energy to electricity. In the teaching case, we described utility-level solar PV, on-shore and off-shore wind. We focused on the Kristal Solar Park, the Luminus on-shore wind fleet, and the Norther off-shore wind farm, all located in Belgium. All assets have a lifecycle – they are developed, manufactured, transported, installed, operated, maintained, decommissioned, and destroyed or recycled. Their components and associated technologies also have a lifecycle, with different implications. In this teaching case, we use the Levelized Cost of Energy (LCOE) approach as a tool to launch into an investigation of the lifecycle and future of renewable energy technologies.

Results of LCOE calculations for European Union in 2015 and 2030

from Ram et al 2018 (link)



List of publications, reports and teaching cases

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Samii, B., L. Li., O. Varganova (2019). Literature evolution in physical asset management 1995-2019, International Journal of Production Research, under review.

Samii, B., O. Varganova (2019). Vehicle-To-Grid (V2G) scheduling; An asset lifecycle optimization approach. European Journal of Operations Research, under review.

Samii, B., O. Varganova (2018). Event identification and electricity demand management solutions at Fluvius. The Case Centre Teaching Case, Reference 619-0008-1 (Case) and 618-0008-8 (Teaching Note) (link)

Samii, B., O. Varganova (2017). Developing a smart meter sourcing strategy at Eandis. The Case Centre Teaching Case, Reference 617-0055-1 (Case) and 617-0055-8 (Teaching Note). (link)

Samii, B., O. Varganova (2017). Incorporating new business opportunities at Eandis. The Case Centre Teaching Case, Reference 617-0021-1 (Case) and 617-0021-8 (Teaching Note) (link)

Van den Broeke, M., R. Boute, B. Cardoen, B. Samii. (2017). An efficient solution method to design the cost-minimizing platform portfolio, European Journal of Operations Research, 259 236-250. (link)

Samii, B. (2016). Impact of nested inventory allocation policies in a newsvendor setting. International Journal of Production Economics, 181 247-256. (link)

Samii, B., L. Li. (2016). Electricity storage and inventory management at Eandis. The Case Centre Teaching Case, Reference 616-0072-1 (Case) 616-0072-4 (Supplementary software) 616-0072-8 (Teaching Note). (link)

Van den Broeke, M., R. Boute, B. Samii. (2015). Evaluation of product-platform decisions based on total supply chain costs. International Journal of Production Research, 53 (18) 5545-5563. (link)

Samii, B., L. Li. (2015). Physical asset management certification at Eandis. The Case Centre Teaching Case, Reference 615-063-1 (Case) and 615-063-8 (Teaching Note) (link)

Samii, B., Li, Lingxin (2014) Eandis research chair in resilient supply chains April 2010 - April 2015 (link)

Samii, B., K. Meyers, H. Umit. (2014). The impact of supply chain resilience on the business case for smart meter installation. The Electricity Journal, 27 (1) 53-65. (link)

Samii, B. (2014). Integrated supply chain management (ISCM) at Eandis. The Case Centre Teaching Case, Reference 614-024-1 (Case) and 614-024-8 (Teaching Note). (link)

Samii, B., L. Li. (2014). Smart meter technology acceptance at Eandis. The Case Centre Teaching Case, Reference 614-083-1 (Case) and 614-083-8 (Teaching Note). (link)

Van den Broeke, M., Boute, R., Cardoen. B, Samii, B. (2014). An efficient solution method to design the cost-minimizing platform portfolio, *European Journal of Operational Research*, 259 (1) p236-250 (link)

List of conferences

B. Samii, Physical Asset Management (PAM)-Based Decision Making Platform In The Utility Sector; The Case Of Fluvius, INFORMS **2019** Annual Meeting, USA

B. Samii, Triple-bottom-line Approach To Optimizing Electricity Demand Response Schemes, INFORMS **2018** Annual Meeting, USA

O. Varganova, Analysis and clustering of residential electricity consumers using smart meter data, 29th European Conference on Operational Research (EURO), **2018**, Spain

O. Varganova, Life Cycle Asset Management of Renewable Energy Sources, The Institute of Asset Management Annual Conference **2017**, UK

B. Samii, Product-platform-attribute decisions based on total supply chain costs, IEEE-PES Innovative Smart Grids **2017**, New Zealand

B. Samii, Physical asset management decisions in infrastructure companies, International Society for Inventory Research (ISIR), **2016**, Hungary

M.V.D. Broeke, Facilitating product-platform-attribute decisions based on total supply chain costs, POMS **2015** Annual conference, USA

B. Samii, Two-class single-period inventory allocation policies in smart meter installation projects, INFORMS **2015** Annual Meeting, USA

B. Samii, Physical asset management decisions in infrastructure companies, International Society for Inventory Research (ISIR), **2014**, Hungary

H. Umit, Communication network design for smart grids, IEEE innovative smart grid technologies Europe, **2013**, Denmark

B. Samii, Revenue management in electricity supply chains, IEEE power and energy society general meeting, **2013**, Canada

G. Guthermann, Supply chain management in an asset-driven environment, Vlerick annual supply chain conference, **2012**, Belgium

K. Meyers, Dynamic electricity pricing with predefined tariff constraints, 25th European Conference on Operations Research, **2012**, Lithuania

B. Samii, Resilience of the smart meter-enabled electricity supply chains, 25th European Conference on Operations Research, **2012**, Lithuania

B. Samii, Modeling the Impact of Smart Meters on European Electricity and Gas Supply Chains, POMS Annual conference, **2011**, USA

P. Devos, Smart metering, a challenge for supply chain, Vlerick annual supply chain conference, **2011**, Belgium

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